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Credit Risk Management and Growth Rate

Dr. Olamide Emmanuel Ayodele[1],Prof. Samuel Olufemi Adeusi[2],
Dr. Temiloluwa Ajibade[3], Dr. Suliaman Luqman Adedamola[4]

[1]*Department of Banking and Finance, Ekiti State University, Ado Ekiti, Ekiti State*
[2]*Department of Banking and Finance, Ekiti State University, Ado Ekiti, Ekiti State*
[3]*Department of Accounting, Dominican University, Ibadan, Oyo State*
[4]*Department of Banking and Finance, Ekiti State University, Ado Ekiti, Ekiti State*
Corresponding email: olamidee.ayodele@gmail.com

Abstract: Credit risk management in the banking industry does not mean to eliminate credit risk entirely but it enables banks to bring the risk to acceptable parameters or take a balancing step between risk levels and profits so that extreme level of such risk does not hamper operational performance. The menace of poor credit risk management had continued to impede banking operations in Nigeria over the years, resulting in liquidation, merger and acquisition of players, as well as reform exigencies. The objective of this study therefore is to analyse the impact of credit risk management on growth rate of deposit money banks in Nigeria. This study adopted the expost facto research design. the study made use of secondary data sourced from the annual report of banks selected for the study covering a period of 14 years, spanning from 2005 to 2018. This study analysed the relationship among credit risk management and growth rate of fifteen (15) selected deposit money banks in Nigeria, with focus on the post-consolidation period covering 14 years spanning from 2005 to 2018. Inferential statistics was used to analyse the data. Findings revealed that when cross sectional effect is incorporated into the model, all the explanatory variables except firm's size exert negative impact on growth rate. In specific term, coefficient estimate stood at -.5497109 ($p > 0.05$) for non-performing loan, -.9964811 ($p < 0.05$) for non-performing loan to total loan ratio, -1.988666 ($p > 0.05$) for non-performing loan to shareholders fund ratio, -.7472075 ($p < 0.05$) for loan loss provision and 27.86565 ($p > 0.05$) for firms size, while for the period specific estimation, the result stood at .0162032 ($p > 0.05$) for non-performing loan, -.086418 ($p < 0.05$) for non-performing loan to total loan ratio, .4682801 ($p > 0.05$) for non-performing loan to shareholders' fund ratio, -.6192235 ($p < 0.05$) for loan loss provision and 36.34827 ($p < 0.05$) for firm's sizeconcluded that effective credit risk management is necessary if operational performance of deposit money banks must be sustained, because inability to manage the credit risk framework of banks will be evident in terms of rising non-performing loan; rising ratio of non-performing loan to total loan, shareholder's funds and loan loss provision which on the average will engender reduced level of performance q` of the banks. The study recommended that Deposit money banks in the country should prioritise the need to devise a well- structured credit risk management design that is based on optimal operating framework so as to maintain a desired level of organizational growth.

Keywords: Bank, Growth, Loan, Risk Management, Performance

1. Introduction

Credit risk among other forms of risk faced by players in the banking industry of countries around the world is becoming a fundamental issue of discourse among scholars, policy makers, regulatory authorities and management personnel, given its direct influence on bank's operation, stability and consistency in the mobilisation of resources from the surplus unit to the deficit unit (Ameni, Hasna and Mohammed 2017).As relayed by Gieseche (2004) Credit risk is by far the most significant risk faced by banks and the success of their business depends on accurate measurement and efficient management of this risk to a greater extent than any other risk.For optimal functioning of the financial system of any economy, there is the need to ensure management of credit risk by players in the banking industry. According to Dugguh and Diggi (2015), credit risk management entails systematic identification, analysis, and assessment of credit risk so as to minimise the adverse risk effect on the organisational operation and performance. Credit risk management entails planning, assessing and mitigating of credit mobilisation process in the quest to ensure reduced credit default. Credit risk management in the banking industry does not mean to eliminate credit risk entirely but it enables banks to bring the risk to acceptable parameters or take a balancing step between risk levels and profits so that extreme level of such risk does not hamper operational performance (Krishan & Kavita, 2016).Jane, Willy, & Kennedy (2016) explored the effect of market risk on financial performance of commercial banks and found that financial risk has significant influence on bank's performance. Empirical studies in Nigeria on the interconnection between

credit risk and performance also reflects the need to maintain effective management of credit risk for optimal performance (Omotola, Roya & Safoura 2011; Okoye 2010; Njogo, 2012; Adeusi, Akeke, Adebisi & Oladunjoye 2013; Idowu, Essien, & Adegboyega 2017).

