



Effect of Interest Rate Determinants on the Aggregate Performance of Deposit Money Banks in Nigeria's Banking Sector

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Abstract

In this paper, the effect of selected interest rate determinants on the performance of Deposit Money Banks in Nigeria are investigated. In this context, the interest rate determinants are analyzed for their significant effect on the performance of the banks as measured by the Asset size, and related to that the determinants are further analyzed for significant difference between periods of high bank performance and low bank performance over the period of 1998 to 2015.. Data were sourced from the Central Bank of Nigeria Statistical bulletin and World Development Indicators. The findings of Multivariate ordinary least squares regression revealed that exchange rate has a positive and statistically significant effect on Aggregate Deposit Money Bank performance, Monetary policy rate and Credit Risk have a negative and statistically significant effect on Deposit Money Bank performance, while Inflation rate and savings deposit rate have a statistically insignificant effect on Aggregate Deposit Money Bank performance. Results of independent samples t-test revealed significant difference in means of interest rate determinants between high and low aggregate bank performance periods. The study recommends Naira devaluation and reduction of monetary policy rate amongst other recommendations to boost aggregate bank performance in Nigeria.

Key Words: *Deposit Money Bank performance, Interest rate determinants, Total Assets, Exchange rate, monetary policy rate, credit risk, Savings Deposit Rate, Inflation Rate, Nigeria*

JEL classification: *E43, E44, E58, G21*

Introduction

Deposit Money Banks, popularly referred to as Commercial banks in the bank finance literature, play a vital role in the economic resource allocation of countries (Otuori, 2013). They contribute to economic growth of the country by making funds available for investors to borrow as well as promoting financial deepening in

the country. In the case of developing countries such as Nigeria, Deposit Money Banks are the major engine for mobilizing savings for investment which subsequently boosts economic growth.

Savings are attracted from depositors who have excess funds and therefore save some in the bank in return for interest by the bank, referred to as savings deposit rate. The banks in paying the savings deposit rate to savers do so as the savings of depositors are lent to investors for profitable investment and the investors in return pay the banks interest on their loan borrowed otherwise referred to as lending rate. This interest rate charged by the bank to investors for loans lent, however tends to be higher than the savings deposit rate of the bank and hence the difference between the bank's rate of interest charged for loans and that paid to savers for their deposit, referred to in the bank literature as the interest rate spread, constitutes the banks reward to financial intermediation. Therefore interest rates by nature constitute the Deposit money banks major source of revenue.

Interest rates at which banks lend money are on the rise in world financial markets on account of increased uncertainty of the world economy. This is especially the case given various past adverse global financial and economic occurrences. Consequently, banks have succeeded in realizing huge revenues as a result of high interest rate margins charged on loans borrowed by investors. High interest rates charged on loans though by Deposit Money Banks, may discourage investment since it increases investors cost of investment. However to the extent that the loans obtained from Deposit Money Banks are obtained for highly profitable ventures as argued by the financial liberalization literature, high interest rates may conversely promote quality investment and hence banks' increased profitability. Despite this though, rapid rises in interest rate as highlighted by Robinson (2000) may affect bank earnings since such changes in interest rate are unanticipated. This has consequently resulted in the concern for policy makers and bankers of the potential impact of interest rates on Deposit Money Banks financial performance in countries of the world.

Therefore, control of interest rates in economies of the world is of a necessity and in this respect as highlighted by Corb (2012), the Central Bank of Nigeria as the Apex monetary institution in Nigeria, may control inflation in order to boost economic development as part of its monetary policy roles. Monetary policy may be effected by monetary authorities through manipulation of the exchange rate and money supply, amongst a number of variables in affecting the interest rate indirectly and in that respect monetary policy functions of the Central Bank of Nigeria has a bearing on the potential profitability and therefore the performance of Deposit Money Banks in Nigeria.

Variation in interest rates, may be attributed to a wide variety of factors of which some of the most important are inflation rate, exchange rate, monetary policy rate, reserve requirements, liquidity risk, savings deposit rate, credit risk (Maigua and Mouni, 2016; Njeri, Ombui & Kagiri, 2013) given that a significant number of the factors are macroeconomic factors and therefore outside the control of individual banks while affecting all banks in the country. In respect of factors that are bank specific such as credit risk, the highly competitive business environment in which the banks operate may be argued as contributing to the factors and hence highlighting the relative importance of such selected bank-specific factors affecting interest rates. The aforementioned factors giving rise to variation in interest rates based on existing literature are theoretically argued to be related to bank performance and their management remains essential to promoting desirable levels of bank performance. Not only should interest rate as a determinant of Deposit money bank performance be of interest in examining performance of Deposit Money Banks but of importance are those critical factors that indirectly affect bank performance through their effect on interest rate of which inflation, exchange rate, monetary policy rate, savings deposit rate, credit risk, liquidity risk are a few amongst a variety of factors according to existing literature. However of the highlighted factors with respect to the Nigeria banking sector, inflation rate, exchange rate, monetary policy rate, savings, deposit rate, and credit risk will be specifically examined and are in that respect referred to as interest rate determinants of performance of Deposit Money Banks in Nigeria's banking sector in the context of the present study.

