The Determinants of Assets Performance of Deposit Money Banks in Nigeria

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Authors’ contributions
This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

ABSTRACT

The study examined the determinants of assets performance of deposit money banks (DMBs) in Nigeria after the banking reforms of 2004 through 2005. A sample of sixteen (16) banks consisting of ten DMBs with international business licenses and six DMBs with licenses to operate only locally were selected, with data on internal determinants (Size, Liquidity, and diversification) obtained from individual audited annual financial report of the selected banks while that macroeconomic variables (real Gross Domestic Product growth rate and inflation rate) were sourced from Central Bank of Nigeria official website and regressed on assets performance denoted by ROA for the period of thirteen years (13), from 2004 to 2016. The study employed descriptive statistics, correlation analysis, and panel generalized least square (cross-section random effect). The results revealed that size, liquidity measured by total loans, and advances to total deposits as well as real GDP growth rate were significant determinants of the performance of the asset of DMBs in Nigeria. Also, Diversification measured by non-interest incomes to total assets and inflation rate were found not to have a significant impact on the performance of the asset of deposit money banks in Nigeria. The study, therefore, recommended that bank managers should institute a sound, efficient, and sustainable assets management framework to ensure that the income generation capacity of banks is widened, and regulatory agencies should review existing regulations and make new policies that would encourage deposit money banks in Nigeria.

Keywords: Deposit money banks; size; liquidity; diversification; inflation rate; real GDP; fixed effect panel; Nigeria.

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1. INTRODUCTION

The Nigerian banking sector has experienced major transformations in its regulation, composition, and business environment, resulting in a significant change in how banks' assets are managed. Thus, macro and microeconomic factors (inflation, GDP, exchange rate and production, price respectively) affect banks' assets performance with varying impact. Understanding the key success factors of deposit money banks' assets performance aids the formulation of informed policies that will improve the overall performance of the banking sector.

The deposit money banks (DMBs) otherwise known as commercial banks play key roles that are crucial to the financial and economic activities in Nigeria. Consequently, a sound, reliable, and profitable banking sector should be posed to absorb negative shocks and, constitute a stable financial system that will foster economic growth and development of a nation. According to Chirwa and Miachilla [1] that banks function as financial intermediaries, play a lubricating role by mobilizing and converting deposits into financial assets, channel funds from liquid economic units to those units with deficit liquidity, thus facilitating capital formation and trade; also, banks play an important role in using information gathered to screen and monitor borrowers' activities in a financial system characterized by incomplete and asymmetric information. Nnanna [2] posits that banks play out the roles by keeping the wheels of economic and social development rolling, and this is possible, to a great extent, through financial intermediation. Further, the study opines that financial intermediation is a fundamental and crucial function of the banks especially in developing countries such as Nigeria with inadequate financial resources to support sufficient capital and developmental needs of the economy.

The deposit money banks can perform intermediation functions through acceptance of short-term deposits from depositors that can be converted into medium and long-term loans and advances and lend to customers for investment purposes with the hope that not all depositors will come at the same time to withdraw the monies. In this process of creation of various assets, banks transform maturity, size, and risk attributes of the assets to meet the customer purpose of either long term, medium, or short-term loans; therefore, earn interest incomes. So, in practice, deposit money banks usually diversify by not concentrating and investing the depositors' monies in a single sector of the economy as a strategy to minimize risk relate to income generation. Hence, they utilize incomes generated from deposits, loans, and other investments to maximize returns to increase shareholders' wealth Tang, Zoli, and Klychnikova, [3]. This performance can also be viewed in terms of assets quality, degree of liquidity, and incremental contributions to economic growth and development of a country. Beck, Cull, and Jerome [4] explained that the asset performance of banks links to the managers' ability to gather and allocate resources, as well as managing associated risks.

The Nigerian banking sector has been bedeviled by serious financial crises in recent times attributed partly to mismanagement of assets, poor regulation, systematic and global economic forces having a direct influence on banking sector performance. Consequently, these developments have affected how banks manage the resources which have impacted abysmally on the financial viability of the banking sector.

Assets constituting a sizable portion of any bank resources with which banking activities are done, the return generated by such assets can help improve performance and banking sector growth knowing the impact of factors determining how the assets are utilized will lead to the implementation of good policies in favour of these factors that significantly improve assets performance. However, assets performance of banks has been generally below expectation despite the increase in assets base of banks after the recapitalization exercise raises questions in terms of performance improvement in managing these assets on the account of multiple factors ranging from bank-specific and macroeconomic factors. This poor performance of banks' assets has, in general, affected negatively the banking industry viability and the well-being of the economy as banks are unable to meet other sectors' needs for funds without detail analysis of bank-specific and macroeconomic factors that are crucial in the determination of assets performance of banks.

