Research Article

Effect of Infaltion and Lending Rate on Non-Performing Loans: Evidence from Nigerian Deposit Banks

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I N T R O D U C T I O N

Globally, the financial sector plays a crucial role in economic growth and development by virtues of its financial intermediary service. The factors that responsible for Non-Performing Loan (NPL) in both developed and emerging nations depend on the peculiarities or critical factors that classify such nation and have a multidimensional aspect. This study examined the effects of inflation and lending rate on NPLs using the fourteen DMBs listed in Nigerian stock exchange (from 2000- 2020). Panel data were obtained (from the annual reports of listed DMB) and analyzed. The panel data technique adopted the random effect model through the Housman test. Findings showed that Lending Rate (LDR) have positive but insignificant relationships with NPLs of banks and Inflation rate (INF) have negative but significantly effect on NPLs of banks. The study presents recommend that the policy makers should give serious attention to sudden forceful flow in inflation as a determinant of NPL as it affects not only Banking institutions alone but general financial system in Nigeria. And also, CBN should control the level of NPL by reducing the lending interest rate in Nigerian banks.

Background to the Study

Globally, Financial sector plays a crucial role in economic growth and development by virtues of its financial intermediary service which includes saving mobilization, risk management and project evaluation among others. The causes of non-performing loans in both developed and emerging nations depend on the peculiarities or critical factors that classify such nation and have a multidimensional aspect. There are so numerous reasons to back the failure of loan performance which may be in term of internal and external factors. External factors (factors that cannot be manipulated by the bank that affect the performance of loan include: Lending rate and Inflation rate among others that will be determined their effect on non-performing loans in this study (Amah, 2017, Kjosevski, Petkovski & Naumovska, 2019, Kumar & Kishore, 2019, Ogundipe, Akintola & Olaoye, (2020).

Non-performing loans is a serious issue that has defile solution overtime. The problem is not just particular to Nigeria but associated with all countries of the world. Empirically, researchers like Singh (2016), Wood and Skinner (2018), Qwader (2019), Zain, Ghazali and Daud (2020) and Rezina, Chowdhury and Jahan (2020) and a number of studies have

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made concerted efforts to solve the problem in various countries yet, the World Bank data 2017, revealed that level of non-performing loan in Ukraine is 54.5%, Cyprus 40.2%, Chad 22.9%, Central African Republic 23.2%, Sub-Saharan Africa 10.1% and Congo 12.0% among other given figures.

In Nigeria due to the staggering performance of the economy and other internal factors; the performance of commercial banks in Nigeria has strongly been affected. The economic indicators of these challenges include: huge fiscal deficit, low economy diversification, increasing domestic risks, rising banking industry failure among others (IMF Report, 2018). These economic challenges have increased the level of non-performing loan over the years. The Nigeria banking industry has experienced a number of bank failures with non-performing loan becoming the precursor to eventual bank failure in Nigeria (NDIC, 2019). Extract from the bank financial statements shows that the NPLs grew from ₦363.31 billion in 2014 to ₦649.63 trillion in 2015 and 1.678 trillion at end-June 2016 and 1.639 trillion in December 2016 (CBN, 20 16). There was an increase of 50% to 2.424trillion by September 2017. According to the NDIC report 2017, the "non-performing loan ratio in the banking industry is 5% but the banks non-performing loan have moved from 10.15% as at December 2016 to 15.5% as at October, 2017 with solvency ratio declining from 14.8% to 10.5% between December 2016 and October 2017" (IMF Report, 2018).

While scholars such as Akerl of (1970), Aurannen (2003), Mchopa (2013), Keett on & Morris (1989), Berger and De Yong (1997), Klein (2013), Ahmad & Bashir (2013), have developed several theoretical explanations to justify why non-performing loans of commercial banks is on the increase and how it has affected the profitability and other activities of the institution, the commonly cited justification is that financial institutions are prone to taking adverse risks by lending to customers who are not concern on how to pay the principal and interest (Prasanth, Nivetha, Ramapriya & Sudhamathi, 2020., Yakub, Rusli, Febrian & Yahanan, 2019., Akmel, 2019, Chimkono, 2016). A number of previous studies such as Abebrese, Pickson & Opare (2016), Dey (2019), Appiah (2019), Koju, Abbas and Wang (2018) among others have established that financial institutions activities are dependable on the mobilization of deposit and lending it to productive sectors of the economy and concluded that the higher the deposits amount, the bigger the lending and investments portfolio can be maintained by banks to sustain its expansion and future growth all else being equal. However, the issues of non-performing loans over the years have resulted into a system whereby banks no longer venture in lending but rather focus attention on less risky investment such as money market instrument, fixed income securities among others.

Although the controversy over the factors in determining commercial bank non-performing loans remains substantial and inconclusive, different institutional settings have presented different determinants and generated different results. This present study focused on determinants of non-performing loans among others are lending rate and Inflation rate as issued by regulatory authority.