A survey of existing studies on interest rates and bank performance highlights that despite the importance of interest rates for bank performance in general, and the considerable number of studies on interest rate in

relation to Deposit money bank performance, yet the effect of the determinants of interest rate on the performance of commercial banks have not been fully ascertained. Deposit Money Banks in Nigeria must achieve performance if the Nigeria economy is to benefit from their invaluable role in the economy. Such performance not only refers to financial performance as popularly discussed in the bank performance literature or market performance, but also refers to performance in terms of increase in the Deposit Money Banks assets which enables such financial or market performance in the first place. Increase in Deposit money bank assets increases the banks' ability to make more loans and therefore the banks perform better. Further, a study on interest rate determinants in relation to Deposit money bank performance has to the best of our knowledge not been performed in Nigeria while existing studies on the topic in other countries of the world are limited. While in Kenya, Maigua and Mouni (2016) explore interest rate determinants, and Khan and Sattar (2014) examines interest rate in relation to bank performance, in Nigeria however, Obidike, Ejeh and Ugwuegbe (2015) examines interest rate spread on the performance of the Nigeria banking industry, Okoye and Eze (2013) explores the impact of bank lending rate on the performance of Nigerian Deposit Money Banks, and Newman (2012) examines interest rate policy and performance of deposit money bank in Nigeria. In addition, inherent weaknesses in the methodology of existing studies exploring interest rate or interest rate determinants on bank performance, are observed which include use of primary rather than secondary data in analysis giving rise to findings based on perception rather than thorough empirical investigation, and inappropriate use of macroeconomic variables as determinants in a panel data of commercial banks within the same country (Njeri, Ombui and Kagiri 2013; and Maigua and Mouni, 2016).

Hence the aforementioned identified concerns of existing studies on interest rate determinants and bank performance constitutes the research gap to be bridged by the present study and is the significant contribution of the study to the finance literature. An additional gap to be filled by the present study is whether the differences between high and low bank performance of Deposit Money Banks in Nigeria's banking sector may justifiably be attributed to differences in the means of interest rate determinants of deposit money bank performance.

In light of the novel contributions of the present study, two hypotheses are tested. The first hypothesis examines whether selected interest rate determinants have a significant effect on the performance of Deposit Money Banks in Nigeria's banking sector, while the second hypothesis examines whether a significant difference exists in the means of selected interest rate determinants of performance of Deposit Money Banks in Nigeria's banking sector during high bank performance compared to low bank performance

The present study in light of its objectives is an exploration of the effect of selected interest rate determinants and their significance on the performance of Deposit money banks in Nigeria's banking sector. In the context of the present study, Deposit money banks refers to the aggregate of Deposit money banks in Nigeria operating in Nigeria's bank sector rather than individual Deposit Money Banks which tends to be more popular in the literature on bank performance. Aggregated Deposit Money Bank performance is important to be examined, as while the performance of individual Deposit money banks may be of some importance to an economy, of significantly more importance is the performance of Deposit Money Banks at the aggregate level. It is the aggregate of Deposit money banks that will together in playing their financial intermediation role support Nigeria's growing economy. In addition in the present study, Deposit Money Bank performance is measured using natural log of aggregated total assets of Deposit Money Banks in Nigeria. This adopted measure of Deposit Money Bank performance contrasts with the traditional measure of bank performance in the finance literature in general for which profitability measures as Return on assets and Return on equity tend to be popularly used, as the banking sector performance on an aggregate level is evident where the banking sector grows in size as a result of increased assets based on the assumption that the banks overtime invests in assets. Banks investment in assets may however be related to banks profitability.

This present study is constituted of 5 sections including the present section. Of the remaining sections of the study, the second section reviews empirical literature on interest rate, its determinants and Deposit Money Bank performance. The methodology adopted in performing this study is discussed in the third

section. The empirical results following data analysis are presented and discussed in the fourth section. The fifth section concludes this study providing conclusions and policy recommendations based on the findings of the study.

Literature Review

Keynes Liquidity preference theory, the classical theory of interest rate, loanable funds theory and Rational expectations theory are some of the most popular theories explaining interest rate determination in the economics and finance literature.

