Interest Rate Deregulation and Performance of Deposit Money Banks: Time Series Evidence from Nigeria

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ABSTRACT: This work investigated the relationship between interest rate deregulation and performance of Nigerian deposit money banks for the period 1996-2018. Interest rate deregulation was disaggregated into prime lending rate, maximum lending rate, 3-months deposit rate and over 12-months deposit rate while return on assets (ROA) was used as a proxy for deposit money banks' performance. Data on the above variables were sourced from the Central Bank of Nigeria Statistical Bulletin (2018 edition) and the World Bank data base. The data were tested for stationarity using the Dickey-Fuller (D-F) test, for long-run relationship using Bound's co-integration test, and for reliability of ARDL results using serial correlation, heteroscedasticity and normality tests. The results of the tests revealed that all the variables were integrated of order zero or one, and that a long-run relationship exists between the variables. Consequently, ARDL model for parameter estimation process revealed that only prime lending rate was positively related to ROA of banks while none of the explanatory variables was statistically significant. The researcher then submitted that there is no significant relationship between interest rate deregulation and the performance of Nigerian deposit money banks for the period considered. Hence, deposit money banks should strive to mobilize adequate savings from surplus spenders by offering them deposit rates that are capable of inducing savers to increase their savings and boost the availability of loanable funds. Also, there is urgent need to restructure the Nigerian financial system whereby policies by the monetary authorities will achieve pre-determined goals. In essence, to make interest rate policies meaningful, there is need to curtail financial transactions that escape the banking system.

KEYWORDS: Interest Rate Deregulation, Performance of Deposit Money Banks, Time Series Evidence, Nigeria

INTRODUCTION

In an effort to curtail government involvement in the Nigerian economy, a set of structural adjustment initiatives were undertaken in 1986 by the Nigerian government. These initiatives was tagged the Nigerian Structural Adjustment Programme (SAP). The major policy measures under the SAP covered the second-tier foreign exchange market (SFEM), privatization and commercialization, withdrawal of petroleum subsidy, trade liberalization, debt conversion scheme/programme, bureau de change, and interest rate deregulation. Prior to 31 July, 1987, interest rates in the country were directly managed by the Central Bank of Nigeria (CBN). In the absence of a well-developed financial market, the management of interest rate then was based on expert advice. Under this system, the CBN did set the deposit and lending rates of the financial intermediaries at their prevailing levels. In addition, the government did set the rates for lending to specified sectors of the economy, with a view to encouraging or discouraging lending to those sectors. It was because of this that lending rates to agriculture, small-scale industries, and residential building construction were lower than the rates for other borrowers (Ugwuanyi, 2012).

The CBN, on 31 July, 1987 announced the abolition of all controls of interest rates by the Nigerian government. In effect, deregulation of interest rates commenced on the 1st day of August 1987. By implication, lending and deposit rates were to be determined by the forces of demand and supply. This explains why there is no uniform lending rate among deposit money banks today. Also, customers of the same bank are charged different rates. High creditworthy customers (borrowers) are charged prime lending rate while others are charged the normal lending rate which is a function of the customer's credit rating. The interest rate deregulation policy on the other hand also afforded banks the ability to have deposit rate portfolio. Today, different deposit rates exist in the system. The annual deposit rate depends on the amount and duration of deposit. According to CBN (2018), the classifications on this front are: 3 months deposit rate, 3-6 months deposit rate, 6-12 month deposit rate and over 12 month deposit rate.

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However, the likes of Onoh (2019) argued that interest rate in Nigeria is still indirectly regulated. He opined that "The monetary policy rate (MPR) which the Central Bank uses to control interest rate still determines the direction of interest rate flow in deposit money banks in Nigeria. A higher MPR means interest rate will be high and vice versa. The cash reserve ratio and liquidity ratio which the central Bank uses mainly to ensure stability and reduction of risk in the banking sector also exerts high influence on how interest rate are determined by the deposit money banks in Nigeria.

Nevertheless, Ozigbu (2018) opined that "the main source of investable funds remains bank deposits, and loans and investments". While other sources exist, the main source of income and profitability of banking remains the spread or difference between the rates at which various deposits are received and the rate they are loaned out. As such, banks in the deregulated environment borrow at the least possible rate and lend at the highest possible rate. The difference between both rates is a pointer to how efficient the management of a bank is. All financial performance indicators of a bank like return on assets, return on equity, net interest margin etc. are tied to the difference between lending and deposit rates of a bank.