Furthermore, empirical evidence from relevant studies on the factors affecting NPLs of banks suggests mixed findings. Researchers such as Us (2016), Bhattarai (2016), Kurti (2016), Sarker (2019), Muhovic & Subic (2019) and Rezina, Chowdhury & Jahan (2020) have established the nexus between non-performing loans and its determinants in financial institutions as exhibiting convergence and divergence. It is against this backdrop that this study is carried out to fill the gap in literature by examining the effect of inflation and lending rate on NPLs in Nigerian DMB.

Statement of the Problem

The advent and accumulation of non-performing loans has become a systemic issue affecting a significant portion of the financial system; challenging its stability and/or hampering its core role of fostering financial intermediation. A large rise in non-performing loans across the system can have adverse effect on the banking sector's resilience to shocks (rising systemic risk). non-performing loans can also be linked to increased borrowing costs as well as decrease in 'credit supply' to the 'real economy'. This may occur due to negative 'market sentiment' against banks with high rates of non-performing loans, which reduces 'banks' access to liquidity' and 'capital markets' (possibly resulting in credit-supply constraints).

Non- performing loan has pose a major threat to the stability of the Nigeria financial system. This is because the banking industry is always at the apex of any financial system. The failure of which tends to have a negative multiplier effect of the entire economy (Ozili, 2019), Clementina and Isu (2014), found out that the risk that loans may not be paid back is one of the serious and prominent issues facing the Nigeria banking industry. The stress test conducted by the CBN in 2016 revealed that the industry is still faced with poor corporate governance, poor capital adequacy ratio, poor risk management and liquidity related challenges among others (CBN Financial Stability Report, 2016).

Khemraj and Pasha (2016) opine that non-performing loans is the proximate cause of most financial problems in many nations of the world. In support of this assertion, Saba, Kouser and Azeem (2012) stated that non-performing loans are so important to study; because, these are responsible for various economic and financial problems in both developed and developing countries Despite the efforts made by the regulatory agency to keep the non-performing loans

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within the regulatory threshold of 5 percent maximum, non-performing loans grew from ₦363.31 billion in 2014 to ₦649.63 billion in 2015 and 1.639 trillion in December 2016 (CBN, 2016). There was an increase of 50% to 2.424 trillion by September 2017.

According to the NDIC report 2017, the NPL ratio in the banking industry is 5% maximum but the banks NPLs have moved from 10.15% as at December 2016 to 15.5% as at October, 2017 with solvency ratio declining from 14.8% to 10.5% between December, 2016 and October 2017 (IMF Report, 2018).

Clementina and Isu (2014), found out that high inflation rate increases the level of non-performing loans in all sectors of the economy. The increase which have a significant impact on the Gross Domestic Product of the nation. Khemraj and Pasha (2009), found a positive relationship between inflation and bank non-performing loans. Considering the severity of this problem several researchers such as Ugoani (2016) andWood and Skinner (2018) and a host of others have made concerted efforts to curb the menace. However, current statistics as highlighted previously has revealed that this issue has defiled solution overtime. Most of the findings have not been able to reach a conclusion. Among some of the factors that may likely be responsible for the rising level of non-performing loans which has been looked into in both developing and developed nations are inflation rate and lending rate, among others. Among these studies include: Abebrese, Pickson and Opere (2016), Kurti (2016), Rajha (2016), Badar and Javid (2013), Amah (2017), Atio (2018), Onyango and Olando (2020) and a host of others. Different macroeconomic variables have also been tested which also give divergent results base on the peculiarities of the economy under study. Hence, it appears difficult to extrapolate the effect of previous studies to the context of Nigeria for the fact that findings are mixed and unclear.

Likewise, Lending rate is one of the macro variables that contribute significantly to the rising level of non-performing loans in Nigeria (Munialo, 2014). Lending rate is the price a borrower pays for the use of money they borrow from a lender or financial institution or a fee borrowed on assets. The higher the lending rate, the higher the risk of default. Empirical literatures show inconsistencies in findings. Warue (2013) and Kanyinji (2014) showed positive relationship while Mondal (2016) showed a negative relationship. Hence, the factors highlighted above may be some of the reasons for the rising figures in non-performing loans despite all the efforts that have been made by other researchers to solve the existing problem. It is in response to this problem, that this study seeks to examine the impact of external factors (inflation and lending rate) on the non-performing loans of commercial banks in Nigeria. The findings of this study will contribute significantly to existing literature and serve as template to the regulatory agencies and the policy makers as they will be able to know the factors affecting non-performing loans s and how to control it.

Research Questions

The following research questions were developed in response to the above issues:

- To what extent is the effect of inflation rate on the non-performing loans of Nigerian DMB?
- What is the effect of lending rate on the non-performing loans of Nigerian DMB?