Keynes Liquidity Preference Theory

Keynes liquidity preference theory was put forward by John Maynard Keynes in 1936. The theory is alternatively referred to as the monetary theory of interest rate. According to Keynes, the rate of interest is determined by the supply of money and the desire to hold money. That is the rate of interest in the Keynesian theory is determined by the demand for money and supply of money. The demand for money is the sum of transaction, precautionary and speculative demands for money, while the supply of money is determined by the policy of the Central Bank of a Country. Interest is the price paid for borrowed funds. People like to keep cash with them rather than investing cash in assets. Thus, there is a preference for liquid cash. Money is consequently viewed as a liquid asset and interest is the compensation for the loss of that liquidity when the money is saved or invested in assets, hence the rate of interest is determined by monetary variables. The rate of interest is what brings savings and investment in line and hence the popular savings-investment equality.

Classical Theory of Interest Rate

The classical theory of interest rate was put forward by economists from the classical economics school of thought. The school of thought includes economists as David Ricardo and Alfred Marshall. The classical theory of interest rate argues that the rate of interest is determined by two forces: the supply of savings derived mainly from households, and the demand for investment capital coming mainly from the business sector. The demand for capital is a function of the productivity of capital; the supply of capital is a function of the individual abstaining from consuming current output. Interest arises because capital is 'productive' and 'scarce' in relation to the demand for it. On the other hand and on the supply side, households supplying capital for firms through their savings prefer present to future consumption but may be enticed to sacrifice their desire for present consumption by being paid interest rate on their savings. For investment to take place therefore, there must be a prior pool of savings. Further, a high interest rate induces savings but restrains investment. This contrasts with the Keynesian view of interest rate determination that savings result because of investment which brings about income which is saved, and so a high interest rate may reduce savings because it restrains investment and consequently income.

Loanable Funds Theory

The loanable funds theory of interest rate determination argues the equilibrium interest rate in a market to result from the interaction of demand for loanable funds by consumers, businesses and Government; and supply of loanable funds by direct lenders, such as banks, mortgage companies, credit card companies, and purchasers of the interest-bearing financial assets - the bonds, notes, and bills (which include the Central Bank). Note that the demand for credit consists of two components: (1) the direct demand for credit through loan applications (by consumers, for example) and, (2) the sale of all classes of interest-bearing financial assets as a means to raise money. Demand for loanable funds increases with a fall in the interest rate and factors argued to affect demand for loanable funds include government budget deficits, consumer borrowing, business borrowing, residential and business mortgages, foreign demand for local funds, inflationary expectations, consumer confidence, rates of profit, demographic variables, wealth and income growth. Conversely, supply of loanable funds increases with a rise in the interest rate and factors argued to affect supply of loanable funds include consumer savings rates, Business savings rates, mandatory savings (such as Pensions), Central Bank credit creation, Foreign purchases of local financial assets, inflationary expectations, consumer confidence, rates of profit, demographic variables, wealth and income growth

Rationale Expectations Theory

Rationale expectations theory of interest rate argues that people on the basis of available information in the market formulate expectations of the future concerning interest rates and react accordingly to such expectations which affects interest rates in the market. Rational expectation theory holds that the best estimation for future interest rates is the current spot rate and that changes in interest rates are primarily due to unexpected information or changes in economic factors. Thus according to rationale expectations theory, if expectation of the people is that interest will rise many people will avoid borrowing, and on the other hand, people expect interest rate to drop people would be willing to borrow (Bekaert, 1998).

Interest Rates and the Financial intermediation role of banks

Interest rates play a role in the decision by banks to lend money to borrowers, the decision by savers to save money and the decision of investors to invest. Thus interest rates may be argued as being central to financial decision-making and on this basis are related to the performance of the banking sector of countries of the world as a tool to bring about optimal banking sector performance. Consistent with this, Khan and Sattar (2014) find in Pakistan that interest rates have a strong positive and significant correlation with commercial bank profitability.

Financial intermediation by banks across the world, to the extent that it is an important function of the banks in country bank sectors, interest rates play a role in financial intermediation in ensuring that funds of savers lent to borrowers are put into profitable projects where they will realize significant returns and consequently banking sector performance results. However interest rates as one of factors affecting bank performance is affected by a variety of factors which are inflation rate, money supply and monetary policy rate as highlighted by Ajudua and Okonkwo (2015) who find a positive and significant relationship between inflation rate, money supply and monetary policy rate on the one hand, and trend of interest rate using Error correction model in Nigeria over the period of 1986 to 2012. The determinants employed in their estimated model based on theory were inflation rate, money supply and monetary policy rate. Data were analyzed using Augmented Dickey Fuller Unit root test, Johansen cointegration test and error correction mechanism. The findings revealed that: there existed a significant relationship between interest rate and the explanatory variables selected in the study. It was recommended that an investment-friendly rate of interest is necessary for promoting economic growth; infrastructural decay should be addressed as infrastructural expenditure incurred by banks are passed to borrowers through interest rate.