Therefore, empirical examination of these factors become important, as this will not only enhance the understanding of the relationship among the variables but will also help in enhancing bank assets performance in particular and banking industry growth in general. This is based on the fact that banks depend largely on the
performance of their assets for survival – in terms of assets return. In an attempt to examine the factors that determine banks’ assets performance over the years, a great number of researches have been carried out with contradictory findings among these studies.

For instance, Antonio [5], Obamuyi [6], and Gul, Irshad, and Zaman [7] found a positive relationship between some selected bank-specific and macroeconomic variables and banks’ assets performance. On the other hand, Abdus [8] revealed that internal factor has significant relationships with banks’ assets performance but the external factors employ does not impact significantly on bank’ assets performance. More so, Olaoye and Olarewaju [9] study shows that both chosen internal and external factors analyzed do not have a significant relationship with banks’ assets performance. The study of Abu, Okpeh and Okpe [10] uncovered that foreign directorship significantly and positively impacts the performance of deposit money banks in Nigeria.

A link of capital adequacy contributes significantly as a measured of banks performance. As revealed by Umoru and Osemwegie [11] that less than 30% of capital adequacy impacted on Banks performance in Nigeria. Again, Kolapo and Olaniyan [12] found that past values of bank deposit have a positive and significant relationship with deposit money banks in Nigeria. While Edem [13] opined that liquidity and bank performance are key factors in determining the survival, growth, sustainability and performance of the banking system. Further, Igoni, Onwumere, and Ogiri [14] maintained that the advancement in the digital financial environment by the Nigerian DMBs will expand the economy frontier by playing a key role of diversification.

Consequently, the mixed findings and contradictions among these studies could empirically be ascribed to differences in techniques, and variables used to measure the performance of banks’ assets with limited small sample units and scope, and none of the researchers has taken into consideration the non-primary activities of DMBs regarding how they allocate the assets through diversification to generate non-interest incomes. Based on this knowledge gap, this study seeks to provide additional empirical evidence using a larger scope and sample size of deposit money banks that will be drawn from Nigerian banking sector and applying statistical and dynamic panel data techniques to examine the impact of banks-specific and macroeconomic factors (such as diversification, size, liquidity, inflation, RGDP growth rate.) on banks’ assets performance (return on assets). Thus, this study seeks to give answers to the following research questions: The relationship between diversification, asset size, liquidity, inflation, Gross domestic product, and assets performance of deposit money banks in Nigeria. The study also addressed; the impact of diversification, asset size, liquidity, and other selected variables on the performance of the asset of deposit money banks in Nigeria. The following research questions were sought; there is no significant relationship between the aforementioned variables on the performance of the asset of deposit money banks in Nigeria. This study stands to add value to Researchers, industries, institutions /organizations, scholars, etc.

2. RELATED LITERATURE REVIEW

Several theories have been propounded by scholars in explaining bank performance in general. These theories have also sought to explain the performance of the asset of banks. In relating to this study, the theories of financial intermediation, financial liberalization, financial regulation were underpinned in the study.

The theory of financial intermediation postulated by McKinnon and Shaw [15] that the financial market plays a key and lubricating role in economic development, attributing the differences in economic activities level across countries to the quantity and quality of functions performed by financial institutions. According to Shaw [16] that a debt intermediation hypothesis whereby expanded financial intermediation between the savers and investor resulting from financial liberalization and development increase the incentive to save and invest, stimulates investments due to an increased supply of credit, and raises the average efficiency of investment. The theory of financial intermediation was built on the concept of imperfect information that began to emerge during the 1970s through the seminal presentation by Spence, [17].

In literature, two complementary views formally explain the existence of financial intermediaries. The first view emphasizes the ability of financial intermediaries to provide liquidity. The other view focuses on the financial intermediaries' ability to transform the risk characteristic of assets. In both views, financial intermediaries can reduce the
costs of mobilizing funds among the borrowers and the lenders, hence leading to a more efficient allocation of resources.

In modern theories of financial intermediation, the two most prominent explanations for the existence of intermediaries like depository institutions are the provision of liquidity and the provision of monitoring services. Diamond and Dybvig [18] posit that by issuing demand deposits, banks can improve on a competitive market because these deposits allow for better risk-sharing among economic agents that face idiosyncratic shocks to their consumption needs over time. The importance of banks in this framework arises from an information asymmetry: the shock that affects an economic agent consumption needs is not publicly observable. Banks exploit a comparative advantage in information production because of economies of scale and scope, which reduces the cost of informational asymmetries and their extent in the economy. So diversification reduces the cost of delegating monitoring to a financial intermediary.

Again, the financial liberalization theory was also developed by McKinnon and Shaw [15]. The theory argues that financial sector reforms have a good effect on economic growth. The theory also upholds that the segmentation of the financial sector through artificially created low-interest rates and excessive regulation as evidence in many developing countries reduces the mobilization of savings and hampers capital allocation efficiency Ndungu, [19]. In the same vein, they further suggest that to dismantle these significant barriers that work against efficient financial resources mobilization and hence economic growth, liberalization supports the removal of artificially created low-interest rates and easing controls on business, thereby allowing market forces to operate.

