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Relationship between Macroeconomic Variables and Interest Rate: Evidence from Nigerian Deposit Money Bank

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Abstract: This study was conducted to assess the effect of interest rate on financial performance of listed Deposit Money Bank (DMBs) listed on the Nigeria Stock Exchange (NSE) between 2015-2020.The study population comprised of (14) listed DMB listed on the NSE. The total population was studied hence, the sample size was made up of (14) DMBs. Purposive sampling technique was employed in the determination of the sample size. Panel data was used which consists of 84 observations analysed using multiple regression model. Robust regression model was employed to test the effect of interest rate and financial performance of DMBs. The outcome of this analysis showed that maximum lending rate has a coefficient of 0.319 which is significant at 1% (p=0.005). Domestic Money supply is also found to be significant at 5% (p=0.045) with coefficient of -0.102. These results show that maximum lending rate lead to increase in financial performance, domestic money supply rate lead to increase in financial performance while monetary policy rate results in decrease return on asset among DMBs in Nigeria. The study recommends that the Central Bank of Nigeria should redefine the domestic money supply as a tool for monetary policy by establishing an equilibrium level. This would allow more funds to be made available to deposit money banks so that they could improve their performance and advance loan applications

Keywords: Interest Rate; Maximum Lending Rate; Financial Performance; Deposit Money Banks; Stakeholder Theory

JEL Classification: E00

1. Introduction

The banking industry performs a major part in driving economic progress in Nigeria, and the performance of this sector is mostly decided by the actions of monetary policy, notably the levels of benchmark interest rates. To be more precise, selecting a relevant interest rate is vital to improved performance and promoting the expansion of the banking business. This is because interest rates have a direct impact on profitability (Jibrin, Okorie, Okoro, Dada, Chiemeke, & Owolabi, 2015). The cost of borrowing money goes up when interest rates are high, which in turn slows down local investment,

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lowers aggregate demand, increases unemployment, and slows down economic progress. It poses considerable challenges for policymakers about the options for investment and financing that are currently accessible. A decrease in interest rates, on the other hand, leads to a rise in aggregate demand as well as business confidence, output, investments, employment, and export competitiveness (Precious & Palesa, 2014). The policy rate that serves as a benchmark and is set by the monetary authority is a significant factor that is taken into consideration when determining the interest rate that banks and other financial institutions charge their clients. Despite this, the fees that banks charge to various economic players are decided by a mix of the explicit and implicit costs associated with the transaction. The expenditures associated with acquiring deposits are referred to as the explicit costs, whilst the opportunity cost associated with the use of the banks' own resources is referred to as the implicit cost (Olayemi & Michael, 2016). Before the Central Bank of Nigeria (CBN) was established, the Nigerian financial system was characterized by a lack of interdependence currency for the management of businesses, the dominance of expatriate industries (which were predominantly owned and controlled by foreigners), and a lack of local investment outlets, which resulted in excess funds being repatriated for investment overseas. These factors led to the establishment of the CBN. The establishment of the CBN was necessary due to the combined effects of all of these contributing causes (Emecheta & Ibe, 2014).

This trend led to the loss of any efficient apparatus for supporting industrial expansion, and this was the case for both the public sector and the private sector. This was the case because both sectors tended to follow this tendency. There was no stock exchange, no capital markets, no development banking institutions, and a striking absence of development banking practices. There was also a lack of development banking practices (Balogun, 2008). The Federal Government of Nigeria passed the Central Bank Act of 1958 in March of 1958. This gave the CBN the sole authority to issue legal tender currency in Nigeria, to maintain external reserves, to regulate interest rate policy in Nigeria, to safeguard the international value of the currency, to promote monetary stability and a sound financial structure in Nigeria, and to act as a banker and financier. This law gave the CBN the authority to issue legal tender currency in Nigeria. This was done so that the industrial system in Nigeria could be repaired, and the CBN was granted the right to create money that is legal tender in the country (Toby & Peterside, 2014).

Additionally, the CBN has been of assistance by providing specialized lending programs at interest rates that are more beneficial to borrowers. These loan programs have been especially useful in the areas of farm finance, export development, and small and medium-scale company financing. In spite of these measures, interest rates that are imposed by banks have remained high. This has made credit expensive, which has led to the breakup of corporate organizations, which has contributed to a reduction in output as well as a loss of employment (Akinwale, 2018). Deposit money banks (DMBs) in Nigeria are an essential route for the transmission of the CBN's interest rate policy across the country, which is reflected in the fact that banks serve as intermediaries in the process of resource mobilization and allocation. This reflects the fact that banks serve as intermediaries in the process of resource mobilization and allocation. However, banks not only pay interest on deposits but also charge interest on loans and advances provided to clients who borrow money from them. This means that banks make money not just by paying interest on deposits but also by charging interest. The success of financial institutions that deal in deposit money is strongly influenced by the interest spread, which can be thought of as the difference in interest rates between the two types of investments. This is especially true with regard to the amount of money that may be made. As a result of this, the interest rate is acknowledged as a significant component that contributes to the continuing existence and effective operation of deposit money institutions. This is because the interest rate affects the profitability of these institutions (Okoye& Eze, 2013). As a consequence of this, when interest rates shift, as can be seen from the unstable interest rate regime in Nigeria, such variations in interest rates have the ability to undermine both the overall performance of