Further, Onanuga and Shittu (2010) analyze the determinants of interest rate in Nigeria within the framework of a vector error correction model using quarterly data between first quarter of 2000 and last quarter of 2008. The study employing treasury bill rate as a measure of interest rate, found that that Treasury Bill Rates (TBR) in Nigeria and its hypothesized determinants are generally I (1) series, with two cointegrating equations existing among their linear combinations. Results based on normalisation of the restricted VAR system in respect of the TBR and real GDP revealed that Real money supply (RMS) and Expected Foreign Returns (EFR) exerts significant ($p < 0.01$) long-run influence on both the TBR and domestic outputs. The equilibrium relationship was found to be stable, with exogenous shocks due to TBR being corrected within 92 days, while those due to real output are corrected within 4-days. In general, rising domestic outputs and past quarters' TBR leads to significant increases in current TBR in Nigeria, while increase in past quarters' RMS cause current TBR in Nigeria to decline.

Related to interest rate is the interest rate spread which was found by Njeri, Ombui and Kagiri (2013) in the case of commercial banks in Kenya using primary data to be influenced by inflation rate, return on average asset, liquidity risk and credit risk to a substantial extent. Despite the liberalization of the financial sector, high interest rate spreads was argued as still an issue of concern in a number of African countries, including Kenya. Primary data on the factors affecting interest rate spread collected with the aid of questionnaires distributed to a sample of 103 credit officers in commercial banks in Kenya, selected from a population of 1036 credit officers using stratified random sampling was analysed, and the impact of the factors quantified. The data collected was analyzed using inferential statistics and descriptive statistics which involved frequencies and mean. The inferential statistics involved the use of Pearson's correlation and regression analysis. However, of the determinants of interest rate spread found as significant by Njeri,

Ombui and Kagiri (2013), Were and Wambua (2013) in a study of 44 commercial banks in Kenya over the period of 2002 to 2011 found credit risk as measured by non-performing loans to total loans ratio, and return on average assets as significant determinants of interest rate spread having a positive effect. Further bank size and operating costs as bank-specific determinants also play a positive and significant role. On the other hand, higher bank liquidity ratio has a negative effect on the spreads, the impact of macroeconomic factors such as real economic growth is insignificant and the effect of the monetary policy rate is positive but not highly significant. The findings of Were and Wambua (2013) is highlighted to largely reflect the structure of the banking industry in Kenya, in which a few big banks control a significant share of the market. This further highlights the inevitable level of intense competition in banking sectors in countries of the world especially those of developing countries in general, notably those of sub-Saharan Africa.

Interest Rate Determinants and Banking Sector Performance

Given the finding of country-specific and bank-specific factors affecting interest rate as well as its spread, and the role of interest rates in enabling banks realize huge returns on loans lent for investment, interest rate determinants may be related to banking sector performance. Maigua and Mouni (2016) investigated influence of interest rate determinants on the performance of commercial banks in Kenya. The study employed as interest rate determinants, inflation rate, discount rate, exchange rate and reserve requirement. The target population for the study was 43 commercial banks operating in Kenya and a mix of primary and secondary data was used for their analysis. Specifically ordinary least squares regression was used to estimate their model using secondary data. The results showed that discount rate, inflation rate and exchange rate leads to higher performance in commercial banks in Kenya, while higher level of reserve requirement ratio results in lower bank performance. These determinants are monetary policy instruments by nature and while the results of analysis may have merit, it is questionable the validity of estimating pooled ordinary least squares for a panel data sample of banks based on secondary data whereby the interest rate determinants which are country level variables by design are invariant across sample banks. However, Staikouras and Wood (2011) reviews the literature on bank performance studies and classifies the bank profitability determinants in addition to quantifying how internal determinants ("within effects" changes) and external factors ("dynamic reallocation" effects) contribute to the performance of the EU banking industry as a whole in 1994-1998. Ordinary Least Squares and fixed effects models were constructed, and the results provide a new perspective for understanding the impact of changes in competition on the performance of the EU banking industry. The estimation results suggest that the profitability of European banks is influenced not only by factors related to their management decisions but also to changes in the external macroeconomic environment.

Interest rates given their tendency to vary considerably over time more so in an era of post-financial liberalization where interest rates have become increasingly unstable and have been rising in general over time must be examined over time for its effect on financial and economic variables. Consistent with this, Ogunbiyi and Ihejirika (2014) examines how interest rate affect the profitability of Deposit Money Banks in Nigeria using country aggregate level annual data that covered a period of thirteen years 1999 to 2012 and made use of multivariate regression analysis. It was found that maximum lending rate, real interest rate, and savings deposit rate have negative and significant effects on the profitability of Nigeria deposit money bank as measured by return on asset. Thus addressing maximum lending rate, real interest rate, and savings deposit rate by bringing about a reduction will boost the profitability of Nigeria Deposit Money Banks. This finding is consistent with that of Obidike, Ejeh and Ugwuegbe (2015).