In establishing the relationship between interest rate deregulation and performance of deposit money banks, a whole lot of studies have been carried out. These studies have adopted different variables for interest rate deregulation and bank performance. For instance, Onoh (2019) used total assets of banks as a proxy for bank performance while interest rate deregulation was disaggregated into prime lending rate, inflation rate, and loans and advances. Afza, Raja, Imran and Saima (2018) adopted return on assets, return on equity and earnings per share as bank performance indicators, while interest rate changes, deposits with other banks, advances and loans, and investment were components of interest rate. Alhassan, Anokye and Gakpetor (2018) in their study used interest rate spread and net interest margin as the independent variables. While return on assets and return on equity were the dependent variables (profitability) used. Omowunmi (2018) adopted banks' investment to total assets as a proxy for bank performance while money supply growth rate, maximum lending rate, liquidity ratio, loan-deposit ratio and monetary policy rates were subsets of interest rate deregulation. In another study, Obagunwa and Akinwale (2018) broke down interest rate deregulation into interest rate, lending rate and deposit rate, while loan and advances was used as a proxy for bank performance.

Among the several studies on interest rate deregulation and bank performance that were reviewed, none disaggregated deposit rate. The question that readily calls to mind is: what are the impacts of the various existing deposit rates on the performance of deposit money banks? This study is designed to fill the gap arising from the above question and other related issues bordering on the relationship between interest rate deregulation and bank performance in Nigeria.

REVIEW OF RELATED LITERATURE
Interest Rate Deregulation

Interest rate is a term that has been variously defined and described. It represents a percentage that is usually charged on a sum that is given to a borrower for the usage of such money with the promise to pay back on a future date. This rate is defined as the rental payments for the use of credit by borrowers or the return for parting with liquidity by lenders. Rate of interest can also be seen as the amount paid per unit of time expressed as a percentage of the amount borrowed. Thus, the cost of borrowing money, measured in naira, per year per naira, borrowed, is the interest rate (Omowunmi, 2018). In essence, it connotes the price paid for the right to borrow and use loanable funds. It is the price that must be paid to get people to forgo willingly the advantage of liquidity. In other words, interest rate refers to the cost of holding money. Interest rate can be classified using yardsticks like maturity and liquidity. However, it can also be classified along lending and deposit rates lines. For banks, prime and maximum lending rates exist. The interest rate that deposit money banks charge their most creditworthy borrowers, such as large corporations is referred to as prime lending rate, whereas the general rate all other customers are charged is referred to as maximum lending rate. In recent times, banks have come up with a wide range of products in other to outsmart one another. This has led to the existence of different deposit rates. In Nigeria, the Central bank has classified these deposit rates based on time duration to include: 3-months, 3-6 months, 6-12 months and over 12-months deposit rates (CBN, 2018). In other words, four major types of deposit rates exist in Nigeria and the longer the time a customer's deposit stays with the bank, the higher the interest rate the said customer is entitled to.

These rates can be regulated or deregulated. The former is a practice where such rates are directly managed by the monetary authorities. That is, an arrangement whereby the management of lending and deposit rates are based on expert advises and directives from such authorities. The reverse is the case for the later. According to Obute, Adryorough and Itodo (2012), interest rate deregulation is a situation whereby interest rate is determined by the forces of demand and supply. The point of emphasis in a deregulated practice is that the central bank does not directly determine what the prevailing lending and deposit rates would be. In as much as interest rates are tied to rates like monetary policy rate, cash reserve ratio and liquidity ratio, the uniqueness of

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a deregulated regime is that the banks and customers have a say in determining what the rate for a transaction will be at all times. The rates are not fixed as controllable and uncontrollable factors play significant roles.

Review of Interest Rates Policy in Nigeria

Prior to the adoption of SAP, the CBN administratively pegged the interest rate with a view to facilitating socially optimum resource allocation, growth of the financial market and credit flows to preferred sectors. Between 1970s and the mid of 1980s, different interest rates were applicable for different sectors of the Nigerian economy (Kolawole, 2013). This followed the assumption that the market rate would cause financial exclusion; especially for priority sectors if its application is universal for all sectors of the economy.