Abdullahi (2013), noted that credit risk management is a fundamental factor that defines survival and pattern of growth of banks. The observed influence of credit risk management on banks' growth is traceable to the negative influence of credit risk on profitability of banks, which is a sine-qua-non for operational expansion and growth.

The menace of poor credit risk management had continued to impede banking operations in Nigeria over the years, resulting in liquidation, merger and acquisition of players, as well as reform exigencies. According to Owojori, Akintoye and Adidu (2011), one of the major causes of distress among Nigerian banks over time, is the inability to manage repayment of loans and advances. Ikpe and Enang (2022) further asserted that if credit risk management problem occur in a bank, it can be enough to trigger systemic risks in the deposit money banking industry.

In the bit to sustain a more resilient, competitive and dynamic banking system that can support and contribute positively to the growth of the economy, the authority simulated consolidation reform in 2005. However, performance of commercial banks after consolidation was still not satisfactory, which was why the Central Bank of Nigeria in 2009 pointed out that the banking sector was experiencing critical system weakening. This system weakening among others was attributed to factors such as poor risk management, lack of investor or customer sophistication, inadequate disclosure and transparency about financial position due to poor performance (Sev, Utor & Kwanum, 2014).

Despite concerted efforts geared towards sustaining performance, efficiency, and growth over the years, banking industry is yet to be set free from the grip of inadequate risk management, and low capital adequacy among other deleterious bank defects. According to Nigerian Deposit Insurance Corporation (NDIC, 2016), there is rising provision for loan losses, operating losses and declining profits among Nigerian Deposit money banks, and these by extension had continued to impede their operational efficiency and growth.

Quite a number of empirical researches had been conducted in a bit to clearly establish the connection between credit risk and performance and liquidity of commercial banks in Nigeria. For instance, Taiwo, Ucheaga, Achugamonu, Adetiloye, Okoye and Agwu (2017) examined the implication of credit risk management on banks' performance and lending growth; Onaolapo and Oyedele (2015) assessed credit risk management, capitalisation and performance in the Nigerian banking sector, while Kolapo, Ayeni and Oke (2012) analysed the effects of credit risk on commercial bank's performance in Nigeria.

Observably, most of the previous studies do not capture the role played by credit risk management in the discourse of operational efficiency and growth of deposit money banks in the country. In the same vein, an overview of past empirical studies reflect that much attention has not be given to the nature of causal relationship that exists between credit risk management, operational efficiency and growth of players in the industry. Hence, there is no clear cut submission as to whether credit risk management granger causes operational efficiency, and/or growth of banks in Nigeria.

The objective of this study therefore is to analyse the impact of credit risk managment on growth rate of deposit money banks in Nigeria.

2. Literature Review

2.1 Credit Risk

Credit risk management is a process of minimizing bank's risk adjusted rate of return by maintaining credit risk exposure within acceptable boundary (Catherine, 2020).According to Colquitt (2007), credit risk may derive from deterioration in the counterparty's credit quality, which consequently leads to a loss to the value of the debt. Crouhy, Galai and Mark (2006) attributed credit risk to borrower's defaults when he/she is not willing to fulfill repayment obligations. Kithinji (2010) believed that credit risk stems from limited institutional capacity, inappropriate credit policies, volatile interest rate regime, low capitalisation and poor loan underwriting among others. Kolapo, Ayeni and Oke (2012) ascribed credit risk to exposure faced by banks due to a borrower's (customer) defaults in honouring debt obligations on due date or at maturity. Credit risk occurs when the borrower is unable to pay his/her debts as agreed or fails to make timely payment on his/her debt servicing (Taiwo, Ucheaga, Achugamonu, Adetiloye, Okoye, & Agwu, 2017).Credit risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor and control the probability and impact of unfortunate events. Effective risk management seeks to maximize the benefits of a risky situation while minimizing the negative effect of the risk (Nwude& Okeke, 2018). Maverick, (2019) stated that since banks now calculate credit risk by combining

market exposures with distress threat and recovery analysis, risk has shrunk in many markets as a result of integration in credit risk management.