Obidike, Ejeh and Ugwuegbe (2015) examined the impact of interest rate spread on the performance of Nigerian banking industry for the period of 1986-2012. The study used Ordinary Least Squares (OLS) method of estimation to analyze the data generated from Central Bank of Nigeria (CBN) statistical Bulletin and World Bank online database. Testing for the properties of time-series, ADF test indicates that all the variables are integrated of same order $I(1)$. The Co-integration test reveals that there exists a long-run relationship among the variables under consideration. The result shows that interest rate spread, negatively and significantly impact on bank performance in the long-run. Exchange rate and GDP was found to be positively and significantly affecting bank performance in Nigeria at the long-run. The result of the ECM indicates that 23.37 percent of the disequilibrium in the model will be corrected annually. Moreover at the

short-run interest rate spread also negatively but insignificantly affect bank performance in Nigeria. The study recommended that Government should improve the macroeconomic environment by striving to develop the level of infrastructural facility in the country as well as reducing the level of insecurity in the country by cubing the menace of the Boko-Haram sect and that of Militancy in Nigeria. Therefore banks should not rely only on interest income if they must continue in business.

Irungu (2013) examines Kenya commercial bank performance using secondary data for the period of 2011 to 2012, for the existence of a relationship between interest rate spread and the performance of commercial banks in Kenya. The target population in this study is all 43 commercial banks in Kenya. Data was collected from central banks supervision report. The data collected was analysed using Regression analysis.

The study found that there is strong positive relationship between financial performance of commercial banks with interest rate spread. The study found that interest rate spread affect performance assets in banks as it increases the cost of loans charged on the borrowers, regulation on interest rates have far reaching effects on assets nonperformance.

The study recommends that there is need for government to regulate interest rates as this would help to safeguard borrowers from exploitation by commercial banks. However Okoye and Eze (2013) examined the impact of bank lending rate on the performance of Nigerian Deposit Money Banks between 2000 and 2010. The study specifically determined the effects of lending rate and monetary policy rate on the performance of Nigerian Deposit Money Banks and analyzed how bank lending rate policy affects the performance of Nigerian Deposit Money Banks. Secondary data was employed in their analysis and econometrics was used in a regression in model estimation. The results of data analysis confirmed that the lending rate and monetary policy rate have significant and positive effects on the performance of Nigeria Deposit Money Banks. The implication of these is that lending rate and monetary policy rate are true parameters of measuring bank performance. The study recommends that government should adopt policies that will help Nigerian Deposit Money Banks to improve on their performance and there is need to strengthen bank lending rate policy through effective and efficient regulation and supervisory framework.

Enyioku (2012) however examines the performances of banks and macro-economic performance in Nigeria based on the interest rate policies of the banks. The study analyses published audited accounts of twenty (20) out of twenty-five (25) banks that emerged from the consolidation exercise and data from the Central Banks of Nigeria (CBN). The year 2004 was denoted as the pre-consolidation period while the year 2006 was denoted as the post-consolidation periods for the analysis. The study noticed that the interest rate policies have not improved the overall performances of banks significantly and also have contributed marginally to the growth of the economy for sustainable development. The study concludes that the Nigeria banking sector is becoming competitive and market forces are creating an atmosphere where many banks simply cannot afford to have weak balance sheets and inadequate corporate governance. The study posits further that consolidation of banks may not necessarily be a sufficient tool for financial stability for sustainable development. The study recommended that bank interest rate policy in the financial market must be market driven to allow for efficient process.

Research and Methodology

Conceptual Framework

The present study is built on the conceptual framework as in Figure 1 below bringing together the selected interest rate determinants and how they affect aggregate deposit money bank performance. This model is applicable in the absence of applicable theories that bring together interest rate determinants of deposit money bank performance and deposit money bank performance.