McKinnon and Shaw [15] argued for financial liberation, claim that in the presence of negative bank loan rates, investors deem it convenient to borrow and buy inflation hedges loan rather than investing, therefore lowering the amount of investment. The interest rates set by regulators are almost all the time low and also lack flexibility. This creates impossibility for financial institutions to adjust their lending rates to the changing costs of funding which in turn affects profit margins. Such interest rates also expose depositors to low non-negotiable rates and they cannot benefit from higher rates offers by banks competing for deposits in a free market. Hence, banks are left with no incentive to mobilize deposits or compete for loan customers. At the same time, low-interest rates prevent the entry of new financial institutions reducing the level of competition in the banking sector and encourage capital flight causing foreign exchange shortages in absence of standard international capital control measures to discourage capital outflow Paula, [20]. Conversely, advocates of financial liberalization further argue that the removal of interest rates ceilings will enhance savings mobilization in the financial market and at the same time boost growth through the realization of efficient capital allocation. A distinctive characteristic of this theory is its emphasis on the importance of official indirect financing on the focus of the market mechanism.

Direct credit programmes can encourage lending to sectors that are usually shunned by the financial intermediaries. In an economy, where the markets are underdeveloped and; imperfect competition does not ensure Pareto-optimal allocation of resources. The unchecked competition among the financial intermediaries cannot achieve and protect the social benefits of a stable payment system thus, it tends to increase the probability of banks' failure and breakdown of payment methods.

Consequently, deposits and loans/advances and incomes fluctuations usually introduce uncertainty and risk in bank’s assets management and hence may hurt banks’ assets performance. By this notion, the bank’s assets performance will be a random variable that is influenced by the joint probability distribution of deposits inflows, loan outflows, and the resulting assets yields; therefore, performance can be modeled using bank incomes and Asset.

2.1 Empirical Review

The theoretical and empirical studies on various determinants of performance of banks are on the increased base on the significant roles the banking sector interacts with and promotes the other sectors of the economy. Several researchers have different views about the determinants of asset performance of the banking environment. Many claimed that deposits from customers, loans and advances, investment, shareholders’ funds, and total assets have relationships with bank asset performance. However, the direction of the relationships may differ from the findings. Also, the macroeconomic
variable such as Gross Domestic Product in most studies has a positive effect on the performance of the asset of banks while the annual inflation rate in many of the studies has a negative effect. Whereas, others revealed a positive directional relationship with banks' assets performance.

Ani, Ugwunta, Ezeudu, and Ugwuanyi [21] argued on the determinants on the performance of 15 deposit money banks in Nigeria for a period of 10 years between 2001 and 2010. Pooled Ordinary Least Square (OLS) was employed to analyze data obtained from annual reports and accounts of the selected banks. Some of the findings were: increase in size (higher total assets) did not necessarily lead to higher profits due to diseconomies of scale; higher capital-assets ratio and loans and advances contribute strongly to bank performance. Besides, the study further revealed that bank size, capital, and asset composition are the key internal determinants of bank performance in Nigeria.

Owolab and Ogunlalu [22] evaluated the financial performances of pre and post-consolidation exercises in an attempt to ascertain if there was a significant difference between the two periods. The study used secondary data gleaned from the audited financial reports of the selected banks. They employed descriptive analysis and regression to determine the direction of relationships between dependent and independent variables while t-test statistics were used to ascertain the statistical difference between the means of consolidation variables and financial performance (return on assets) variables. The study claimed that consolidation and capital increase did not all the time result in increased banks' performance. Thus, the study recommended that the CBN should intensify its oversight over banks to build a strong banking sector.

Abata [23] investigated the banks' asset quality and performance in Nigeria. Secondary data was obtained from the annual reports and accounts of a sample of six largest banks listed on the Nigeria Stock Exchange and the sample units were selected based on market capitalization with a scope of 1999 to 2013. The data were analyzed using the Pearson correlation and regression tool, bank performance was proxy by ROA, and the ratio of loans and advances to total loan portfolio and total loan to total assets were employed as independent variables to measure assets quality. The findings showed that assets quality had a significant influence on bank performance.

Abdus [8] examined the impact of bank-specific characteristics and macroeconomic variables in determining the banks' profitability of Bangladesh banking industry with a sample of 42 banks for the period from 2009 to 2011 using panel data. The panel regression results, regressing bank size, operating expenses, loans loss provision to total assets, loans to total deposits loans provision, GDP, and inflation on return on assets revealed that bank-specific variables such as Loan to deposit, loans loss provision to total assets, equity capital to total assets, and operating expenses to total assets have a significant impact in explaining profitability proxy by ROA. On the other hand, inflation and GDP have no positive impact on ROA.