Objectives of the Study

The study's broad objective was to investigate the effect of inflation and lending ration on non-performing loans in Nigerian DMB from 2000 to 2020. (Twenty years). However, the specific objectives of this study were to:

1. Determine the effect of inflation rate on the non-performing loans of Nigerian DMB.
2. Investigate the effect of lending rate on the non-performing loans of Nigerian DMB.

Review Literature

Concept of Non-Performing Loan

The definition of non-performing loans varies by region. In one nation, a loan could be regarded as non-performing loans andin the other, it may not be. However, views in some cases do coincide. As such, the "International Monetary Fund's (IMF) Compilation Guide on financial soundness indicators" (2015) states that: "a loan is non-performing when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons such as a debtor filing for bankruptcy to doubt that payments will be made in full".

NPL in Nigeria Commercial Banks

Rising level of non-performing loans has become a serious issue in Nigeria in recent times. The Central Bank of Nigeria has on several occasions raise alarm over the ruinous and noxious effect of allowing non-performing loans to continue in the financial sector; as they express their worries as well as warned against a grave of financial crises in the Nigerian banking sector: due to the exposure of banks to the oil and gas sector, high rate of inflation in the economy and insider abuses among other factors (CBN, 2017).

The apex bank notes that the failing in lending rate and high inflation rates among others, have had a negative effect on many banks' balance sheets; oil and gas firms' revenue sources and their ability to fulfill their financial commitments to banks and financiers, among others (CBN,

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2015). In regards to the significant exposure to the oil and gas sector, amidst other unprofessional insider abuses coupled with the rising exchange rate, non-performing loans are likely to increase which will variably lead to high credit risk in the banking industry and which if not controlled, can lead to closure of some banks (CBN, 2017).

Non-performing loans Determinants

Non-performing loans are always used as a proxy for asset quality andthey are used to identify asset quality problems in a loan portfolio; hence, they are a financial soundness indicator (IMF, 2017). Various factors responsible for non-performing loans have been recorded in literature either as internal or external factors. Literatures have identified diverse studies that either focuses on internal factors or external factors; such as: Awuor (2015), Qwader (2019), Rezina, Chowdhury and Jahan (2020), Ogundipe, Akintola and Olaoye (2020) among others. In accordance with the various studies as highlighted above, the growth of in the level of non-performing loans in Nigerian DMB is considered to be influenced by either internal or external factors as discussed below.

Internal factors are these factors within the control of the banks. They are mostly referred to as bank specific factors as they affect the successful operations of the banks directly. they are Loan to total asset ratio, Capital adequacy and insider lending among other.

Externals factors are variables beyond the influence of any commercial bank. These external factors influence, as well as shift in those factors, has an impact on the total firm in the industry. Any of the external factors have a major effect on bank non-performing loans. They are often referred to as macroeconomic factors or exogenous factors because they have the potential to influence the bank's loan efficiency. Banks anticipate that "in case of any financial crisis or economic recession, firms and households will encounter liquidity shortages, which in turn would raise the likelihood of delays in the fulfillment of their financial obligations" (Rajha, 2016). Warue (2013) found an important and adverse relationship between the loan issue and some external factors. External variables used in this analysis include "inflation rate andlending rate".

Lending Rate: According to Munialo (2014), "lending rate is the bank rate that usually meets the short and medium-term financing needs of the private sector". This rate is usually differentiated based on the creditworthiness of the borrower and the goals of the financing. However, the terms and conditions applied to these rates vary by region, restricting their comparability. Specific commercial banks decide the lending rate to be used in the loan disbursements. When the economy is in an undesirable state, with extreme volatility in inflation rates and tension on exchange rates, banks will raise lending rate to cover for the high risk of default from risky borrowers. Banks, on the other hand, will lower their lending rates if the central bank lowers its rates during a good economic period. The interest rate paid would eventually decide the total cost of the loan.

In addition, the lending rate can be viewed as the other depository entity rate, which typically serves the private sector's short- and medium-term funding needs. This rate is usually differentiated based on the creditworthiness of the borrower and the goals of the financing (International Monetary Fund). Dramatic changes in "lending interest rates are associated with the level of non-performing loans, because high lending interest rates will broaden the debt burden of borrowers eventually causing loan defaults" (Pullicino, 2016). The lending interest rate has an underlying implied expense on the credit provided by banks, which has consequences for loan defaults, according to the economic rationale. Simply put, there is a significant relationship between non-performing loans and lending interest rates.