banks as well as the economy of a country as a whole. In other words, the discovery of inflationary pressures by the CBN led to the establishment of an interest rate policy, which was then put into action and used to regulate the circulation of money in the economy. This was done in response to the inflationary pressures discovered by the CBN. This strategy was used to exercise control over the flow of money throughout the economy. After the CBN took the decision to increase the interest rate that deposit money banks in Nigeria pay to borrow money, the banks were compelled to reduce their overall borrowing amounts in order to remain profitable. As a direct consequence of this, the entire operations and performance of DMBs in Nigeria witnessed a major reduction as a whole as a result (Hassan, 2016). But at the same time, deposit money institutions simultaneously raised the interest rates they lend to businesses and other borrowers. As a consequence of this, there were fewer loans and advances made, which led to a reduction in the total amount of money that was circulating throughout the economy. As a direct consequence of the high interest rate, people, companies, and industries have been dissuaded from taking out loans and advances. As a direct result of this, there is less money in circulation, a decline in credit, and a fall in prices (Anyingang & Udoka, 2012).

The primary objective of this study is to examine the effect of interest rate on performance of listed DMBs.

The specific objectives are to: determine how maximum bank lending rate affects return on asset of listed DMBs in Nigeria; ascertain the significant influence of monetary policy rate on return on asset of listed DMBs in Nigeria; and examine the significant relationship between domestic money supply and return on asset of listed DMBs in Nigeria

2. Literature Review

Interest Rate

The opportunity cost of deferring the use of money in the present in favor of a period in the future is a component of the interest rate, as well as the return or yield on equity. The loan rate, the saving rate, and the discount rate are the three individual rates that make up the phrase “interest rate.” The supply and demand for loanable funds in any given economy compete to determine the price of credit, often known as the interest rate (Victor & Eze, 2013). An interest rate serves as a proxy for both the cost of taking out a loan and the return you get from putting your money in a bank. It is calculated as a percentage of the entire amount borrowed or saved over a 12-month period, or for any other duration that the borrower and lender agree upon when the loan agreement is signed. The percentage of the principle that is paid as a charge over a given period of time is what is referred to as the interest rate, to be more precise. The term “interest” is used to describe this fee. It is also conceivable to conceive of it in terms of the rental payments made by borrowers in exchange for the usage of credit as well as the return that lenders get over time in exchange for sacrificing their liquidity (Dhungana, 2016).

Additionally, depending on whether or not changes to the general level of prices (also known as inflation) are included in the computations of either form of rate, interest rates may be expressed in either nominal or real terms. The interest rate will be expressed in nominal terms if it is not adjusted for inflation. Nominal interest rates are interest rates of interest that do not account for inflation (Owolabi, 2014). This is due to the fact that inflation reduces the lender's buying power, which means that the lender won't be able to acquire the same amount of goods or services with the money realized at the loan's repayment or maturity as compared to the time when they were secured (Ogunbiyi & Ihejirika, 2014)

Monetary Policy Rate

What we mean when we speak about monetary policy is the use of different monetary instruments to control or manage the quantity, price, availability, and direction of money and credit in an economy in order to achieve a certain macroeconomic policy goal (Ayodele, 2014). To achieve a set of planned economic objectives, the CBN intentionally tries to have some influence on the money supply and credit conditions in the economy. Macroeconomic objectives include stabilizing prices, producing sustainable economic growth, attaining full employment, and maintaining a steady balance of payments (Akinwale, 2018). But whether or not monetary policies are effective in achieving the objectives for which they were intended depends critically on how closely banks abide by the policy directives. This is as a result of the policies often working against their financial interests.

Maximum Lending Rate

The interest rate that deposit money banks may legitimately charge their borrowers for loans they make to their customers is known as the maximum bank lending rate. Banks run the risk of creating problematic selection issues if the greatest interest rate they are willing to lend at is too high. When high-risk borrowers agree to pay high interest rates, this happens. Nigeria's DMBs might deter long-term investment by charging exorbitant interest rates, which would restrict the nation's ability to experience economic growth (Ngumo, 2012). The maximum interest rate that commercial banks may charge their customers who borrow money would climb in response to an increase in the base rate that the central bank uses to calculate other interest rates. Individuals will be impacted by a hike in the maximum lending rate, especially if the interest rate on any loans they hold is variable. People's available funds for spending, saving, or investing would decline as a consequence of this. People will have to pay their bills, and as those prices increase, families will have less money to spend on other things (Victor & Eze, 2013).