Odunayo and Adeyemi [24] examined the major determinants of the operational efficiency of deposit money banks in Nigeria using Ratio analysis of a panel of six (6) deposit money banks covering the period of 2004 through 2013; using the interest expenses, personnel expenses, customers' deposits, total loan, a total investment of banks listed on the Nigeria Stock Exchange and employed Pooled OLS, Fixed Effect Model. The results of the analyses showed that the price of labour, total loan, and the total deposit has a negative influence on banks' operational efficiency. Therefore, they recommend that Nigerian deposit money banks should embrace more sophisticated pieces of technology and also a sound management team and credit officers with regular examination of bank assets book by the supervisory bodies with aim of reducing operational costs given its undesirable effect on bank performance.

Lambert, John, and Alwell [25] examined how capitalization had affected banks' profitability in Nigeria. Both panel and Partial Frontier efficiency analyses were utilized to analyze data obtained from financial statements of 18 banks for 2001 and 2013. Employing gross profits of DMBs as a dependent variable while the capital base of DMBs, real income (GDP), financial deepening, interest rate, and inflation rate were independent variables. The result showed that capitalization had a significant impact on the profitability of banks, while financial development, real income levels were found to have contributed less to the profitability of banks in Nigeria. Further, the result also revealed that interest rate had less
implication on the profitability, while the effect of inflation on the profitability of banks was positive but not significant. They also found that 58% of the total variation in profitability is influenced by the capital base, financial deepening, interest rate, GDP, and price level in Nigeria over the period. The study discovered that the impact of capitalization on the profitability of banks is the same across the banks. On the other hand, the partial efficiency frontier analysis found that Unity Bank and UBA performed better with the improved capital base while Union and Heritage Banks performed poorly with high capital base given the very low-efficiency scores.

Nenubari and Emeka [26] examined the dynamic of capital adequacy and profitability of internationalized deposits money banks. The result revealed that return on asset and equity response positively to asset size, efficiency if effectively used. However, insignificant in the dynamic of assets where the asset model showing a weak dynamic.

In light of the above literature, this study seeks to contribute additional by employing a robust panel econometric method, a larger scope and sample size, including a diversification variable non-interest income) in the model because this serves as a dependable source of incomes for banks during a higher loans and interest repayments default rates.

3. METHODOLOGY

The study adopted the ex-post facto research design. According Onwumere as cited by Igoni, Onwumere and Amaewhule [27] that ex-post facto design is suitable for a study of quasi-experimental. The work employed secondary data to measure the determinants of assets performance of deposit money banks (DMB’s) and the variables in the Nigerian contexts. The selected variables included diversification, asset size inflation, liquidity, and gross domestic products to assess the bank’s performance.

The data were sourced from the financial statement of accounts of individual banks and other macroeconomics variables sourced from Central Bank of Nigeria Statistical bulletins. The study applies to all the banking selectors and ten deposits money banks were selected within and outside with licensed and other six with a national operating license in which data could be obtained. The study adopted panel data to test the effect of diversification and other variables in our context.

3.1 Theoretical Framework

To capture the variables in our model, assets performance is examined in line with intermediation and firm performance theories that assume banks accept deposits with a combination of other inputs in the operational cycle to cause variation in outputs Sealey and Lindley, [28]. The model involves the use of one output and input variables. This provides information on how the bank uses inputs in the best practical manner to produce output under similar conditions since performance measurement is practically important to firms using economic resources to operate in a competitive market. The two models mostly considered in analyzing firms include first, that which take into account economic factors and, the second is that which is considered firm-specific factors. The economic factor models address the significance of external factors in influencing firms’ success or performance. On the other hand, the firm-specific factor model emphasis the behavioural and sociological dispositions of decisions maker in an organization as it impacts on the performance of a firm. Therefore, this attests to the importance and interdependent role the two factors play in determining the performance of a firm. Following the above assertion, we agree with firm performance theory to say that asset performance implies an important economic and organizational objective of profit maximization base on the minimization of cost possible to achieve a budgeted volume of production. Thus, it is assumed that a well-performing bank in the sample will have performance greater than zero (P>0). The asset performance \( P \) of a bank depends on the combination of bank-specific vector \( (z) \) and macroeconomic \( (m) \) and a set of random factors \( (u) \) that denotes the impact of errors in the measurement of variables. Thus the performance function is simply expressed as:

\[
P = f(z, m, u) \tag{3.1}
\]

Where the performance variable, \( z \) and \( m \) are bank-specific and macroeconomic variable indicators respectively while \( u \) are random errors assumed to be independently and normally distributed.