2.2 Organizational Growth

According to Ana (2014), organisational growth is manifested through increase in the number of employees, income, profits or market share Organisational growth is an indicator of a flourishing organisation. There are many parameters an organisation can use to measure its growth. Since the goal of most businesses is profitability, most organisation measure growth in term of profit, revenue and other financial data.For a bank to be successful in its operations, managers must weigh complex trade-off between growths, return and risk, favouring the adoption of risk-adjusted metrics. According to Agbada and Osuji (2013), banking profitability over the years has been measured in terms of two major indicators or variables, namely, Returns on Asset (ROA), Return on Equity. Profitability is the potential of a venture to be financially successful; the ability of an investment to make profit or the state or condition of yielding a financial profit or gain. Herry (2012); Junaidu (2014) affirmed that managers often measure the profitability of a firm by the ratio of net income to total assets, otherwise referred to as Return on Asset (ROA). Also, Return on Equity in Accountancy is a common method of measuring and judging the size of the return which has been made on the funds invested in a business (Harrison and Joseph, 2012).

2.3 Empirical Review

Hamisu, M., Ibrahim, M. A., & Zango (2021) examined the effect of credit risk management on the financial performance of some listed Deposit Money Banks (DMBs) in Nigeria spanning the period 2015 - 2019. The Ordinary Least Square (OLS) regression estimation technique was used in the study. The study's findings revealed that loans and advances significantly affect return on asset. In order to maintain the long-term survival of deposit money institutions in Nigeria, this study recommended that regulatory authorities should support strict credit risk management practices. Furthermore, in order to safeguard the interests of investors and other stakeholders, Nigerian DMBs must implement contemporary measures to reduce their exposure to credit risk and enhance their financial performance. Chui Jarrow, Kastrati and Stulz (2005), studied the impact of credit risk management on the banking profitability. The study was based on a survey of the theoretical and empirical literature. The study concluded that banking sector's profitability has received great attention in recent years, and the purpose of the study was to showcase theoretically and empirically the relationship that exists between credit management risk and banking profitability indicators. The study concluded that credit risk management is the primary contributor on the profitability of commercial banks.

Fanli and Catheriine (2014) empirically investigated the impact of credit risk management on profitability of commercial banks. Data were generated from the largest 47 commercial banks in Europe from 2007 to 2012 and were analysed using regression analysis. Variables used in the study included return on equity, return on asset, capital adequacy ratio as well as non-performing loans ratio as proxies for credit risk management and profitability. The study stipulated that credit risk management does have positive effects on profitability of commercial banks. Between the two proxies of credit risk management, NPLR has a significant effect on both ROE and ROA while CAR has an insignificant effect on both ROE and ROA. However, from 2007 to 2012, the relationships between all the proxies are not stable but fluctuating. The study suggested that further researchers should move the core of credit risk management to other risks.

Ameni, Hasna and Mohammed (2017) assessed the effect of liquidity risk and credit risk on banks' stability. The study specifically focused on the relationship between liquidity risk and credit risk and their impact on banking fragility in MENA region. The study hypothesized interdependency between liquidity risk and credit risk and positive relationship between liquidity risk and credit risk. The study employed simultaneous equation model with liquidity and credit as dependent variable each for the two equation in the model while the independent variables are banks' internal factors (Capital adequacy ratio, credit risk, return on equity, net interest income to earning assets, Liquidity gap, return on asset, size of the bank, liquidity and loan growth) and external factors (inflation rate and GDP). The study sampled 49 banks operating in the MENA region over the period 2003-2016. The study analysed data using General Moment Method and Panel vector autoregressive model. The result revealed that there is negative but no significant reciprocal relationship between liquidity risk and credit risk. Also, it was revealed that liquidity and credit risks jointly contribute to banking instability. Thus, the study recommended a joint management of liquidity and credit risks in a bank to substantially increase banking stability.