Inflation Rate

When the average price of goods and services in an economy is rising over time at an ever-increasing pace, inflation is said to be present in that economy. One unit of currency may now buy a smaller total amount of those goods and services due to the overall rise in the cost of goods and services. The value of goods and services in the medium of exchange and the unit of account within the economy are both declining, and thus leads one to conclude that inflation reflects a fall in the purchasing power of each unit of the nation's currency (Fischer, 1993). Fisher continued by stating that the inflation rate, which is calculated by determining the yearly percentage change in a general price index (which is frequently represented by the consumer price index) over a period of time, is one of the most crucial factors to consider when analyzing price inflation. According to Kojo and Innocent (2015), there are a variety of factors contributing to Nigeria's low DMBs mobilization levels, from low savings interest rates to inadequate banking practices or societal norms. They thought that these three elements had a role in the nation's low level of money mobilization. They say that constrained mobilization is a consequence of certain people's lifestyle choices and that customers do not find it desirable to save money for the future. Savings is the part of an individual's income that is not used for urgent necessities. Omotosho and Doguwa (2013) assert that saving boosts industrial production during the capital mobilization phase. As a result, for an economy to efficiently mobilize savings, the deposit rate must be relatively high and inflation must be kept under control in order to guarantee a high interest on savings. Because of this,

investors need to receive more interest on their savings in order to encourage them to do so. Additionally, for your savings to increase, the interest rate you get after taxes has to be higher than the rate of inflation.

Interest Rate in Nigeria

The Structural Adjustment Program (SAP) was put into place in 1986 to liberalize the interest rate regimes that were allowed to be determined in Nigeria by the interaction between the forces of supply and demand. This made it possible for the market to decide on interest rates. The idea for enabling players in the financial market to negotiate interest rates on deposits and loans was to promote an efficient intermediation process and ensure a healthy level of competition and participation (Ogundipe, Akintola& Olaoye, 2020). DMBs are established as the principal network via which the CBN disseminates information on interest rate policy in Nigeria, according to Ogunbiyi and Ihejirika (2014). This is what the two researchers claimed. DMBs impose interest on the debt (loans and advances) that they provide to borrowers in addition to paying interest to their customers on the deposits they have placed with them. This leads to the so-called interest spread, which is the difference between these two interest rates. The interest spread accounts for a significant amount of the earnings produced by deposit money institutions (DMBs).

In a similar vein, Obidike, Ejeh, and Ugwuegbe (2015) contend that due to insufficient infrastructure and high operating costs in a highly volatile economic environment, Nigeria's liquidity ratio and exchange rate have not recently resulted in an increase in the volume of deposits, money bank loans, or advances.

3. Theoretical Framework

Stakeholder Theory

Stakeholder theory is a pertinent idea that supports research on interest rates and deposit money banks. The stakeholder theory was first developed by Freeman as a management tool in 1984, but it has since developed into an enterprise theory with tremendous promise for describing a wide range of events. The stakeholder theory explicitly emphasizes that the key issue in developing corporate policy is the balancing of interests among several stakeholders. The goal of the stakeholder theory is to comprehend how managers should prioritize and react to stakeholder claims in order to improve a company's ability to create value. This idea takes a prospective stance (Freeman, 1984). Stakeholders are “defined groups or persons who have a real interest in an organization and these interests have intrinsic value,” according to Donaldson and Preston's (1995) definition. [Reference required] Since it is concerned with how management decision-making affects all of the stakeholders, no one interest should be permitted to take priority over the others, according to this theory. To succeed and endure over time, a company's management must keep the interests of its stakeholders—customers, suppliers, employees, communities, and shareholders—aligned and moving in the same direction. It is not advisable to place more importance on the simple strategy of hedging one's bets by pitting the interests of several stakeholders against one another than on the need for ongoing innovation to preserve this alignment of interests. Therefore, if executives run the business with the interests of the stakeholders in mind, they will create the highest potential value for shareholders and other financiers (Osho &Akinola, 2018).

The main theoretical basis for this inquiry is the stakeholder theory. This is because for the firm to execute at its highest level, cooperation among the several stakeholders is necessary. Stakeholders are those who are affected by an entity's activities and also have some degree of influence over that entity.

Different ways in which stakeholders may be impacted These stakeholders in the context of deposit money institutions include, but are not limited to: management, shareholders, clients, government agencies, and so on. The government's authority over deposit money institutions' interest rate policies affects every member. It is obvious that all of the individuals involved in the economy who are also owners of deposit money institutions are affected by and involved in the control of interest rate policies. The regulations controlling interest rates have some impact on the efficiency of DMBs as a whole. This suggests that the management of interest rates in Nigeria's deposit money institutions, which results from the actions of a number of stakeholders, has an impact on the banks' general performance. Additionally, the success of banks has an impact on a wide range of stakeholders. In order to restrict the amount of borrowing done by DMBs, the CBN charge DMBs a high bank rate of borrowing. This may also take the shape of dividends given to shareholders, among other things.

Empirical Review

Ayodele (2014) conducted an empirical study to examine the impact of monetary policy on commercial bank lending in Nigeria between the years 1988 and 2008 using macroeconomic time series variables like exchange rate, interest rate, liquidity ratio, money supply, and commercial bank loans and advances. The research spanned the years 1988 through 2008. When the Vector Error Correction Mechanism of the Ordinary Least Square econometric approach is employed as the estimate method, the findings indicate that there is a long-run relationship between the variables in the model. The model's construction lends credence to this claim. More specifically, the data revealed that although the money supply and liquidity ratio had a detrimental influence on commercial banks' lending and advances, the interest rate and exchange rate had a significant impact as well.