3.2 The Panel Regression Model

The model adopted in this study is based on a dynamic panel regression analysis procedure.
The dynamic panel data analysis has the advantage of comprehensively taking the individual characteristics of the different firms used in the study to control for fixed effect (FE) and random effect (RE). It is observed in the previous studies that firm-level behavior is an influencing factor in the determination of the performance of firms and hence, these differences may result in a spurious estimation outcome. The Dynamic panel data analysis helps to correct this obvious inherent estimation problem. The basic linear model that can be estimated using dynamic panel techniques is written as:

\[ y_{it} = \beta_0 + \sum_{k=1}^{K} \beta_k X_{ik}^k + \epsilon_{ik} \]  

(3.2)

Where the performance of the asset of deposit money of bank i at time t, with \( i = 1, \ldots, N; t = 1, \ldots, T \), \( \beta_0 \) is a constant term, \( X_{iks} \) are k explanatory variables, and \( \epsilon_{ik} \) is the disturbance that represents the unobserved bank-specific, macroeconomic and other variables influencing banks’ assets performance.

The explanatory variables \( X_{iks} \) are grouped, according to explanatory variables, i.e., into bank-specific and macroeconomic variables.

The general specification of the model (3.2) with the \( X_{iks} \) separated into two groups of bank-specific and macroeconomic variables is:

\[ y_{it} = \beta_0 + \sum_{y=1}^{Y} \sum_{z=1}^{Z} \beta_x X_{yi}^x + \beta_z X_{zi}^z + \epsilon_{ik} \]  

(3.3)

Where the \( X_{iks} \) with superscripts \( y \) and \( z \) signify bank-specific and macroeconomic determinants respectively (Gujurati, 2009).

### 3.3 Model Specification

To analyze the bank-specific and macroeconomic factors affecting the deposit money banks assets performance, following the theory and Neter, Wasserman and Kutner as cited by Igoni Onwumere and Orlu [29] the model in equation (3.1) above can be rewritten in econometric form thus:

\[ ROA_{it} = \beta_0 + \beta_1 NI_{it} + \beta_2 SIZE_{it} + \beta_3 LAD_{it} + \beta_4 INF_{it} + \beta_5 RGDPGR_{it} + \epsilon_{it} \]  

(3.4)

#### 3.3.1 Dependent variable in the model

\( ROA_{it} \): Bank assets performance i in the year t.

#### 3.3.2 Independent variables in the model

- \( NI_{it} \) = ratio of non-interest incomes to total assets of bank i in year t
- \( SIZE_{it} \) = natural logarithm of total assets of bank i in year t.
- \( LAD_{it} \) = ratio of loans and advances to total deposits of bank i in year t.
- \( INF_{it} \) = yearly inflation rate at year t.
- \( RGDPGR_{it} \) = yearly Real Gross Domestic Product growth rate at the current price at year t.

Where the \( t \) = time

A positive and negative theoretical relationship is expected amongst employed variables in line with the above-identified theory.

### 3.5 Diagnostic and Robustness Test

However, the central assumption about fixed/random effects estimation is that the random effects are uncorrelated with the independent variables. Therefore, the Diagnostic and robustness test employed is:

[a] Hausman Test was used to compare the fixed and random effects estimates of coefficients. This test is also used to examine the randomness of the data distribution in this study. The basic rule is that if the chi-square statistics show by the Hausman test is larger than the critical Chi-square at a 5 percent level, then there is evidence for fixed effects estimator choice Hausman, [30].

### 4. PRESENTATION OF RESULTS AND DISCUSSION

This chapter contains the data presentation and empirical analysis of results obtained from the estimation techniques. The study attempts to empirically examine the determinants of assets performance of deposit money banks in Nigeria. The data were estimated by applying two major techniques of statistical and econometric
techniques to provide an understandable analysis of the study.

Descriptive statistics and correlation analysis were applied to examine the fundamental characterization and the degree of relationship between and among the variables used in this study. The econometric technique used was the Pool Panel data technique to examine the determinants of assets performance of deposit money banks in Nigeria.

The estimates of descriptive analysis of the variables employed in this study are shown in the table above as the summary statistics on the performance of the asset of deposit money banks denoted by (ROA) and the independent variables. The descriptive statistics reveal that the average value of return on assets (ROA) is 5.37 while the median value is 5.09. This indicates that for every one naira invested in assets by high-performing banks in the sample, it earns an average return of 5.37. Furthermore, there is a little dissimilarity in individual deposit money bank asset returns over the period. The maximum and minimum values are 8.10 and 2.52 respectively. This wide divergence between these two values shows a possibility of the return on assets of the sampled deposit money banks to fall extremely to low values if the management does not swing into action to boost income generation for the banks. However, the ROA value reveals that fundamentally, the deposit money banks’ performance is good on average performance during the period under study. The standard deviation value of 1.45 is relatively low and it shows a little variability during the period for the respective banks. The skewness value of 0.06 is quite positively low, and it reveals that more deposit money banks (DMBs) generated lower ROA values than the average value across the banks. The Jarque-Bera value of 15.05 for the ROA with a probability of 0.00 confirms the data on size is not normally distributed. The size has the highest average value of 15.86, with a median value of 14.68; a signal of little differences in the size of the sampled banks with some banks having higher total assets than the overall average of the industry. The bank with the highest size has a maximum value of 21.85 and a bank with lower size, has a minimum value of 8.11 on average. The standard deviation of -0.13 shows that there are small variations in the size of the deposit money banks sampled for this study. The Jarque-Bera value of 15.05 for the ROA with a probability of 0.00 indicates that the data on size is not normally distributed.