Consequently, periodic adjustments of the prevailing rates of interest were carried out to engender growth in the key sectors of the Nigerian economy. Specifically, agriculture and industrial sectors received special attention as commercial banks' loans to these sectors wereassociated with preferential interest rates. Although nominal and real interest rates were low during the controlled interestrate regime, the costs of these manifested in high inflation and financial disintermediation due to low savings and investments (Soludo, 2008). The introduction of SAP in 1986 following the recommendation of the International Monetary Fund (IMF) necessitated the deregulation of the Nigerian financial sector including interest rates. Consequent upon this, the interest rates become market-driven as the forces of demand and supply of funds rather than administrative fixing by monetary authorities were allowed to act as the driving force for resource allocation. This caused an increase in the rates of interest compared to the repressed regime when it was administratively fixed by the monetary authorities. Between 1970 and 1979, interest rate averaged 6.8 percent and increased to 17.5 percent in 2005 (Kolawole, 2013).

The Central Bank of Nigeria continued to manipulate the minimum rediscount rate (MRR) in response to overall changes in economic activities. In the first quarter of 1987, the CBN reduced the minimum rediscount rate to 12.5 percent with the objective of stimulating investment and growth of the economy (Eregha, 2010). This increased the demand for money for investment purposes. The desire to moderate financial expansion necessitated an increase in the minimum rediscount rate. Specifically, the minimum rediscount rate was increased to 13.25 percent in 1989 (CBN, 2018). This caused variations in the rate of interest charged by different banks with newly licensed banks charging high interest rates compared to old and well-established banks. The CBN introduced quantitative easing in order to cushion the effect of global financial and economic meltdown on the Nigerian economy. Despite the measures employed, credit to the private sector declined and lending rates increased astronomically.

Additionally, the growth in government borrowings increased the crowding out of private sector credit due to upward trend in the interest rate. Despite the costs associated with the liberalization of interest rates in Nigeria, it generated some positive spillovers due to the prevailing moderate level of inflation. Soludo (2008) posits that from 1998 to 2006 inflation rate in Nigeria moderated significantly, which enhanced the aggregate level of economic activities. Again, (Kolawale, 2013) asserts that the annual average rate of inflation declined from 12.5 percent in 2009 to 13.7 percent in 2010. The fluctuations in the rate of interest can affect the willingness of surplus spenders to part with liquidly and overall objective of financial intermediation by deposit money banks.

Bank Performance

The term performance simply means the achievement of predetermined goals. As such, bank performance may be described as the reflection of the way in which the resources of a bank are used in a form which enables it to achieve its objectives. In essence, it means the adoption of a set of indicators which are indicative of the bank's current status and the extent of its ability to achieve the desired objectives. According to the European Central Bank (ECB), a distinction can be made between traditional, economic and market based measures of performance. The traditional performance measures consist of ratios like return on assets (ROA), return on equity (ROE), cost-to-income ratio and the likes. Return on asset is a performance indicator which depicts how profitable a bank is relative to its total assets. ROA gives a manager, investor or analyst an idea as to how efficient a bank's management is at using its assets to generating earning. Return on assets is a profitability ratio which expresses the relationship between net income and total assets (Ene, Atong and Ene, 2015).

In addition, ROA has said earlier is an indicator of how well a bank utilizes its assets, by determining how profitable a bank is relative to its assets. This ratio is best used when comparing similar banks or comparing a bank to its previous performance. As such, ROA takes into account a bank's debt, unlike other metrics, such as ROE.

THEORETICAL REVIEW
The Classical Theory

This theory is associated with the name of David Ricardo, Marshall, Piggon, Cassels, Walras, Tansing and Knight. According to the classical theory, rate of interest is determined by the interaction of demand and supply of capital or to be more accurate, by the

intersection of the investment demand schedule and the savings schedule. It could also be stated that the interest rate is determined by the equality of savings and investment under the condition of perfect competition. The rate of interest is construed to be the balancing factor, which equates the volume of savings with the volume of investment. There is an inverse relationship between the rate of interest rises and the demand for capital. In the same manner, if the rate of interest falls, the demand curves for capital rises. That is why the demand curve for capital slopes downward from left to the right.