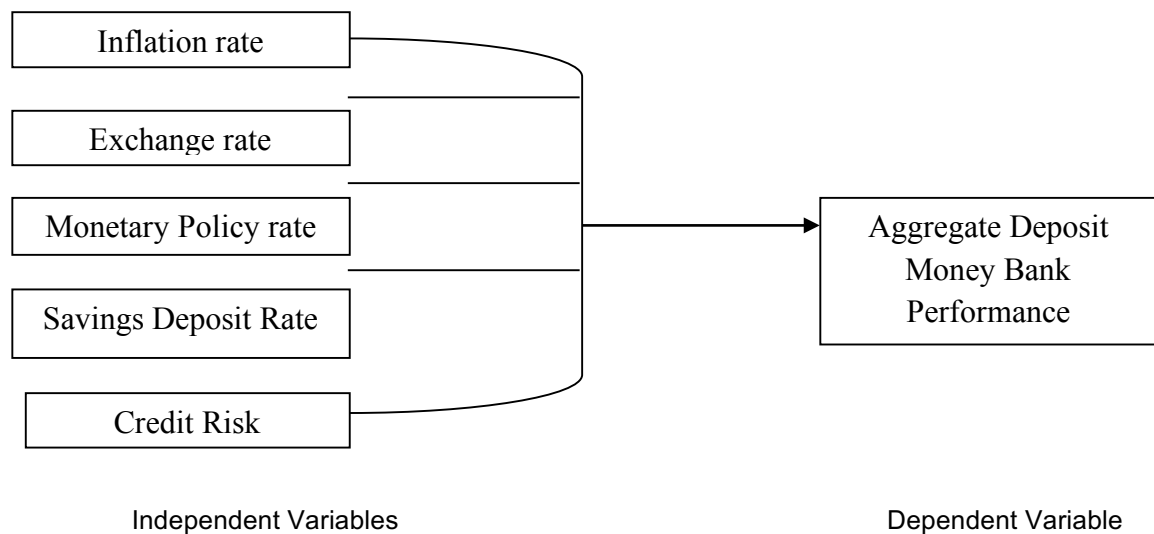


Figure 1: Conceptual Framework of Interest determinants on Aggregate Deposit Money bank performance

The above framework highlights that inflation rate, exchange rate, monetary policy rate, savings deposit rate, credit risk, which together constitute the selected interest rate determinants for the present study individually affect aggregate performance of Deposit Money Banks in Nigeria's banking sector

Model Specification

Two models are adopted in testing the formulated hypotheses of the present study given the two hypotheses formulated to be tested.

Effect of Interest Rate Determinants on Aggregate Bank Performance

A multivariate model is specified for testing the first hypothesis of this study. Similar variables as employed by Maigua and Mouni (2016) are employed. This study however modifies Maigua and Mouni (2016) model by excluding reserve requirement and discount rate and instead employing savings deposit rate, monetary policy rate and credit risk in the model. The general form of our model is as in equation (1)

$$\text{Aggregate Deposit Money Bank performance} = f(\text{inflation rate, exchange rate, monetary policy rate, savings deposit rate, credit risk}) \quad (1)$$

Equation (1) above is written as an econometric model as in equation (2) below.

$$AGGDMBPERF_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 EXR_t + \alpha_3 MPR_t + \alpha_4 SDR_t + \alpha_5 CREDRISK_t + \mu_t \quad (2)$$

Where: AGGDMBPERF = Aggregate Deposit Money Bank Performance; INF = Inflation rate; MPR = Monetary Policy rate; SDR = Savings deposit rate; CREDRISK = credit risk and μ is the stochastic error term. $\alpha_0 = \text{Constant}$. $\alpha_1 \dots \alpha_5$ are coefficients of independent variables measuring the marginal effects of respective independent variables on commercial bank performance. The subscripts t denote the time period of the variables which is 1998 to 2015. It is expected that on the basis of theory, the following are the prior signs of the coefficients of independent variables: $\alpha_1 < 0$, $\alpha_2 > 0$, $\alpha_3 < 0$, $\alpha_4 > 0$, $\alpha_5 < 0$

Significant Difference in Interest rate determinants Between High and Low Bank Performance

In testing the second hypothesis of the present study, comparing interest rate determinants for significant difference during high and low Aggregate Deposit Money Bank performance, the independent samples t-test was employed. In this context high bank performance refers to Aggregate bank sector performance above the second quartile of the distribution of aggregate Deposit Money Bank total assets while low performance on the other hand refers to performance at or below the second quartile of the distribution of

aggregate Deposit Money Bank total assets. The independent samples t- test therefore tests whether the difference in means of determinants in high bank performance compared to low bank performance are significant. This will provide evidence regarding the relative effects of the interest rate determinants in different bank performance periods. The test statistic for the independent sample t-test denoted t follows the formula as in equation (3) below.

$$t = \frac{X_H - X_L}{S_{X_H - X_L}} \quad (3)$$

Where,

X_H = Sample Mean of respective interest rate determinants during High Deposit money bank performance

X_L = Sample Mean of respective interest rate determinants during low Deposit money bank performance

$S_{X_H - X_L}$ = Standard error of the mean difference of the respective interest rate determinants during high and low bank performance.

Measurement of Variables

AGGDMBPERF: This is the Aggregate performance of Nigeria's Deposit Money Banks in Nigeria's banking sector. It is measured by the log of the aggregated total assets of Nigeria Deposit Money Banks.

INF: This is the inflation rate defined as the continuous increase in the general price level . It is measured in percentage

EXR: This is measured as the cost of US\$1 in terms of Naira

MPR: This is the rate of interest paid by the Nigeria Deposit Money Banks to the Central Bank of Nigeria for loans borrowed from the Central Bank of Nigeria.

SDR: This is the rate of interest paid by Nigeria Deposit Money Banks to depositors for use of their savings for lending to investors for investment.