Inflation Rate: Inflation is described as a period of general increase in prices of commodities and production factors. In every economy, "inflation is undesirable because of a particular economic costs associated with inflation, when inflation is high, non-interest and currency bearing checks accounts are undesirable because they are constantly declining in purchasing power and also as inflation rages, the real value of these deductions is much lower than it should actually be, when there are tax distortions" (Imbuga, 2014). For example, as inflation strikes, some individuals benefit and some lose as the value of their future earnings decreases, people whose pensions are unchanged in shilling terms lose Inflation is also described as the rate at which prices generally rise (Silaban, 2017). Inflation is extremely unsuitable and a high inflation rate is considered to be one of the most important problems a country may face. Inflation is driven by a rise in the amount of money in supply. Credit airs crucial economic issues of our era andone of the underlying facets of every economic setup is inflation control. One aspect that every nation and government has to deal with in a modern economy is inflation. This means that economic phenomena are not only dreaded, but also wrongly understood (Silaban, 2017). During period of inflation, the money at hand for disposal purposes is much more lower with the raising in prices, there is possibility that some of the borrowers will face difficulties repaying their loans. Banks' loans and advances to businessmen vary in size from what can be regarded as micro to macro financing. Some were personal, while others were institutional loans. In both cases, banks have noticed that there is a rate of failure with respect to repayment of loans. However, this does not mean that all loans on the part of banks have been bad. Financial

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institutions are losing a lot of money due to the non-servicing of loans and overdrafts received from banks by individuals and institutions. (Kaliba, Muya & Mumba, 2009).

Theoretical Framework

This section provides an analysis of the relevant theory that describe the causes of non-performing loans which is the Bad Luck Hypothesis.

Bad Luck Hypothesis

Berger and DeYoung (1997) proposed the Bad Luck Hypothesis, which claimed that external factors affecting the economy similarly affect non-performing loans, resulting in banks incurring additional costs in handling these loans, thus weakening the banks' cost efficiency. Under this hypothesis, external events lead to increase in problem banks' loan. When a loan repayment installment is missed or there is a breach in the original terms of the agreement, the bank incurs additional managerial costs and effort in coping with the problem loan. As a consequence, as the bad luck theory predicts that an increase in non-performing loans would result in a decrease in cost performance. Importantly, the "extra expenses associated with problem loans create the appearance, but not necessarily the reality, of lower cost efficiency" (Rajha, 2016).

According to Dimitrios, Louri and Tsionas (2016), the bad luck theory presuppose that external factors increase bank NPLs. As a result of this, banks incur higher operating costs when dealing with the problem loans which reduce banks' efficiency. Additional operating costs can result from a variety of factors, including moral hazard monitoring, borrower and collateral valuation andthe cost of recovering and selling collateral in the event of nonpayment (Podpiera & Weill, 2008).

The bad luck theory suggests that non-performing loans are caused solely by bad luck, such as bad weather or sudden increases in the price of a particular commodity, among other things. The underpinning theory for this research is the Bad Luck Hypothesis because it provides a more credible explanation for DMB non-performing loans and the factors affecting it. Specifically, the theory suggested how external factors affect the economy and NPLs of banking industry. The study will adopt this theory because it provides a compendious platform of non-performing loans and its determinants.

Empirical Literature Review

Series of studies have been conducted with the clime of sub-Saharan Africa and developed nations of the world on the determinants of non-performing loans of DMB. This section reviewed some of the previous literature so as to bring out areas of divergence and convergence.

Ogundipe, Akintola and Olaoye (2020) investigated interest rates and loan performance of DMB in Nigeria for the period 2010 to 2015. Dependent variables were proxied as bank loan repayment, credit quality and loan loss provision while independent variables include interest on loans, monetary policy rate, liquidity ratio, non-interest fee income, capital adequacy and NPL. The research used descriptive, correlation andregression analysis to investigate the nexus between dependent and independent variables. The study found a substantial association between interest rates and loan repayment, as measured by credit quality (through the use of non-performing loans ratio). This means that a rise in interest rates would almost certainly result in an increase or decrease in credit quality. It also demonstrated that any small improvement in the lending rate would result in a rise in non-performing loans.

Ademola (2018) conducted a study on determinants of non-performing loans of listed DMB in Nigeria. The scope of the study was limited from 2006 to 2016. Secondary source of data was used. Dependent variable was proxied as non-performing loan while explanatory variables include: capital adequacy ratio, loan-to-total asset ratio, loan loss provision of banks, crude oil price and exchange rate. Panel regression estimate was adopted by the study. Findings from the study revealed that loan loss provision ratio, loan to asset ratio and crude oil price have a positive and significant impact on the non-performing loans of banks while capital adequacy ratio and exchange rate show a positive but insignificant impact on the non-performing loans. The study therefore recommends that bank management and loan officers should always give serious attention to the health of asset quality of banks specifically loan performance for prevention of loans loss that could arises as result of default in repayment of loan from the bank loan customers.