Misker (2015), examined the impact of credit risk management on profitability of banks in Ethiopia. The study used a secondary data for eight banks which stayed in the industry more than eleven years among nineteen banks which were functional at the moment in Ethiopia banking industry. Data was obtained from banks annual

report, National Bank annual report and MoFED. Correlation and multiple regression analysis were adopted with random effect model. Dependent variables used in the study included return on equity, while non-performing loan, capital adequacy, bank size, loan and advance to deposit ratio as well as GDP stood as the independent variables. The result revealed that all explanatory variables exert positive and significant impact on financial performance. It was suggested that a further study should be done on the impact of credit risk management on profitability of Ethiopian Banks by taking additional variables as credit risk management highly determines how banks can be profitable with the risk amount they took to do the business.

Ariff, Anjum and Jawad (2016), examined the relationship between management and bank's performance in Pakistan. This study used capital adequacy ratio, non-performing loans, liquidity risk, interest rate risk and operational risk as proxies for risk management. Panel data from 2005-2014 was taken from the published annual reports of commercial banks. Descriptive statistics, correlation analysis and random effect OLS regression was used to analyse the data. The analysis led to the conclusion that better risk management system of banks leads to enhanced performance. It was also concluded that capital adequacy ratio, non-performing loans, interest rate risk, operational risk and liquidity risk are key drivers of profitability in large banks while non-performing loans and capital adequacy ratio are the only drivers of profitability in small commercial banks of Pakistan.

Jane, Willy, & Kennedy (2016) sought to explore the effects of financial risk on financial performance of commercial banks in Kenya. Quantitative research design was adopted in the study. The target population of this study was the 43 commercial banks licensed by CBN by December 2014. Time Series Cross Sectional unbalanced secondary panel data was adopted in the study. The data was obtained from published financial statements of accounts of all 43 commercial banks in Kenya, CBK, and the Banking survey publications for ten years from 2005 to 2014. The study used financial ratio analysis and panel data techniques of random effects, fixed effects estimation and generalized method of moments. Findings of the study indicated that credit, market, liquidity and operational risks have significant negative effects on return on equity. Hence, the study recommended that commercial banks together with the banks' supervisors should make a trade-off between financial risk and financial performance.

Kolapo, Ayeni and Oke (2012) explored credit risk and commercial banks' performance in Nigeria. The study investigated the quantitative effect of credit risk on the performance of commercial banks in Nigeria. The study employed profit, measured by Return on Asset, as a function credit risk. Credit risk was measured by ratio of non-performing loan to loan and advances, ratio of total loan & advances to total deposit and the ratio of loan loss provision to classified loans. The study sourced data for 5 commercial banks in Nigeria from 2000-2010. The study analysed data using panel regression analysis. The constant effect model revealed that all variables are significant while the result of fixed effect showed otherwise. Therefore, the study concluded that effect of credit risk on bank's performance is cross sectional invariant. That is, nature and managerial pattern of individual firms do not determine the impact. Thus, the study recommended that banks in Nigeria should enhance their capacity in credit analysis and loan administration.

Okoye (2010), examined the impact of risk management in two Nigerian Banks. Data were obtained from the annual accounts and reports of the two banks (Afri Bank Nigeria PLC and Fidelity Bank Nigeria PLC). An event study methodology was employed to examine the effects of deposit, asset quality and credit risk exposures on the growth and profitability of Nigerian commercial banks. The result concluded that ownership of liquid assets reduces the profitability of a bank selling its loan under pressure at unfavourable terms. Also when there is an unexpected flow of funds into the bank, either because of depositors increasing the volume of deposit they lodge at the bank, or through the repayment of loans on maturity, the banker should exercise a lot of cautious in viewing such funds.

Adeusi, Akeke, Adebisi and Oladunjoye (2013), carried out investigation on risk management and financial performance of banks in Nigeria.Secondary data sourced was based on a progressive annual reports and financial statements of 10 banks and a panel data estimation technique was adopted. Result revealed that an inverse relationship exists between financial performance of banks and doubt loans, and capital asset ratio was found to be positive and significant. This connotes that the higher the managed funds by banks, the higher the performance. Thus, the study suggested that a significant relationship between banks' performance and risk management needs to practise prudent risks management in order to protect the interest of investors.