CREDRISK: This is measured by the Non-performing loans to total loans ratio of the aggregate of Nigeria Deposit Money Banks in Nigeria's banking sector..

Data Type and Source

Data employed for the present study was secondary data from 1998 - 2015. Data on total assets of Aggregate Deposit Money Banks in Nigeria, inflation rate, exchange rate, monetary policy rate, and savings deposit rate, were obtained from the Central Bank of Nigeria statistical bulletin 2015. Data on non performing loans to total loans ratio of Aggregate Deposit Money Banks in Nigeria were obtained from the World Bank World Development Indicators.

Estimated Results

The results of data analysis as well as model estimation including necessary model pre-estimation tests are as presented and discussed in this section.

Descriptive Statistics

The summary statistics of the variables of interest of the present study are presented in Table I. All the variables used for the econometric investigation in this study covers the period 1998 – 2015. All variables show some considerable amount of variability in their values over the sample period of study as evident from Table 1

Table 1: Descriptive Statistics of Variables

Variables	Total Assets (In Billions of Naira)	Inflation Rate (In %)	Exchange Rate (N/US\$)	Monetary Policy Rate (in %)	Savings Deposit Rate (In %)	Non performing Loans to Total Loans (In Decimal Figures)
Mean	11537.18	11.27	132.17	12.61	3.58	15.13
Median	9077.31	11.19	131.58	12.50	3.56	18.75
Maximum	28312.44	18.90	196.99	20.50	5.49	37.25
Minimum	694.62	5.42	21.89	6.00	1.41	2.96
Std. Dev.	9651.72	3.80	36.67	3.71	1.28	9.66
Skewness	0.35	0.40	-1.26	0.14	0.028	0.38
Kurtosis	1.60	2.37	5.89	2.90	2.01	2.46
Observations	18	18	18	18	18	18

Source: Author's Computation (2018)

Multicollinearity Test for Estimated Model

The model of the present study prior to estimation using Ordinary least squares was tested for the presence of excessive multicollinearity between the independent variables of the model. The presence of excessive multicollinearity results in the Ordinary least squares regression estimates to be biased. Table 2 below presents the results of pair wise correlations of the independent variables of the model estimated.

Table 2: Pair Wise Correlation Test Results

Independent Variables	Inflation Rate [INF]	Exchange Rate [EXR]	Monetary Policy rate [MPR]	Savings Deposit Rate [SDR]	Non performing Loans to Total Loans [CREDRISK]
Inflation Rate [INF]	1.00	0.0413	0.238	0.0396	0.311
Exchange Rate [EXR]	0.0413	1.00	-0.337	-0.665	-0.400
Monetary Policy rate [MPR]	0.238	-0.337	1.00	0.679	0.118
Savings Deposit Rate [SDR]	0.0396	-0.665	0.679	1.00	0.486
Nonperforming Loans to Total Loans [CREDRISK]	0.311	-0.400	0.118	0.486	1.00

Source: Author's Computation (2018)

The above Table 2 indicates the absence of excessive multicollinearity of the independent variables of the model estimated as no pair wise correlation is at |0.8| or higher. Excessive multicollinearity as defined by Gujarati (2008) refers to pair wise correlation between two independent variables of |0.8| or above. Therefore all independent variables are valid for inclusion in the model estimated and so Ordinary least squares as a method to be used in estimating the specified model is valid.

Empirical Analysis

In examining the effect of selected interest rate determinants on the performance of Deposit Money Banks in Nigeria's banking sector as measured by the size of total Deposit Money Banks assets, the present study employed ordinary least squares regression. This is in pursuit of the achievement of the second objective of the present study. Ordinary least squares regression results in regression estimates that are best linear unbiased estimator in that they are unbiased, consistent and have minimum variance in the class of all unbiased estimators. Table 3 below shows the results of the estimated model for the present study.

Table 3: Ordinary Least Squares Regression Estimated Result

Dependent Variable: AGGDMBPERF				
Sample: 1998 2015				
Included observations: 18				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.092	0.656	13.865	0.0000
INF	0.011	0.025	0.431	0.6744
EXR	0.016	0.003	5.380	0.0002
MPR	-0.111	0.035	-3.147	0.0084
SDR	-0.180	0.129	-1.388	0.1904
CREDRISK	-0.031	0.011	-2.744	0.0178
R-squared	0.9468	Durbin-Watson stat		1.948
Adjusted R-squared	0.9246			
F-statistic	42.72	***		

,* represent significance at 5% and 1% levels of significance

Source: Author's Computation (2018)

From the results in Table 3, The R-squared of 0.9468, adjusted R-squared of 0.9246, Durbin Watson Statistic of 1.948 and statistically significant F-statistic of 42.72 all indicate that the model estimated is valid and the regression result estimates are credible to be used for making sound policy decisions.