The supply of capital on the other hand, at any particular time depends on a number of factors. An important factor influencing the supply according to the classical economists is the rate of interest. The public saves more at a higher rate than at a lower rate. This is why the supply curves of capital slopes downwards.

The classical economists believe that the rate of interest must be high enough to induce the saver to forego consumption. If the public saves less, the total supply of capital will fall short of the total demand and intimately the rate of interest will have to rise high enough to compensate the saver (Ugwuanyi, 2012).

The Neo-Classical or Loanable Funds Theory

The neo-classical or the loanable funds theory of interest rate was first pro-founded by the Swedish economist Wicksell and later developed and supported by several leading American and Swedish economists including professor Robertson, Bertil, Lindhal and Mydal (Ene, Agok and Ene, 2015). However, the theory in its present form is associated with Professor Robertson.The theory statedthat interest rate is determined by the forces of demand and supply of loanable funds. The theory further explained the purpose of demand for loanable funds which are: investment, hoarding and dissaving. For investment, the theory explained the inverse relationship between demand for loanable funds and interest rate. An investor desires for funds to invest in making of new capital goods, but such demand can only be actualized if the interest rate is less than the expected return on investment. If the interest rate is less, the demand will be high and if theinterest rate is high, the demand will be low. For hoarding, the theory explained that the desire for liquidity triggers hoarding by some people which has inverse relationship with interest rate. Same inverse relationship still exists indissaving.

For supply of loanable funds, the theory explained it under savings, dishoarding, disinvestment and bank credit. For savings, the theory explains that people will save more with high interest rate and less with low interest rate. Such positive relationship was also utilized to explain dishoarding and disinvestment. Bank credits were also explained as it affects loanable funds. Since the banks also creates credit when they lend money out. The theory concluded that interest rate is determined by the point of equilibrium between demand for and supply of loanable funds (Onoh, 2019).

However, this work revolved around the Classical theory of interest rate determination. This is because interest rate according to the theory is determined by the interaction between demand and supply of capital. In other words, the forces of demand and supply actually determine interest rate (the lending and deposit rates). This as such, provided the bases for our argument and methodologies.

Empirical Review

Onoh (2019) examined the impact of interest rate deregulation on the performance of deposit money banks in Nigeria for the period of 1989-2017. He also examined the causality relationship between interest rate deregulation and performance of deposit money banks in Nigeria. The ordinary least square method was adopted for data analysis. The entire test was conducted at 5% level of significance. The tests conducted were unit root, co-integration, ECM and granger causality tests. The estimation output of the research shows a positive relationship between interest rate and bank performance in Nigeria measured by total assets of deposit money banks in Nigeria. The coefficient of determination at 67% also shows above average explanatory power of the independent variables on the dependent variable. The results of the study revealed a long and short run relationship between the dependent variable (total assets) and the independent variables (interest rate, inflation rate, loans and advances). The result also shows unidirectional causality between total Assets and loans and advances.

Afza, Raja, Imran and Saima (2018) employed correlation and regression analysis in regressing return on assets, return on equity and earnings per share on interest rate changes, deposits with other banks, advances and loans and investment in Pakistan. The result shows that deposits with other banks and interest rate are negatively affecting the profitability of banks, while advances and loans and investment are having positive influence over profitability of banks.

Alhassan, Anokye and Gakpetor (2018) carried out an empirical study on the effect of interest rate spread on the profitability of commercial banks in Ghana. The research was based on a sample of 24 banks over a ten - year period using panel data. Interest rate spread, net interest margin, return on assets and return on equity were the data used for the study. They adopted a full scale regression analysis alongside other econometric tests like unit root, co-integration, and granger causality. Augmented Dickey Fuller criterion was adopted for unit root test while the Johansen technique was employed for co-integration analysis. Majorly,

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the study revealed that there is a positive and statistically significant association between interest ratespread and bank profitability in Ghana.

Obagunwa and Akinwale (2018) carried out a study on the effect of interest rate deregulation on Nigerian banking system. The study adopted Augmented Dickey – Fuller (ADF), Bound test and Autoregressive Distributed Lag (ARDL) tests. The correlation result indicated that of the correlation matrix, all the explanatory variables (interest rate, lending rate and deposit rate) have effects on loan and advances. The results of the unit root test revealed that interest rate and lending rate were stationary at level I(0) while loan and advances and deposit rate were stationary at first difference I(1). Also the results of the bounds test revealed that there exists a long run equilibrium relationship among the variables. The result of the ARDL indicated that interest rate had significant effect on loan and advances while lending rate and deposit rate had an insignificant effect on loan and advances.