Akomolafe, Danladi, Babalola, and Abah (2015) looked at how Nigeria's commercial banks function in relation to monetary policy. Profit before taxes (PBT) was employed to indicate the success of commercial banks, while interest rates and the total quantity of money in circulation served as stand-ins for monetary policy. Numerous forms of regression, including pooled regression, fixed-effect regression, and random-effect regression, were used in the research. On the other hand, the Hausman test showed that fixed effects regression is the best approach. The results show a positive relationship between monetary policies—here represented as the money supply and interest rates as proxies—and bank profitability. However, statistical research revealed that there was no discernible difference between an interest rate rise of 1% and 5%. The research's conclusions therefore imply that the country's monetary authorities should look into the prospect of implementing an interest rate policy that is conducive to the development of the lending sector there.

In order to ascertain the degree to which the variables that influence interest rates have an impact on the performance of commercial banks in Kenya, Maigua and Mouni (2016) performed study. Interest rates are the main economic factors that have the most effects on an economy's total economic growth. They are effective instruments for promoting economic development and controlling inflation. Some of the elements affecting interest rates that have been looked at in order to determine their impact on the operations of financial institutions include inflation rates, discount rates, exchange rates, and reserve requirements. The study's main population of interest was the 43 commercial banks that are presently operating in Kenya. 26 commercial banks were chosen at random from the population to make up the sample, which was considered to be the appropriate size. Multiple regression analysis was the technique employed in this study to analyze the data. The results showed that reserve requirement ratios had a negative effect on the performance of commercial banks whereas discount rates, inflation rates, and

currency rates all had positive effects. The study's conclusions indicate that higher exchange rates, inflation rates, and discount rates are associated with greater levels of performance in Kenyan commercial banks.

Nguyen and Le (2017) used panel data regression to analyze the impact of monetary policy on the profits of Vietnamese commercial banks. Twenty commercial banks active in Vietnam's banking sector provided the researchers with data for their study, which covered the years 2007 to 2014. Their study covers the years 2007 through 2014 as its time frame. Variables like base (MB), discount rate (DIS), and required reserve ratio (RRR) are used as proxies for monetary policy. Profit before taxes is a common metric used to assess commercial banks' performance (PROFIT). The research indicates a connection between the monetary policies in place and the profits produced by banks. When using a significance criterion of 10%, only MB has a significant positive impact on the bank's bottom line. This is true for the variables chosen to represent the monetary policy of the SBV. Based on this supposition, the study suggests that MB be one of the factors that SBV's policies addressing the performance and stability of banking should concentrate their attention on.

In addition, Oladele, Amos, and Adedeji (2017) looked at how Nigeria's DMBs' profitability is impacted by the present interest rate environment. Data was gathered from 21 different DMBs in Nigeria during the years of 2005 and 2014. To determine the nature of the relationship between the interest rate and the profitability of DMBs in Nigeria, researchers conducted a regression analysis as part of their study. The results of their analysis showed a correlation between loan interest rates and bank profitability that was both positive and statistically significant. The interest rates that were traded between banks and the profitability of the banks had a strong and positive association. The profitability of banks was positively and significantly correlated with the interest rate on Treasury bills, while the profitability of deposit money banks was positively and significantly correlated with the interest rate on monetary policy.

Musah, Anokye, and Gakpetor (2018) conducted a research that was quite similar to ours in which they examined how the variation in interest rates influenced the profitability of commercial banks in Ghana. The study used net interest income (IntSp) and net interest margin (NIM) to calculate the interest rate spread, as well as return on assets (ROA) and return on equity (ROE) to calculate the bank's profitability (ROE). Panel data from a sample of twenty-four distinct financial institutions during a ten-year period were studied in this study. The research's results suggest that there is a link between the interest rate spread and the profitability of Ghana's banks that is not only statistically significant but also favorable. The results might be interpreted in terms of the loanable funds hypothesis to indicate that there is a greater demand than supply for loans, enabling banks to charge higher interest rates on loans compared to deposits to boost profitability. This would be in line with the theory's proposed notion about loanable money.

In order to better understand how the market interest rate influences the business mix of commercial banks, Kostikov, Jilkova, and Stranska (2019) performed study. Due to the worldwide character of the banking sector and the present global economic situation, interest rates on the loan and mortgage markets in the Czech Republic are at all-time lows. Low interest rates have made money more affordable and facilitated wider access to loans and mortgages since 2014, when the mortgage interest rate fell below 2.5%. In the near future, this tendency is anticipated to persist. This study's main goal is to examine how different interest rates have affected the performance of two different types of loan products over the previous five years (2014–2018). They conclude that the interest rates on deposits, mortgage loans, consumer loans, PRIBOR 2w-repo, disposable income, unemployment rates, gross domestic product, and real effective exchange rates (REER) all have a considerable influence on the amount of money borrowed for mortgages and consumer loans.

In their 2019 study, Eyigege and Nguavese looked at how bank lending rates affected the financial performance of DMBs that are listed on the NSE. In order to investigate the impact of bank lending proxies (loans and advances to total deposit) on financial performance, the research employs a descriptive research design with cross-sectional panel data over a 12-year period (2004-2015). Profitability and liquidity are the dependent variables proxies, represented by ROA and CA/CL, respectively. Because it wants to explore the connections between bank lending proxies and financial performance, the study uses a descriptive research approach. The study uses data from five out of a total population of 21 deposit money institutions, using Yemane's sampling methodology. In order to expand their ability to lend, DMBs in Nigeria should raise the number of deposits they receive. Additionally, these banks should create financial plans that are both comprehensive and practical in order to enhance their financial performance.