Abdullahi (2013) assessed the efficacy of credit risk management on the performance of banks in Nigeria. The study mainly focused on the effect of credit risk management on the performance of banks in Nigeria. The study hypothesised that higher loan losses do not have negative effect on the profitability of Union Bank Plc; and that there is no significant relationship between interest income and bad debt of Union Bank Plc. The study covered period form 2006-2010 for secondary data related to Union bank of Nigeria. The study adopted correlation coefficient and regression analysis to test hypothesis. The result revealed that higher loan

losses have negative significance on profitability (ROE) of banks; higher loan losses have negative significance on profitability (ROA) of Union Bank plc; and there is significant positive relationship between high interest income and lower loan losses. Therefore, the study concluded that credit risk affects the performance of Union Bank PLC and that to maintain high interest income, attention needs to be given to credit risk management especially regarding the lending philosophy of Union Bank. Thus, the study recommended that Union Bank Plc should ensure that loans given out to customers should be adequately reviewed from time to time to assess the level of its and that risk such loan should be backed by collateral security.

2.4 Theoretical Framework

This study is hinged on the theoretical framework of the commercial banks theory proposed by Moulton (1944) which states that a commercial bank should forward only short-term self-liquidating productive loans to business organisations. Loans meant to finance the production and evolution of goods through the successive phases of production, storage, transportation, and distribution are considered as self-liquidating loans. This theory is considered relevant because it is geared towards the management of credit risk of commercial banks, as it posited claim in favour of self-liquidating to productive loan to business organisation with lower possibility of credit default upon maturity.

3. Methodology

This study analysed the relationship between credit risk management and growth rate of fifteen selected deposit money banks in Nigeria, with focus on the post-consolidation period covering 14 years spanning from 2005 to 2018. The rationale for selecting 15 deposit money banks (Access Bank, Diamond Bank, FCMB, Fidelity Bank, First Bank of Nigeria Plc, GTBank, Skye (now Polaris Bank), UBA, Wema Bank, Zenith Bank, Union Bank, Unity Bank, Citi Bank, Stanbic IBTC Bank and Sterling Bank) is to ensure accurate generalisation about how credit risk management influences operational efficiency and growth in Nigeria banking industry. Notably also, the 15 selected banks are banks with relatively stable operations and structure over the years despite reform and distress within the industry since 2005. Also the study will focus on the post consolidation period in a bid to observe how credit risk management in an era of capital reform influences bank's operational efficiency and growth prospect.

This study adopted the *expost facto* research design. the study made use of secondary data sourced from the annual report of banks selected for the study covering a period of 14 years, spanning from 2005 to 2018. Raw data for variables included in the models of the study was collected from each firm over the period covered in the study and observations for all firms, over time were pooled together for analysis.

3.1 Model Specification

This study modified the model used by Idowu and Awoyemi (2014) for investigating the impact of credit risk management on performance of commercial banks in Nigeria. In their study, credit risk management was measured in terms of non-performing loan (NPL) and capital adequacy ratio (CAR), and performance was measured in terms of return on equity as well as return on asset. Mathematical representation of the model is presented below:

$P_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + e_{it}$ ----------(3.1)

Where:

P = Bank's performance measures: Return on Equity (ROE) and Return on Asset (ROA)
NPL= Non-Performing Loan
CAR= Capital Adequacy Ratio
i = cross sectional unit (deposit money banks)
t =time period (2005 to 2018)
e = Stochastic Error Term

Given the focus of this study, the above model was adapted (i.e adopted with modification), in an attempt to incorporate measures of operational efficiency and firm's growth as dependent variables, extending representative variables of credit risk management and controlling the model against variation in firms' size. Hence, the model of this study specifies operational efficiency ratio (OER) and firm's growth rate (FGR) as a function of credit risk management variables such as non-performing loan (NPL), Non-performing loan to total loan ratio (NPLTLR), non-performing loan to shareholder's fund ratio (NPLSFR), loan loss provision (LLP), and firm size (FZ) as control variable. For simplicity, the models are presented in functional and linear forms below:

FGR= f (NPL, NPLTLR, NPLSFR, LLP, FZ) ---------- (3.2)

Linear representation of the models

$$FGR_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 NPLTLR_{it} + \beta_3 NPLSFR_{it} + \beta_4 LLP_{it} + \beta_5 FZ_{it} + \mu_{it} --(3.2)$$

$$OER_{it} = \delta_0 + \delta_1 NPL_{it} + \delta_2 NPLTLR_{it} + \delta_3 NPLSFR_{it} + \delta_4 LLP_{it} + \delta_5 FZ_{it} + \mu_{it} --(3.3)$$

Where:

FGR=Firms' Growth Rate (in %)
OER=operational efficiency ratio (in ratio)
NPL= Non-performing loan (in million naira)
NPLTLR=Non-performing loan to total loan ratio (in ratio)
NPLSFR=Non-performing loan to shareholder's fund ratio (in ratio)
LLP=Loan loss provision (in million naira)
FZ= Firm size (natural log of total asset)
β = Stochastic error terms are all parameter estimates of the corresponding models.