The NIC (non-interest income to total assets) measuring diversification for each bank has the highest mean value of 1.59, with a median value of 0.66; an indication of wide dissimilarity in the non-interest incomes of the sampled banks with some banks among them having the ability to generate non-interest incomes than the overall average value thus; non-interest income maximum value of 45.53 and minimum value of 0.00 respectively; with a probability of 0.00 indicating that the data on size is not normally distributed. The size has the highest average value of 15.86, with a median value of 14.68; a signal of little differences in the size of the sampled deposit money banks in terms of assets performance. This lends confirmation to the pre-assumed Endogeneity problem that will be encountered if the ordinary least square is applied to estimate the model. Hence, the adoption of the panel data analysis technique to establish relationships between the dependent and independent variables used in this study.

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<td>0.00</td>
<td>208</td>
</tr>
<tr>
<td>LAD</td>
<td>0.72</td>
<td>0.70</td>
<td>1.96</td>
<td>0.16</td>
<td>0.26</td>
<td>1.25</td>
<td>7.24</td>
<td>210.53</td>
<td>0.00</td>
<td>208</td>
</tr>
<tr>
<td>RGDPRGR</td>
<td>17.48</td>
<td>17.83</td>
<td>18.31</td>
<td>16.27</td>
<td>3.83</td>
<td>1.37</td>
<td>3.30</td>
<td>31.53</td>
<td>0.00</td>
<td>208</td>
</tr>
<tr>
<td>INFR</td>
<td>10.61</td>
<td>10.80</td>
<td>17.90</td>
<td>1.60</td>
<td>4.28</td>
<td>-0.30</td>
<td>2.58</td>
<td>4.79</td>
<td>0.00</td>
<td>208</td>
</tr>
</tbody>
</table>

Finally, the descriptive statistics show that the explanatory variables unveil high variability, positive skewness, leptokurtic, and highly significant J-B values. The deposit money bank’s individualities are important in describing the performance of the asset of DMBs.

4.1 Correlation Test

Based on the econometric and statistical assumption, it is necessary to confirm that the explanatory variables in models do not have extreme correlation patterns. To ensure this is avoided, the correlation analysis technique is employed to examine the correlation pattern of the independent variables. The correlation analysis tool enables us to investigate the preliminary characterization and degree of association among the variables modeled in this study. The correlation estimates are presented in matrix form as showed in Table 2. From the correlation matrix, it is observed that ROA, representing assets performance of the deposit money banks of this model, has a positive association with size, total loans to total deposits, and real gross domestic product growth rate but a negative association with both the non-interest income to total assets and the inflation rate over the period.

This means that as the size of deposit money banks, total loans to total deposits, and real gross domestic product growth rate increase, the asset performance of banks will be stimulated. On the other hand, the higher the non-interest income to total assets and inflation rate decline assets performance of DMBs because of their negative correlations with ROA. The investigation of correlations among the independent variables reveals that size, non-interest income to total assets, and inflation rate are negatively associated. This implies that a rising inflation rate will result in decreasing size and non-interest income to total assets (NIC) of DMBs, however total loans to total and deposits (TLD) are negatively correlated with both non-interest incomes to total assets and inflation (INFR), as a rise in NIC and INFR tend to reduce LAD. The correlation estimates further reveal evidence of a negative relation between RGDPGR and INFR, obviously, a higher inflation rate reduces economic activities hence decrease in RGDPGR

4.2 Empirical Estimate on the Multivariate Pool Panel Data Analysis

In this stage, the result of the econometric analysis is examined to determine the impact of the individual independent variables have on the performance of the asset of DMBs using the panel data technique. Following the model specification, assets performance is measured ROA as a dependent variable for the sampled banks. Therefore, we are to establish the extent to which the explanatory variables influence the performance of the asset of deposit money banks in Nigeria during the period under study.