The examined indicates that there is a dearth of research on the relationship between interest rates and the financial success of listed DMBs in Nigeria. The fact that the reviewed were studied makes this clear. Even the small number of studies that were conducted scarcely addressed the effect that interest rates have on how banks operate. These studies had an exploratory, qualitative nature, and they gathered their data using questionnaires. This is a fascinating feature of the study that was done. Therefore, the goal of this study was to examine, using secondary data and different panel data analysis techniques, the effect of interest rates on the financial performance of listed DMBs in Nigeria.

3. Methodology

This study adopts quantitative research design so as to establish the effect of explanatory variables on the explained variable. The population of this study covers all the 14 DMBs listed on the NSE as at 31st December, 2020. The justification of studying the DMBs is owing to the fact that the sector is a giant performer in the Nigerian economy constituting 70% approximate market capitalization. (NSE, 2018). The total population is shown in Table 1.

Table 1. List of DMBs used as Population of the Study

S/N	Company	Date Listed
1	Access Bank Plc	1998
2	Ecobank Transnational Incorporation	2006
3	FBN Holding Plc	2012
4	FCMB Group PLc	2013
5	Fidelity Bank Plc	2005
6	Guaranty Trust Bank Plc	1996
7	Jaiz Bank Plc	2017
8	Stanbic IBTC Holding Plc	2012
9	Sterling Bank Plc	1993
10	Union Bank of Nigeria Plc	1971
11	United Bank For Africa Plc	1970
12	Unity Bank Plc	2005
13	Wema Bank Plc	1991
14	Zenith Bank Plc	2004

Source: Authors' Compilation from NSE website, 2022

The study used census sampling to cover all the 14 DMBs. Data on all the explained and explanatory variables were extracted from the published financial statements of the 14 DMBs during period of the

study. This gave a balanced panel data consisting of 14 DMBs for six years (2015 to 2020) giving 84 observations. Due to the dynamic panel effect of the data, multiple regression method is used for data analysis. This entailed estimating the Ordinary Least Square (OLS) regression model result and conducting post estimation tests of Heteroscedasticity. This test came after the pre-estimation test for normality and multicollinearity. The variables specified in the models are measured in Table 2 below:

Table 2. Variables measurement and sources

Variable	Acronyms	Measurement	Sources
Maximum Banking Lending Rate	MBLR	The difference between principal interest rate multiply by principal amount.	Akinwale (2018)
Monetary Policy Rate	MPR	Interest rate monetary policy rate divided by GDP	(Akomolafe et al, 2019)
Domestic Money Supply	DMS	Change in supply reserve multiply by change in multiplier	(Alimi, 2014)
Inflation Rate	INFR	Total liabilities divided by total assets	(Suyono, 2018)
Returns on Assets	ROA	The ratio of pre-tax book income to total assets	(Ogbeide, 2017)

Source: Authors' Compilation, 2022

Model Specification

The following is a specification of the model that was used for this investigation:

Y_{lt}: $\alpha_{it} + \beta_1 MBLR_{lt} + \beta_2 MPR_{lt} + \beta_3 DMS_{lt} + \beta_4 INFr_{lt} + \varepsilon_{it}$.. 3.1

The study adapted the model stated in 3.1 by incorporating variables to capture interest rate and financial performance of listed deposit money banks in Nigeria. Hence, the adapted model is specified as follows:

ROA_{it}: f(MBLR, MPR, DMS, INFr) 3.2

ROA_{lt}: $\alpha_{it} + \beta_1 MBLR_{lt} + \beta_2 MPR_{lt} + \beta_3 DMS_{lt} + \beta_4 INFr_{lt} + \varepsilon_{it....}$ 3.3

Where:

ROA: Return on Asset

ROE: Return on Equity

MBLR: Maximum Bank Lending Rate

MPR: Monetary Policy Rate

DMS: Domestic Money Supply

INFR: Inflation rate

$\beta_1, \beta_2 \ldots \beta_4$: coefficients of the estimated variables e = error term.

α: the constant term

ε: error or disturbance term

i: Number of Firms in the observation

t: Number of periods in years

4. Results and Discussions

This section presents data used in the study with particular attention to descriptive statistics of all the variables. This is followed by correlation matrix explaining the respective correlation between the explained variable and the explanatory variables. Finally, the section presents regression results after conducting robustness tests for accuracy of results.

4.1 Robustness Test of Explained and Explanatory variables

The study conducted robustness tests for heteroskedasticity, multicollinearity and normality of explained variable before arriving at robust regression as the tool of analysis.

4.1.1. Checking Homoscedasticity of Residuals

Heteroscedasticity test is conducted using Breusch-Pagan/Cook-weisberg to find out stability of the error terms is constant or not. The present of heteroscedasticity indicates that the error term is not stable. The result of the test reveals that residuals of the data is homoscedastic evidence from small probability of chi square which is less than percent (P = 0.0012) as shown in Table 3 (See appendix II). This implies that there is presence of heteroscedasticity and as such robust regression was employed to correct this problem.