Idewele (2016) examined the factors that contribute to NPLs in Nigeria. Secondary data were gathered from the CBN's Statistical Bulletin and all commercial banks' annual reports. The research used ordinary least square (multiple regression analysis) because the data were cross-sectional and time series in nature. According to the study's findings, the GDP is not a major determinant of bad debt ratio andweak credit risk management leads significantly to NPLs in the Nigerian banking sector.

In addition, Ogechi and Fredrick (2017) used time series data from 2005 to 2014 to examine the macro-economic determinants of NPLs in Nigeria. NPLs were the study's dependent variable, while "Gross Domestic Product Growth Rate (GDPGR), inflation (INR), Lending Rate (LR), exchange rate (ER), money supply to gross domestic product (G2GDP) and Unemployment Rate (UR)" rate were the study's independent variables. GDOGR was found to have a good relationship with NPL based on the outcome of the regression results. The findings also showed that INR and

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ER have a positive relationship with NPL, while LR, M2GDP andUR have a significantly positive correlation with NPL. Of the six macro-economic variables that were examined, only LR, M2GDP andUR determine NPL in Nigeria, while GDPR, INF andER have a strong relationship with NPL but do not determine or decide NPL in Nigeria. The monetary authorities should ensure that the lending rate charged by DMB on loans is fair in order for borrowers to repay the borrowed funds, according to the policy implications of this report.

Gap in Literature

This research differs from previous studies that attempted to shed light on the factors that influence non-performing loans in financial institutions. A number of past studies have tried to review the issue of bad debts and clarify key influencing factors that have contributed to banks' continuous rise in non-performing loans over time. This study examined the impact of two selected factors (Inflation rate and lending rate) on non-performing loans. These factors have been selected because of the perceived influence they will have on the non-performing loans in Nigerian DMB. Furthermore, the selected two variables are yet to be examined by previous studies to determine their joint impact on the non-performing loans of banks. This therefore creates a niche for this study. Furthermore, the pattern and performance of loans in DMB in Nigeria were investigated using a time-based applied approach (2000 to 2020). This report, according to the researcher, will make a new scientific contribution to knowledge in the field of financial management and economic research.

Methodology

Research Design

Research design is the theoretical arrangement within which research is undertaken it proposes the outline for the collection, measurement and analysis of data (Kothari, 2014). For the purpose of this study a cross-sectional research design was used for the study. Twenty-four (24) DMBs operating in Nigeria as of June 2020 were the core population for the study. The study selected the banks as they represent Strategic Position in the entire banking industry based on their approved criteria of size, inter connectedness, complexity and substitutability. Therefore, the sampled banks are of interest to this study because their failure could have a multiplier effect on the entire economy by posing a severe systematic risk to the entire banking industry and subsequently cause financial instability and total collapse of the financial system. This study makes used of secondary source of data collected from the annual reports and accounts of the 14 sampled banks. Likewise, data on macroeconomic variables were obtained from the statistical bulletin of the Central Bank of Nigeria.

Method of Data Analysis

To examine the determinants of non-performing loans in Nigerian DMB, this study makes used of panel data analysis. Panel data analysis is one that consists of cross sectional units denoted by i=1……N, observed at each of T time period t=1………T. Panel data analysis are usually estimated through either fixed effect or random effect models. In the fixed effect model, the individual specific effect is a random variable that is allowed to be corrected with explanatory variables while the random effect model is uncorrelated with explanatory variables. Panel data has the potential to improve the accuracy of econometric predictions (Xiao, 2005). It can also capture the dynamics of human activity better than a single cross-sectional or time-series data set (Umer, 2015). For the purpose of analysis, the STATA statistical software was used to analyze the data gathered for this study.

Model Specification

To properly determine the determinants of non-performing loans in Nigerian DMB, the model was adopted from studies such as Dey (2019), Kurti (2016), Idewele (2016) among others. The model is presented below:

$$Y_{it} = \beta_{it} + B1\beta S_{it} + B2macro_{it} + \varepsilon_{it} \tag{1}$$

Where:

Y_{it} = dependent variable

β_{it} = intercept term

β = coefficient of the slope of variables.

BS_{it} = Banks Specific factors.

$Macro_{it}$ = macroeconomic factors

ε_{it} = error term

Therefore, the modified model that used for this study is presented below:

$$NPL_{it} = {}_{it} + \beta_1 INF_{it} + \beta_2 LDR_{it} + \varepsilon_{it} \tag{2}$$

Where: β_1, β_2, are the coefficient of the explanatory variables.

NPL= NPL

INF= Inflation Rate

LDR= Lending Rate

Data presentation

Descriptive Statistics

The mean, standard-deviation, maximum andminimum values for each dependent and independent variables are shown in the descriptive statistic table. The analysis of descriptive statistics can be found in Table 1.