4.3 Ordinary Least Square (OLS) Estimates

The pooled data for the sixteen (16) deposit money banks sampled for this study using OLS to establish if this method will be appropriate in explaining the relationship between the dependent variable (ROA) and the independent variables. Table 3 represents the summary of results derived from estimating the ROA baseline regression model. An examination of the coefficient of multiple determinations R-square which indicates the quality of goodness of fit of the model shows that the result is poor given the low coefficient of determination. This implies that using the OLS method the explanatory and projecting power of the model will be poor. The pooled OLS method low result is expected as this cannot take care of individual characteristics inherent in the sampled data and invariably, this is necessary to carry out the fixed-effect model and random effect estimations before conducting Hausman test for uncorrelated randomness to statistically decide which of the method will be suitable in analyzing the data. However, the OLS estimate revealed a low R- squared value to be 0.46; meaning that the independent variables in the model can only explain 46 percent of the changes in ROA of deposit money banks over the period. A close look at the coefficients of the individual independent variables shows that size is statistically positive and significant at a 1 percent level, thus the real GDP growth rate is positive and significant at the 5 percent level. This implies that a 1 percent increase in size and RGDPGR deposit money bank assets performance will be enhanced. Among NIC, LAD, and INFR coefficients only LAD is positive while the other two variables are negatively related to ROA.

4.4 Hypotheses Testing

Furthermore, to examine the empirical results in conjunction with previously formulated hypotheses, this section is devoted to hypotheses testing. This would enable us to determine either to accept or reject null hypotheses which are restated below as follows:
Table 2. Correlation matrix results for the variables

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>SIZE</th>
<th>NIC</th>
<th>LAD</th>
<th>RGDPGR</th>
<th>INFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>0.730</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIC</td>
<td>-0.016</td>
<td>0.005</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAD</td>
<td>0.149</td>
<td>0.193</td>
<td>-0.103</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGDPGR</td>
<td>0.135</td>
<td>0.103</td>
<td>0.128</td>
<td>-0.067</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>INFR</td>
<td>-0.069</td>
<td>-0.046</td>
<td>-0.112</td>
<td>-0.026</td>
<td>-0.081</td>
<td>1.000</td>
</tr>
</tbody>
</table>


Table 3. Presents OLS estimates for ROA model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>0.298 (.000)*</td>
<td>14.702</td>
<td></td>
</tr>
<tr>
<td>NIC</td>
<td>-0.007 (.553)**</td>
<td>-0.593</td>
<td></td>
</tr>
<tr>
<td>LAD</td>
<td>0.019 (.943)**</td>
<td>0.072</td>
<td></td>
</tr>
<tr>
<td>RGDPGR</td>
<td>0.045 (.042)**</td>
<td>2.039</td>
<td></td>
</tr>
<tr>
<td>INFR</td>
<td>-0.014 (.378)**</td>
<td>-0.882</td>
<td></td>
</tr>
</tbody>
</table>

R² = 0.46
Adjusted R-squared = 0.42

Note: * means the coefficient is significant at 1% level; ** means the coefficient is significant at 5% level. *** means the coefficient is not significant at both 1% and 5% levels.


Table 4. Presents summary of random effects results for ROA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.1849</td>
<td>-1.1989</td>
<td>0.231</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.1933</td>
<td>6.7624</td>
<td>0.000</td>
</tr>
<tr>
<td>NIC</td>
<td>0.0018</td>
<td>0.2334</td>
<td>0.815</td>
</tr>
<tr>
<td>LAD</td>
<td>0.6222</td>
<td>3.6549</td>
<td>0.000</td>
</tr>
<tr>
<td>RGDPGR</td>
<td>0.1814</td>
<td>3.2960</td>
<td>0.001</td>
</tr>
<tr>
<td>INFR</td>
<td>-0.0126</td>
<td>-1.4096</td>
<td>0.160</td>
</tr>
</tbody>
</table>

R² = 0.76
Adjusted R² = 0.74
D.W = 1.63
F = 33.2


Hypothesis 1:

H₀₁: There is no significant relationship between diversification and asset performance of deposit money banks in Nigeria.

Hypothesis 2:

H₀₂: There is no significant relationship between deposit money banks’ size and asset performance of deposit money banks in Nigeria.

Hypothesis 3:

H₀₃: There is no significant relationship between liquidity and asset performance of deposit money banks in Nigeria.
The coefficient of total liquidity is significant at the 5 percent level as its t-statistic of 3.65 passes the significance test at the 5 percent level. The study, therefore, rejects the null hypothesis and accepts the alternative hypothesis thus, liquidity is a vital indicator in influencing the performance of the asset of DMBs.

**Hypothesis 4:**

**H₀₄:** There is no significant relationship between real gross domestic product at current price and assets performance. Given the empirical results, the coefficient of real gross domestic product at the current price significant at the 5 percent level as its t-statistic of 3.29 passes the significance test at the 5 percent level. The study, therefore, rejects the null hypothesis and accepts the alternative hypothesis hence the level of real gross domestic product at the current price in Nigeria is a key indicator in determining assets performance.