Table 3. Heterocesdasticity Test Results

Tests Statistics	chi2 Value	Probability of Chi2
Heterocesdasticity Test	10.52	0.0012

Source: Stata Output, 2022

4.1.2. Checking for multicolinearity

Multicollinearity arises when more than two or more explanatory variables are highly correlated with one another which makes estimation of regression coefficient unstable and also inflates standard error of the variable coefficients. The study used the Variance inflation factor (VIF) and tolerance values for detection of multicollinearity. The rule of thumb is that, a variable must not have VIF values higher than ten and the tolerance which defined as 1/VIF should not be less than 0.1. Results in Table 4 revealed that VIF and tolerance value for all the variables are less than 10 and more than 0.1 respectively (Appendix III). This implies that multicolinearity is absent among the explanatory variables of the study.

Table 4. Variance Inflation Factor and Tolerance values

Variable	**VIF**	**I/VIF**
MBLR	1.66	0.6033
MPR	1.59	0.6281
DMS	1.42	0.7034
INFR	1.41	0.7072
ROA	1.45	0.4356

Source: Stata Output, 2022

4.1.3. Test for normality

The results in Table 2 is on Shapiro-Wilk W test on normality of data used showing that he probability of all the variables are less than 1%. This is an indication that all variables used in the study have normal distribution, hence the data are fit for analysis

Table 5. Results of Shapiro-Wilk test

Variable	Obs.	W	V	Z	Prob
MBLR	84	0.7981	14.426	5.864	0.00000
MPR	84	0.8784	8.867	4.750	0.00000
DMS	84	0.8879	8.012	4.572	0.00000
INFR	84	0.7721	16.280	6.130	0.00000
ROA	84	0.5285	32.258	7.632	0.00000

Source: Stata Output, 2022

4.2. Descriptive Analysis

This section provides overview of the data and description of the main attributes of the data.

Table 6. Descriptive Statistics

	DMS	INFR	MLR	MPR	ROA	ROE
Mean	14256.84	11.46733	22.78800	11.40000	0.071531	0.622312
Median	13893.22	11.40000	22.62000	12.00000	0.107346	0.709170
Maximum	28783.19	18.55000	31.09000	14.00000	0.187693	2.950663
Minimum	2637.910	6.600000	9.030000	6.000000	-0.251615	-3.174599
Std. Dev.	7911.214	3.239576	5.565351	2.662236	0.106897	1.244961
Skewness	0.220717	0.525451	-0.692544	-0.877360	-2.047237	-1.599499
Kurtosis	2.055343	2.717551	3.690082	2.722903	6.779069	7.596704
Jarque-Bera	0.679525	0.740109	1.496676	1.972390	19.40380	19.60205
Probability	0.711939	0.690697	0.473152	0.372993	0.000061	0.000055
Observations	15	15	15	15	15	15

Source: Data Analysis, (2022).

Table 4 provides a summary of the central trends, measure of dispersion, minimum and maximum values, degree of peakedness, asymmetric value including Jarque-bera statistics for all of the series that were used in the investigation. The analysis showed the location of the center of distributions of the series through the use of the average values, minimum and the maximum values. It also revealed how each variable value is spread on each side of the center through the use of the root mean squared deviation (standard deviation), which in turn revealed the uniformity of the items in the distribution of each variable. The kurtosis statistics reveal the peakedness of each variable, the skewness value reveals the symmetric character of the series, and the Jarque-Bera statistics reveal the normality condition of each of the series. The peakedness of each variable is shown by the kurtosis statistics. The numbers that were shown in Table 4 for the domestic money supply, inflation rate, maximum lending rate, monetary policy rate, return on assets, and return on equity were respectively 14256.84, 11.47, 22.79, 11.4, 0.072, and 0.622 respectively. The domestic money supply ranged between a minimum of 2, 637.91 billion and a maximum of 2, 8783.19 billion at its lowest and highest points, respectively. A look at the table showed that the lowest possible figure for the inflation rate was 6.6 percent, while the highest possible value was 18.6 percent. The table 4.1 data showed that the minimum value for the maximum loan rate was 9.03 percent, while the highest value was 31.09 percent. The lowest value of the monetary policy rate that was stated in table 4.1 was six percent, while the highest number was fourteen percent.

According to Table 4, the lowest possible value for return on assets was -0.252, while the highest possible value was 0.188. The smallest figure for return on equity was -3.175, and the maximum value was 2.951. Only the domestic money supply and the inflation rate were found to have a skew to the right, as shown by their respective positive skewness statistics of 0.2207 and 0.5255, respectively, in table 4.1. This was one of the things that was shown to be the case. Their positive values of skewness indicate that the coefficients of the variables are positive and that the means of the variables are higher than the median values. Additionally, the positive skewed distribution indicates that there is less risk than what is measured by the standard deviation. The maximum lending rate, the monetary policy rate, the return on assets, and the return on equity were all negatively skewed, exhibiting their respective values of -0.6925, -0.8773, and -2.047 accordingly. On the other hand, the value of the return on equity was positively skewed. As a result, the presence of a distribution with a negative skew is a signal that the level of risk is higher than what is measured by the standard deviation.