The above Table reports the descriptive statistics for the

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dependent and explanatory variables. The mean value of all the variables as shown in the table above ranges from minimum of -0.66 of determinants of NPLs to the maximum of 20.96 of NPLs itself. The average non-performing loan (NPL) for the listed DMB during the study period is about 0.68 with standard deviation of 0.46; this implies that there exists significant variation among the determinable factors influencing NPL by most banks in Nigeria.

Regarding Inflation Rate (INF) which has a mean value of -1.19 with a standard deviation of 1.20. This implies that Inflation Rate (INF) deviates significantly across the listed DMB because the standard deviation is greater than the average value. The minimum value of -6.66 and maximum of 3.28 show an insignificant variability in the data. Also, Lending rate (LDR) has an average mean value of 16.36 and standard deviation of 1.86 which shows a significant effect. With their respective minimum and maximum values of 11.13 and 20.96 indicating that there is some disparities regarding the behavior of the variable across the DMB under study.

Table 1.Descriptive Statistics

Variable	Mean	Standard Deviation	Min.	Max.	OBS
NPL	0.68	0.46	0	1	280
INF	-1.19	1.20	-6.66	3.28	280
LDR	16.4	1.86	11.1	20.96	280

Source: Output obtained from STATA, 2020

Table 2.Correlation Matrix of Variables

	NPL	INF	LDR
NPL	1.0000		
INF	-0.0974	1.0000	
LDR	0.4557	-03149	1.0000

Source: Output obtained from STATA, 2020.

Correlation Matrix

The correlation matrix reveals the direction and intensity of the nexus between the dependent and independent variables. When the "correlation between two or more independent variables is (too) high, the problem of multicollinearity occurs" (Williams & Rast, 2020). The problem of "multicollinearity may lead to less accuracy of results in the analysis; the coefficients may have very high standard errors and perhaps even incorrect signs or implausibly large magnitudes" (Lindner, Puck & Verbeke, 2020). Table 2, presented the correlation matrix of the response variable (NPLs) and independent variables (Inflation rate and Lending rate).

The correlation result in Table 2, shows that capital adequacy ratio (Inflation rate (INF) is negatively correlated to Non-Performing Loans (NPL) while Lending Rate (LDR)

has positive correlation with Non Performing Loans (NPL) of Nigerian deposit money banks.

In general, while correlation analysis reveals the strength and direction of relationships between variables, it does not enable the researcher to draw causal inferences about the relationship that exists between the variables. According to Kothari & Garg (2014), if it is stated that "y and x are correlated, it means that y and x are being treated in a completely symmetrical way". As a result, there is no implication that changes in x cause changes in y. It basically states that there is justification for a linear-relationship between the two variables and that shifts in the variables are on average linked to the correlation coefficient to a certain degree. Thus, in examining the effects of selected independent variables (inflation rate and lending rate) on non-performing loans, the economic regression analysis (post-estimation tests) which is discussed in the forthcoming section gives assurance to overcome the shortcomings of correlation analysis.

Post-Estimation Tests

This study used a variety of post-estimation tests to make sure the data, particularly the independent variables, meet the assumption of multiple regression. Such tests involve: the Multicollinearity (through the adoption of variance inflation factor and tolerance level) to check the extent the independent correlate, Normality Test to see how the data are normally distributed, the Serial Correlation (Autocorrelation) which check the presence of autocorrelation among the equation error terms andRamsey RESET test to check for omitted variables in the study.

Table 3.Variance Inflation Factor and Tolerance Level

Variables	VIF	1/VIF
NPL	4.01	0.25
INF	3.38	0.30
LDR	2.976	

Multicollinearity Tests

Where a linear-relationship exists between independent variables; multicollinearity occurs and it can cause the regression model to be biased. According to Folli, Nascimanto, de Paulo, da Cunha, Romao&Filgueiras (2020), the "standard statistical method for testing data for multicollinearity is analyzing the variance inflation factor (VIF)". Therefore, in this study, VIF for the two independent variables are shown in Table 3 below. A VIF figure greater than or equal to 5 (≥ 5) shows serious multicollinearity (Kothari & Garg, 2014).

Table 3, above revealed that VIF and TV of the independent variables are within the acceptable limit as established by Kothari & Garg (2014). This therefore means that both

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the variables (INF and LDR) are free from multicollinearity which might lead to spurious regression result.

Normality Test

The normality test was used to ascertain whether or not the data set is adequately modeled through a normal distribution and to calculate the likelihood that an underlying random variable is normally distributed. Thus, this study applied statistical method of Shapiro-Wilk (Tabachnick & Fidell, 2013). The Shapiro-Wilk method was adopted to check the null hypotheses that the residual distribution was normal. The decision rule is when the P-value is greater than 5% level of significance; it means the data are normally distributed. This is presented in Table 4 below:

Table 4.Shapiro-Wilk Test for Normality

Variables Prob&gt>Z	Obs	W	V	Z
Residual	280	0.76	0.66	-0.82

The result shown in Table 4, above indicates the p-value of 0.92. The p-value is greater than the conventional level of significance of 0.05 indicating normality. As a result, the analysis failed to reject the null hypothesis that residual values are normally distributed (at a 95% confidence level) and concluded that the residuals responded normally.