4. Result and Discussion

4.1 Fixed Effect Panel Analysis

Table 4.1 Fixed Effects Estimates (Cross-sectional and Period specific)

CROSS-SECTIONAL SPECIFIC EFFECT			TIME SPECIFIC EFFECT		
Variables	**Coefficients**	**Prob**	**Variables**	**Coefficients**	**Prob**
C	-693.9471	0.241	C	-879.5531	0.056
NPL	-0.5497109	0.406	NPL	.0162032	0.980
NPLTLR	-0.9964811	0.004	NPLTLR	-.086418	0.006
NPLSFR	-1.988666	0.776	NPLSFR	.4682801	0.941
LLP	-0.7472075	0.003	LLP	-.6192235	0.001
FZ	27.86565	0.194	FZ	36.34827	0.042
Effects			**Effects**		
DIAMOND	10.62998	0.907	2006	32.02781	0.707
FCMB	6.578049	0.943	2007	-17.71986	0.837
FIDELITY	-16.84902	0.847	2008	-29.54513	0.737
FIRST	240.6762	0.009	2009	-79.65174	0.383
GTB	-23.67621	0.788	2010	-89.85994	0.312
SKYE	54.42895	0.562	2011	-78.04662	0.384
UBA	-23.4223	0.788	2012	-99.63993	0.262
WEMA	-1.954683	0.983	2013	-98.56618	0.266
ZENITH	-22.63606	0.797	2014	109.6727	0.225
UNION	-42.98331	0.620	2015	-111.8732	0.216
UNITY	2.22924	0.981	2016	-95.67818	0.295
CITY	-26.33352	0.770	2017	-107.6205	0.240
STANBIC	25.57142	0.793	2018	-85.22896	0.365
STERLING	-25.4596	0.772			
R-square=0.6904 Adjusted R-square=0.6710 F-statistics=10.99 Prob(F-stat)= 0.0060			R-square=0.8889 Adjusted R-square=0.8026 F-statistics=11.03 Prob(F-stat)= 0.0076		

Note: Reference Bank is Access Bank Plc and reference year is 2005
Sources: Author's Computation (2020)

Table 4.1 presents results of the fixed effect estimation (cross-sectional and period specific effect). Notably, result presented in Table 4.1 showed that when cross sectional effect is incorporated into the model, all the explanatory variables except firm's size exert negative impact on growth rate. In specific term, coefficient estimate stood at -.5497109 ($p > 0.05$) for non-performing loan, -.9964811 ($p < 0.05$) for non-performing loan to total loan ratio, -1.988666 ($p > 0.05$) for non-performing loan to shareholders fund ratio, -.7472075 ($p < 0.05$) for loan loss provision and 27.86565 ($p > 0.05$) for firms size, while for the period specific estimation, the result stood at .0162032 ($p > 0.05$) for non-performing loan, -.086418 ($p < 0.05$) for non-performing loan to total loan ratio, .4682801 ($p > 0.05$) for non-performing loan to shareholders' fund ratio, -.6192235 ($p < 0.05$) for loan loss provision and 36.34827 ($p < 0.05$) for firm's size

Deviation intercept terms reported in Table 4.4 stood at 10.62998 for Diamond Bank, 6.578049 for