Further from Table 3 above, of all the signs of estimated coefficients only that of exchange rate (EXR), Monetary Policy rate (MPR), and Credit risk (CREDRISK) move in line to their prior expectations. The independent variable, Exchange rate is positive and statistically significant at the 1 percent level of significance. Thus increase in exchange rate results in a boost to the performance of Deposit Money Banks in Nigeria's banking sector. Increase in exchange rate results in attraction of foreign investors to Nigeria and as they invest in Nigeria, they borrow funds from the Nigeria deposit money banks at attractive rates of interest which result in the banks realizing profits on such loans.

The independent variables, Monetary policy rate (MPR) and Credit Risk (CREDRISK) are negative and statistically significant at 1 percent and 5 percent levels of significance respectively. This means that increases in monetary policy rate by the Central Bank of Nigeria and increase in Credit risk adversely affects the performance of Nigeria Deposit Money Banks in Nigeria's banking sector. While borrowing by Nigeria Deposit Money Banks from the Central bank of Nigeria results in a decline in their performance as the banks possess less resources to invest in their expansion as a result of the loan borrowed, increased credit risk results in poor deposit money bank performance as some loans turn irrecoverable as a result of bad lending decisions. Inflation rate and Savings deposit rate are however insignificant in the model estimated.

The findings of the present study with regards to exchange rate is consistent with findings of Ajudua and Okonkwo (2015) and Maigua and Mouni (2016) who find a positive and significant effect of exchange rate on interest rate and interest rate determinants respectively. However in contrast to the finding of Ajudua and Okonkwo (2015) as well as Okoye and Eze (2013), of a positive and significant effect of monetary policy rate on the interest rate, the present study finds a negative effect of monetary policy rate on Nigeria Deposit Money Banks performance.

Independent Samples t-Test

The results of independent Samples t-test are presented in Table 4. The results show that the means of interest rate determinants during low aggregate bank performance were higher in respect of all interest rate determinants except for exchange rate. This suggests that low Aggregate Deposit Money Bank performance may have been a result of high values on average of Inflation rate, Monetary policy rate, Savings deposit rate, and Non Performing loans to total loans ratio. Further in respect of the test of difference in means of selected interest rate determinants as shown by the significance of the respective t-statistics of the mean difference of selected interest rate determinants, the means of exchange rate, monetary policy rate, savings deposit rate and Non Performing loans to total loans ratio respectively are significantly different during high Aggregate bank performance compared to low Aggregate bank performance.

Table 4. Independent Samples t-Test Results

Variable of Interest	Number of Observations	Mean of Variables		Mean Difference	t-Statistic
		High Performance	Low Performance		
Inflation Rate [INF]	18	10.22	12.32	-2.102	-1.187
Exchange rate [EXR]	18	153.81	110.53	43.29	3.058***
Monetary Policy rate [MPR]	18	10.17	15.06	-4.89	-3.698***
Savings Deposit Rate [SDR]	18	2.61	4.56	-1.95	-4.979***
Non performing Loans to Total Loans [CREDRISK]	18	10.51	19.74	-9.24	-2.260**

** ,*** represent significance at 5% and 1% levels of significance.

Source: Author's Computation (2018)

Conclusion

In light of the above findings, the following recommendations are made. Firstly, the exchange rate of the Naira should be increased so as to attract foreign investors to Nigeria as this will encourage their patronage of Nigeria Deposit money banks for loans which when lent to profitable ventures will result in improved bank performance. Secondly, Monetary policy rate of set by the Central Bank of Nigeria, should be reduced so as to promote Nigeria deposit money bank profitability and consequently boost their performance. Thirdly, effective monitoring of the activities of Nigeria Deposit Money Banks and close supervision of the banks should be done by the Central Bank of Nigeria in ensuring that the banks only lend to highly profitable ventures and reduce their probability of loans being given out turning irrecoverable and hence adversely affecting their performance. Finally, Nigeria Deposit Money Banks in general should ensure that they reduce their excessive risk taking behavior in their drive for increased profitability so as not to adversely affect their performance.

In conclusion the findings of the present study highlights that the interest rate determinants of exchange rate, monetary policy rate, savings deposit rate and credit risk are significantly different during high Aggregate Deposit money bank performance compared to low Aggregate Deposit Money Bank performance in Nigeria and hence the determinants are important. Further the study highlights the need for all Deposit Money Banks in Nigeria in seeking for better performance collectively and in light of a tight credit market in Nigeria to individually pay close attention to the effective management of the highlighted interest rate determinants, especially those in which they are in control of such as savings deposit rate and credit risk, while the Central Bank of Nigeria given their influence over exchange rate and monetary policy rate, also have to ensure that they support the performance of Deposit Money Banks in Nigeria collectively as the banks support and contribute positively to the Nigeria economy through their individual financial intermediation roles.

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