Serial - Auto correlation Test

The auto-correlation test was performed using the Lagranger Multiplier (LM) test for the first order auto-correlation, which checks only for a link between an error and its immediately preceding value. The null hypothesis (Ho) was that no first order serial autocorrelation exists. This is reported in Table 5 below:

Table 5.LM Test for Autocorrelation

Dependent Variables	Model	F(7, 148)	Prob>Z
NPL		0.429	0.559

Source: Output obtained from STATA, 2020.

Lagranger Multiplier test for serial correlation was carried out to check for the first order correlation. Serial correlation causes the standard errors of the coefficients to be smaller and increase the R-Squared arbitrarily. Table 5, revealed the probability value (0.559) of LM was greater than 5% conventional level. Thus, the null hypothesis of no autocorrelation is within the non-rejection and no evidence for the presence of auto correlation.

Ramsey RESET Test

Linearity is among the most fundamental concepts driving the linear regression model. Linearity denotes that the explained variable can be represented by a linear function that includes an intercept, predictor variables andan error term (Mahaboob, Prasad, Praveen, Donthi & Venkateswarlu, 2019). To investigate the assumption of linearity of the model, Ramsey RESET test, which is a test for misspecification of functional form was analysed and interpreted.

The result of Ramsey RESET test (see appendix) indicated that there is no model specification error with chi-square value of 20.81 and a corresponding p-value of 0.4310. The RESET test results indicate that the analysis cannot reject the null hypothesis, and that there are no missing variables in the model.

Hausman Specification Test

According to Verbeek (2012) and Ait- Sahalia & Xiu (2019), "it is often said that the Random Effect Model (REM) is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a Fixed Effect Model (FEM) is more plausible when the entities in the sample effectively constitute the entire population/sample frame". Verbeek (2012) stated that "if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model". As a result, the decision here is centered on computational ease. Consequence, the Hausman Test is used to check if the random-effects model is preferable to the fixed-effects model. This is presented in Table 6 below:

Table 6.LM Test for Autocorrelation

Test Summary	Chi-sq statistics	Prob
Cross- section	0.457	0.857

Source: Output obtained from STATA, 2020.

According to Table 6, the random-effects model outperforms the fixed-effects model, as the Chi-Square value of 0.457 is significant at a confidence interval greater than 5%. In terms of the Hausman test, the null hypothesis that the random-effects model is the right specification was confirmed since cross-section random greater than 5% confidence interval, giving more confidence that random-effects model outcomes are accurate.

Presentation and Analysis of Regression Results

In this section, the regression results was presented using the pooled (OLS) estimate, Fixed Effect Model (FEM) and Random Effect Model (REM) for the cross-sectional data set of each of the determinants and for the full sample of observations within the period of 2000 to 2020 having properly accounted for all post- estimation tests. Table 7, below presented the regression results showing the coefficient values and p-value of both the dependent (NPL) and independent variables (inflation rate and lending rate).

The analysis of the table above began with the interpretation of the combined effect of both the explanatory variables and the explained variable using the random effect model

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for interpretation. The R^2 which is the multiple co-efficient of determination gives percentage or proportion of total variation in the dependent variable measured by non-performing loan by listed deposit money bank in Nigeria which is explained by the independent variables jointly (inflation rate and lending rate). Hence, the result of R^2 signifies that 78.92% of total variation in non-performing loan of listed DMB in Nigeria is caused by inflation rate and lending rate of listed DMB in Nigeria. The adjusted R^2 of 76.48% also buttress the position of R^2. The cumulative result is the F-statistics of 88.74 with a significant value of 0.0000. This indicates the fitness of the model and means that the selected attributes are the main determinants of NPLs of the listed DMB in Nigeria.

The coefficient of Macroeconomic variables measure proxy by Inflation rate (INF) was pegged at -0.136 which is negative in nature. The result reveals that Inflation rate has significant effect on non- performing, given the p-value of 0.000 less than 5% conventional level of significance. This clearly shows the adverse effect of recent rise in the value of Nigeria's inflation rate have affected the loans quality of the Nigerian banks. The study therefore fails to accepts the null hypothesis which states that there is no significant effect of inflation rate on the NPL of Nigerian DMB.