FCMB, 16.84902 for Fidelity, 240.6762 for First bank, -23.67621for GTbank, 54.42895 for Skye Bank, -23.4223 for UBA, -1.954683 for Wema Bank, -22.63606 for Zenith Bank, -42.98331 for Union Bank, 2.22924 for Unity Bank, -26.33352 for City Bank, 25.57142 for Stanbic Bank and -25.4596 for Sterling Bank, while period intercept term stood at 32.02781 for 2006, -17.71986 for 2007, -29.54513 for 2008, -79.65174 for 2009, -89.85994 for 2010, -78.04662 for 2011, -99.63993 for 2012, -98.56618 for 2013, 109.6727 for 2014, -111.8732 for 2015, -95.67818for 2016, -107.6205 for 2017 and -85.22896 for 2018. Reported R-square values stood at 0.6904 for cross section specific estimation and 0.8889 for period specific estimation, reflecting that about 69% of the systematic variation in growth rate of the selected money deposit banks can be explained jointly and significantly by non-performing loan; non-performing loan to total loan ratio; non-performing loan to shareholder's fund ratio, loan loss provision and firm's size when heterogeneity effect across the sampled banks is incorporated into the model while about 89.8% of the systematic variation in growth rate can be explained when period effect is incorporated into the model.

4.2 Post Estimation Test

Table 4.2: Restricted F Test of Heterogeneity (Cross-Sectional and Time Specific)

	F-statistics	Probability
Cross sectional	5.06	0.0071
Time specific	0.12	0.2530

Source: Author's Computation, (2020)

Table 4.2 revealed result of the heterogeneity test conducted in respect of both cross-sectional and period specific effect. Reported in Table 4.2 are F-statistics values of 5.06 and 0.12 with probability values of 0.0071, and 0.2530 for cross sectional and period specific effect respectively. Hence, the table revealed that there is enough evidence to reject the null hypothesis that all differential intercept corresponding to the cross sectional specific units are equal to zero, but otherwise for the period specific intercepts. Therefore, it can be concluded that there is only cross sectional heterogeneity/uniqueness effect among the selected banks. Thus pooled OLS estimator restriction is not valid as cross-sectional heterogeneity effect is too significant to be ignored.

4.3 Hausman Test

Table 4.3: Hausman Test

Null hypothesis	Chi-square stat	Probability
Difference in coefficient not systematic	14.64	0.0120

Sources: Author's Computation (2020)

Table 4.3 revealed a chi-square value of 0.29 alongside a probability value of 0.0120. The result showed that there is enough evidence to reject the null hypothesis that differences in coefficients of fixed effect estimator and random effect estimation are not systematic. Therefore, given the fact that the difference between fixed effect estimates and random effect estimates is significant, the most consistent and efficient estimation for the investigation conducted in the study is the fixed effect estimation presented in Table 4.1

Table 4.4 Other Post Estimation Test

Wald test		
Null hypothesis	**Statistics**	**Probability**
Panel homoscedasticity	1.8134	0.2365
Pesaran test		
Null hypothesis	**Statistics**	**Probability**
No cross sectional dependence	1.649	0.8653
Wooldridge test		
Null hypothesis	**Statistics**	**Probability**
No AR(1)panel autocorrelation	1.2370	0.1245

Sources: Author's Computation (2020)

Table 4.4 reported result of post estimation test conducted to confirm if the specified model is in tune with basic assumptions underlining the panel estimation conducted in the study. The result showed that there is no evidence to reject the null hypothesis on panel homoscedasticity, null hypothesis of no cross sectional dependence and null hypothesis of no AR (1) panel autocorrelation. Hence it can be established that the result of post estimation test reported in Table 4.4 validates the assumptions of equal variance of residual terms, cross

sectional independence and absence of serial autocorrelation which reflects that the model is fit for inferential analysis.

5. Conclusion and Recommendation

Premised on discoveries made in the study, it can be concluded that effective credit risk management is necessary if operational performance of deposit money banks must be sustained, because inability to manage the credit risk framework of banks will be evident in terms of rising non-performing loan; rising ratio of non-performing loan to total loan, shareholder's funds and loan loss provision which on the average will engender reduced level of performanceq` of the banks. An overview of the interrelationship between credit risk management variables also reflects that inefficient credit risk management practices by deposit money banks has the capacity to hamper their growth prospect.

The study recommended that Deposit money banks in the country should prioritise the need to devise a well- structured credit risk management design that is based on optimal operating framework so as to maintain a desired level of organizational growth. Furthermore, Deposit money banks should harmonise the composition of shareholder's fund in relation to their non-performing loans so as not to hamper their growth and efficiency tendencies now and in the future.

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