In terms of kurtosis, a leptokurtic distribution is referred to as a kurtosis with a distribution that is bigger than 3. When compared to a normal distribution of kurtosis with a value of 3, a leptokurtic distribution has a kurtosis value that is more than 3, which results in a sharper peak with a lower likelihood. A platykurtic distribution is one that has a kurtosis that is less than three. This distribution has a peak that is lower, broader, and has a larger probability than leptokurtic and normal distributions. Notably, the kurtosis statistics revealed that maximum lending rate (3.690), return on assets (6.779), and return on equity (7.597) were leptokurtic (i.e. positive kurtosis values are greater than 3), whereas domestic money supply (2.055), inflation rate (2.718), and monetary policy rate (2.723) were platykurtic. This finding is noteworthy because it indicates that maximum lending rate, return on assets, and return on equity were all leptokur (i.e. positive kurtosis values are less than 3).

With regard to the Jarque-Bera result, the probability values of domestic money supply (0.7119), inflation rate (0.6907), maximum lending rate (0.4731), and monetary policy rate (0.3730) showed a normal distribution. This was due to the fact that their values were greater than the benchmark 0.05 level of significance specified for the normality test. The only purpose of the aforementioned study was to expose the descriptive statistics associated with each of the variables. As a result, there is no conclusion that can be formed from the traits that were seen. In addition, it is clear that each of the variables has a total of 15 observations. This is because there is a wealth of information available on the factors that were investigated in the research.

4.3. Correlation Analysis

Table 7. Correlation Matrix of Variables

	DMS	INFR	MLR	MPR	ROA	ROE
DMS	1.000000					
INFR	0.291190	1.000000				
MLR	0.260545	0.227507	1.000000			
MPR	0.736340	0.001665	0.384818	1.000000		
ROA	0.279940	-0.412420	0.273544	0.744297	1.000000	
ROE	-0.056220	-0.057870	-0.062357	-0.073703	0.007819	1.000000

Source: Data Analysis, (2022)

Table 5, presents the correlation coefficients that have been calculated between the variables that have been examined. The connection between the two variables is shown in each column of the table. This helps to determine which sets have the greatest degree of association.

The link between the variables that were independent and those that were dependent was outlined in Table 5. Return on assets had a positive relationship with both the maximum lending rate (0.274) and the monetary policy rate (0.2799). (0.744). This indicates that an increase in the domestic money supply, maximum lending rate, and monetary policy rate resulted in an increase in the return on assets of deposit money banks in the proportion of 27.99 percent, 27.4 percent, and 74.4 percent, respectively, as a result of the increase in return on assets. Nevertheless, a negative correlation was found between return on assets and inflation rate (-0.412), which suggests that as inflation rate increases, return on assets of deposit money institutions would drop. On the other side, the data also revealed that return on equity had a negative relationship with the rate of inflation (-0.058), domestic money supply (-0.056), maximum lending rate (-0.062), and monetary policy rate (-0.074). (-0.073). This suggests that the rise in the independent variables led to a fall in the return on equity capital of deposit money institutions as a consequence. The results shown in Table 4.2 demonstrate that, on the whole, correlations between independent variables are low. This is an indicator of the lack of multi-co linearity, which is often associated with data pertaining to time series.

4.4 Test for the Diagnosis and Unit Root

A test of the variables' ability to remain stationary was carried out. Before using traditional econometric methods, the theory of economics mandates that the variables be in a stationary state. This is done so that the findings do not seem to be deceptive. A maximum latency of three was employed while doing the stationarity test, and this lag was included into the intercept. The Augmented Dickey-Fuller (ADF) unit root test was carried out on each of the series that were the focus of this investigation.

Table 8. Unit Root Test Results

	Level			**1st Difference**		
	Intercept	**Intercept and Trend**	**None**	**Intercept**	**Intercept and Trend**	**None**
DMS	0.9986	0.9508	1.0000	0.0404**	0.1226	0.7785
INFR	0.0984	0.1290	0.4288	0.0150**	0.1259	0.0008**
MLR	0.3535	0.2413	0.3814	0.3447	0.8719	0.0413**
MPR	0.5325	0.2791	0.7012	0.0021**	0.0002**	0.0008**
ROA	0.0001**	0.1325	0.2526	0.3145	0.3576	0.0201**
ROE	0.0413**	0.1458	0.0096**	0.0035**	0.0186**	0.0001**

**5% level of significance

Source: Data Analysis, (2022)

Table 9. Summary of Unit root tests

Augmented Dickey-Fuller (ADF)				
Variables	**Level**	**First Difference**	**I(*d*)**	**Remarks**
DMS	-	0.0404**	I(1)	Stationary
INFR	-	0.0150**	I(1)	Stationary
MLR	-	0.0413**	I(1)	Stationary
MPR	-	0.0002**	I(1)	Stationary
ROA	0.0001**	0.0201**	I(0)	Stationary
ROE	0.0096**	0.0001**	I(0)	Stationary

**5% level of significance

Source: Data Analysis, (2020)