Furthermore, results from Table 7, show that Lending Rate (LDR) has a coefficient approximately 0.004 which implies that a unit increase in Lending Rate (LDR) will lead to an increase in NPL in Nigerian DMB by 0.004% and vice versa. However, it has a corresponding p-value of 0.978 which is greater than alpha value of the conventional 5% level of significance. This suggests that the null hypothesis which states that there is no significant effect of lending rate on the NPL of Nigerian DMB was not rejected". The inability of the study to reject the null hypothesis implies that lending rate has significant effect on NPL in Nigerian

DMB. The table further asserts the effect of lending rate on NPL in Nigerian commercial banks to be positive in nature.

Test of Hypotheses

As the above section presents the brief discussion of the regression results, this section of the study gives a detail hypothesis testing by pointing out which of the null hypothesis earlier stated in Chapter one is either rejected or accepted after matching the regression results with the expected signs of relationship between NPLs and its determinants. The hypotheses made by this study states that all the determinable factors (inflation rate and lending rate) have no significant effect on non-performing loans in Nigerian DMB. Table 8, presented the hypotheses of this study.

Discussion on Findings

This study on the effects of inflation and lending rate on non-performing loans in Nigerian deposit money banks was carried out in order to ascertain the factors that influence NPLs in Nigeria. Variables selected for the study are inflation rate and lending rate. Using quantitative method, data for the study were sourced from a sample of fourteen (14) quoted DMB in Nigeria and panel regression technique was used for the analysis. From a well fitted model, the major findings of the study as revealed by the results of the regression analysis are as stated below.

The quantitative analysis revealed that inflation rate (one of the explanatory variables of the study) have a negative and significant effect in explaining and predicting NPLs of quoted DMB in Nigeria. The finding from the analysis of inflation is not consistent with the expectation of the study. However, the finding is contrary to that of Ogechi and Fredrick (2017) and El-Maude, Abdul-Rahman and Ibrahim (2017) who found a positive but insignificant relationship between inflation rate and NPLs.

Table 7.Summary of Regression Result (Pooled, FEM and REM)

Variables	OLS		Fixed Effect Model		Random Effect Model	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Constant	17.01	0.000***	35.88	0.001***	15.88	0.01***
INF	-0.13	0.000***	-0.140	0.000***	-0.136	0.000***
LDR	0.004	0.993	0.004	0.993	0.004	0.978
R-squared	0.8169		0.8217		0.7892	
Adjusted R-square	0.8063		0.8047		0.7648	
F-statistic	326.31		121.11		88.74	
Prob (f-stat)	0.001		0.000		0.000	
Hausman test			0.857			
LM test of Random effect	chi-squ	0.429	prob>559			
Ramsey RESET	chi2	20.81	0.4310			

Source: Output obtained from STATA, 2020.

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Table 8. Summary of Hypothesis Testing

Relationship	Expected sign	Reported sign	P-value	Observation	Decision
INF	Positive sign	Negative sign	0.000***	0.000***	Reject null
LDR	Negative sign	Positive sign	0.978	P-value>0.05	Accept null

Also, the finding is contrary to Bhattarai (2016) who found a negative but insignificant relationship between inflation rate and NPLs. However, the findings of this study is in line with researchers such as Ademola (2018) who established a positive and significant relationship between capital adequacy, loan loss provision ratio, loan to asset ratio and crude oil price have a positive and significant impact on the non-performing loans of banks.

The study further examined the effect of lending rate on non-performing loans in Nigerian DMB. The findings established that lending rate has positive (0.004) but insignificant (0.978) effect on the non-performing loans in Nigerian DMB. The finding revealed that lending rate plays a positive effect in determining non-performing loans is not consistent with the a priori expectation of this study. The finding does not confirm the findings of previous empirical work such as Olayinka&Mofoluwaso (2014) and Ogechi& Fredrick (2017) who found positive and significant effect of lending rate on non-performing loans. However, this study is in contrary to Onyango and Olando (2020).

Conclusion and Recommendations

The study evaluated the effects of inflation and lending rate on non-performing loans of Listed deposit money banks in Nigeria. Based on the findings of the study, the following conclusions are drawn.

The study confirms that Inflation Rate (INF) has significant effect on non-performing loans of Listed DMB in Nigeria. This implies that Inflation Rate (INF) does significantly effect on non-performing loans of Listed DMB in Nigeria. It was therefore, concluded that Inflation Rate is a major determinant of NPLs of Listed DMB in Nigeria.

Furthermore, the study found that Lending rate (LDR) has an insignificant effect on non-performing loans of Listed DMB in Nigeria. Thus, it is concluded that the level decrease/increase in Lending rate (LDR) stipulated by the regulatory agency i.e CBN influences NPLs of Listed DMB in Nigeria.

In line with the findings and conclusions of this study, the following recommendations are made.

Policy makers should devote considerable attention to upsurge in inflation as a determinant of non-performing loans, as the deteriorating conditions will affect not only banking institutions, but the general state of the financial system of Nigeria.

CBN should control the level of non-performing loans by decreasing the lending interest rate in the Nigerian DMB.

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