**Hypothesis 5:**

**H₀₅:** There is no significant relationship between inflation rate and asset performance. Examination of the empirical results, the coefficient of inflation rate fails the significance test at the 5 percent level as its t-statistic of -1.40 (in absolute value) is not significant at the 5 percent level. The study, therefore, accepts the null hypothesis thus; the inflation rate is not a significant variable in determining assets performance DMBs’ in Nigeria.

### 4.5 Discussion of Findings and Policy Implications

The model estimates analyzed in the previous sections are statistically robust and have inevitable policy implications. Primarily, the independent variables are informing in explaining the performance of the asset of deposit money banks in Nigeria. Subsequently, the degree of correlations among the variables are relatively low; therefore, it means that nor of the variable can be a substitution for one another as the independent variables are an individual driver of DMBs’ ROA. Therefore, banks’ management needs to seriously put into account the implication of each variable in their decision making to deliberately boost assets performance. The estimated results reveal that the ROA of deposit money banks used in the study show dissimilarity among the sampled deposit money banks. The varying and heterogeneous patterns can be attributed to the individual characteristics of the banks. However, to enhance and maintain the high sustainability of ROA, appropriate identification of the internal and external variables that have positive implications must be considered by the management of banks in decision making processes regarding the improvement of assets performance. Also, the empirical results have shown the indispensability of increased size, liquidity, and favourable economic conditions in stimulating the performance of the asset of deposit money banks in Nigeria. Nevertheless, size and liquidity issues need to be handled with appropriate cautions to eschew diseconomies of scale arising out of unmanageably large size and excess liquidity that hamper managerial control and decision making becomes extremely complex. Besides, we must acknowledge fact that the variables are mutually strengthening assets performance of deposit money banks, hence, we reiterate the need for bank managers to pay proper policy attention to these internal factors as they have considerable managerial control over them with aim of boosting assets performance. The non-interest income to total assets is chosen as a driver of assets performance to acknowledge the importance of fee-based services of banks and product diversification. The fee-based services argument incomes to banks. However, the income generated from the non-traditional business sources is always less compared to that generated from loans and advances. From the results of the study, it is observed that the explanatory variables were not significant in explaining the performance of the asset of DMBs throughout the study covered. This is in line with Abebe [31]. The implication therefore that DMBs have undermined the potential of generating incomes through diversification over the period.

Finally, according to the empirical results of this study, inflation has a diminishing impact on the performance of the asset of DMBs in Nigeria. The implication of this is that there is a need for DMBs to explore better ways of a factor in inflation effect into the fees, interest incomes charge by banks to counteract the inflation effect on expenses incurred by banks, to mitigate the deteriorating effect of inflation on the performance of the asset in Nigeria.

### 5. CONCLUSION

In conclusion, given the paramount and strategic position which the deposit money banks occupied in the nation economy, especially in the face of recent acquisition, merger and financial
globalization, the imperative is on policy makers and bank management to ensure transparency through properly articulated regulations to install public confidence and strengthen operations of the banking sector. This is a necessity for the bank managers to gear towards optimum utilization of resources, efficient liquidity management, maintain prudent risk control measures and sound competitive operations for performance enhancement. Outwardly, the sustenance and viability of the banking sector is strongly hinged on appropriate regulations, efficiency and good public image for better performance.

In addition, banking sector have vital role to play in the Nigerian economy, to provide enable environment, particularly banking industry regulatory agencies and other stakeholders need to revisit existing regulatory framework that have been cog in the wheel of efficient and global competitiveness of Nigerian banking industry without undermining the importance of comprehensive and rigorous distress testing in order to prevent and mitigate unanticipated banks failures that endangers public confidence in the sector.

Conclusively, banking sector being a giant spider in the web of Nigerian financial system that when it shakes, the economic will be affected, specific and performance enhancing policy measures based on rigorous banking sector investigation and analysis are necessities to create opportunities for rapid performance improvement and the sector development. Internally, serious and effective financial resource mix policies should be strategically formulated and implemented by banks management that will not only minimize the cost of operations but also to maximize returns from profitable diversification capable of creating better growth opportunities and performance. No doubt, putting all these measures in place will not only ensure a sound and resilient banking sector but also a pathway to healthy economic growth and development of Nigeria.

5.1 Recommendations

Base on the empirical findings of this study, the following policy recommendations are suggested for implementations:

1. Bank managers as a matter of operational necessity should institute sound, efficient, and sustainable assets management policies such that optimum and productive allocation of assets of the banks to improve banks' performance in Nigeria.

2. Banks management should strictly adhere to existing regulatory guidelines, international standards, and ensure reasonable and adequate liquidity is maintained to avoid the cost associating with adverse and high liquidity conditions which may affect the efficiency of the banks.

3. Strategic policy on diversification should be formulated by the bank managers to ensure that income generation capacities of banks are widening rather than a complacent reliance on incomes derive from the granting of loans and advances.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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