In order to determine the order of integration among the variables including domestic money supply, inflation rate, maximum lending rate, monetary policy rate, return on assets, and return on equity, the research used the Augmented Dickey Fuller (ADF) Test. This was done in order to look at how these variables were integrated in order. By contrasting the null hypothesis "existence of unit root test" (i.e., presence of non-stationarity) with the alternative hypothesis "series is stationary," the application of the unit root test, also known as the ADF, is assessed for each variable. The alternative hypothesis is first compared to the null hypothesis. The null hypothesis is accepted and it is concluded that the series is stationary if the absolute probability is greater than the benchmark probability (0.05), and it is concluded that the opposite is true if the absolute probability is lower. Table 7 displays the outcomes of the ADF's unit root test. The findings reveal that, at the level denoted as I(0) in Table 7, only return on assets and return on equity were steady. The domestic money supply, the inflation rate, the maximum lending rate, and the monetary policy rate, on the other hand, were all constant at the initial difference, denoted as I. However, the only stationary variables in the table were return on assets and return on equity (1). The results demonstrate co-integration between DMS, INFR, MLR, and MPR, which is a relationship that endures through time. This shows that the co-integrating regression estimate is the appropriate estimation technique since the series are in the same order of integration. The Johansen co-integration test was performed in this context because the model includes a co-integrating process across all four variables.

5. Discussion of Results and Implications

The results of the regression analysis show that all independent variables, including the domestic money supply, inflation rate, maximum lending rate, and monetary policy rate, significantly affect the overall financial performance of Nigeria's DMBs. The data showed that there is a significant positive correlation between the domestic economy's money supply and asset returns. The coefficient associated with the domestic money supply was 5.280, and the P-value was 0.0184, which made this obvious. Both of these numbers fell below the 5% threshold that was established for this study. The result is consistent with the positive a priori assumption and implies that the domestic money supply is a key tool for enhancing the financial performance of DMBs in Nigeria. Additionally, an increase in the money supply encourages banks' ability to create new funds by lending to their customers, and as a consequence, it increases the quantity of credit extended by DMBs. With this strategy, investors may get new loans to raise the interest rates on their current debt. As a consequence of this move, banks that largely depend on interest income as their principal source of income will be able to dramatically increase their profitability. This

conclusion is in line with the findings of Akomolafe, Danladi, Babalola, and Abah's (2015) study using a micro-panel analysis to examine the impact of monetary policy on the performance of commercial banks in Nigeria. They found that there is a significant positive correlation between bank performance and the quantity of money accessible. Contrary to what Ayodele (2014) observed, which indicated that the money supply had a detrimental impact on the performance of DMBs, this study implies that the money supply does not increase profitability. This result conflicts with Ayodele's (2014) research. According to his research, an increase in the money supply is bad for banks because it causes the general level of interest rates to decline. This will impact how well DMBs perform because they will charge customers lower interest rates for loans and advances as a result of the lower interest rates.

It was also shown that there is a strong negative correlation between the return on assets and the rate of inflation. This was amply shown by the fact that the inflation-related coefficient was negative (-0.0124), and its P-value was higher than the 0.0345 percent cutoff set for this study. This shows that Nigeria's inflation has a big impact on how well DMBs function there. This indicates that when the money supply is lowered in an inflationary climate, banks perform worse, which in turn restricts the availability of financial resources for the execution of investment projects. Furthermore, because of the high opportunity cost of storing money in the form of cash reserves, the availability of payment-deferring instruments is severely constrained by inflation. Due to the inability of DMBs to provide loans and advances to consumers, they are less able to earn interest revenue, which in turn lowers their potential to make money from the company. Moreover, since inflation reduces the purchasing power of money, consumers profit from it while DMBs lose out. This is due to the fact that by the time customers are prepared to return the loans or advances, the value of the money that has been advanced or lent to them will have reduced. This finding supports Fisher's (1930) hypothesis on the loanable funds theory of interest rates. He postulated that interest rates would fall as inflation increased and that high inflation would diminish financial sector productivity by making financial markets more resistant, which would then hinder DMBs' performance. Additionally, they examined the effect that the variables that affect interest rates have on the operations of commercial banks with the aid of Maigua and Mouni's (2016) study. The results of their research, which showed that inflation rates had a positive influence on the performance of DMBs, led them to the conclusion that higher levels of inflation rates result in better performance in DMBs in Kenya. The study also revealed a strong correlation between the maximum lending rate and the DMBs in Nigeria's financial performance. One of the study's main conclusions was this. The fact that the coefficient associated with the bank loan rate was 0.808046 and its P-value was 0.0312, both of which were below the benchmark of 5% necessary for this study, made this plainly evident. This shows that the variable representing the bank lending rate is a reliable indicator of bank success since it has a positive sign in its value.

6. Conclusion and Recommendations

The research's conclusions that Nigeria's interest rate liberalization had a positive effect on the country's DMBs' financial performance. The results also show that DMBs' performance is significantly impacted by changes in the amount of money in circulation. As a consequence, the researchers recommended that the CBN create an equilibrium level and redefine the domestic money supply as a tool for monetary policy. In addition, given that the rate of inflation has a detrimental impact on DMBs' performance, it is urgent for the government to strictly impose restrictions on the cross-border flow of capital and to utilize the appropriate macroeconomic management tools to control inflation in times of crisis in order to lessen the impact of inflation on the profitability of DMBs. This is because the performance of DMBs is negatively impacted by the rate of inflation, making it imperative for the government to act.

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