Ene, Agok and Ene (2015) empirically examined the effect of interest rates deregulation on the performance of deposit money banks in Nigeria between 1986 and 2014 using OLS regression method. Unit root test was employed to ascertain the stationary levels of the variables before conducting the regression analysis. Findings from the study revealed that deregulated interest rates have positive and significant impact on the ROA of deposit money banks. It showed that as interest rates increase, the ROA of banks also appreciates. The study further revealed that deregulated interest rates have positive and significant relationship with the loans and advances of deposit money banks. This shows that the higher the rates of interests, the higher the performance of deposit money banks.

Eke, Eke and Inyang (2015) used the classical least squares method to empirically examine interest rate deregulation effect on the lending operations of Nigerian commercial banks for the period 1970 to 2013. The period was divided into two policy regime periods: the regulated interest rate era spanning 1970-1986 and the deregulated period 1987-2013. The Chow test was applied to examine if there was any significant difference in the relationship between interest rate and commercial banks' lending for the two periods. The empirical result obtained for interest rate regulation era showed that interest rate spread and statutory liquidity ratio had negative and significant effect on the volume of commercial banks' loans, while fixed exchange rate had negative and insignificant impact on banks' loans and advances. It was also found that Monetary Policy Rate (MPR) and inflation rate exert a positive and significant impact on banks' loans for the period. For the deregulation era, the result showed that MPR and the exchange rate had significant impact on banks' loans and advances. While the former exerted a negative impact, the later had a positive influence on loans and advances. Interest rate spread, statutory liquidity ratio and inflation rate were found not to have significantly impacted on commercial banks' loans and advances for the period. The chow test result however confirmed the impact of deregulation on volume of commercial banks loans and advances due to the deregulation of interest rate.

Ngerebo-a and Lucky (2017) examined interest rates and the profitability of commercial banks in Nigeria from 1980 – 2014. The objective was to investigate the extent to which various interest rate measures affect profitability performance of the quoted commercial banks. Time series data were sourced from annual financial reports of the commercial banks and Central Bank of Nigeria (CBN) statistical bulletin various issues. Profitability measures such as Return on Investment (ROI), Return on Assets (ROA) and Return on Equity (ROE) were modeled as the function of Monetary Policy Rate (MPR), Prime Lending Rate (PLR), Short-term Savings Rate (STSR), Long-term Saving Rate (LTSR), Treasury Bill Rate (TBR) and Maximum Lending Rate (MLR). The Ordinary Least Square (OLS) method of Regression Analysis was used to estimate the relationship between the dependent and the independent variables. Augmented Dickey Fuller Test (ADF), Johansen Cointegration Test, Granger Causality Test and Vector Error Correction (VEC) Test were used to determine the dynamic relationship among the variables. Findings showed that the independent variables have greater impact on ROI and ROA than ROE. The Granger Causality proved no causal relationship between the variables.

Okoye and Eze (2013) examined the impact of bank lending rate on the performance of Nigerian deposit money banks between 2000 and 2010. It specifically determined the effects of lending rate and monetary policy rate on the return on equity of Nigerian deposit money banks and analyzed how bank lending rate policy affects the performance of these banks. The study utilized secondary data which were analyzed using regression and other econometric properties, whereby time series and quantitative design were combined and estimated. The result confirmed that lending rate and monetary policy rate have significant and positive effects on the return on equity of Nigerian deposit money banks. The implication of these is that lending rate and monetary policy rate are true parameter of measuring bank performance.

Ugwuanyi (2012) examined the relationship between interest rate deregulation and bank lending in Nigeria for the period 1987 to 2011. The study was carried out to show the relevance of the hinges on the fact that credit and its costs (interest) perform a private role in shaping the economic future of Nigeria. The ordinary least square (OLS) techniques were utilized to estimate the parameters of the modeled independent variables/regressors on the chosen dependent variable. Bank Lending was used as the dependent variable while money supply, interest rate, marginal rediscount rate, total bank deposit and inflation rate were the regressors. The research found significant relationship between the dependent variable and the set of independent variables. The hypothesis that interest rate deregulation has a significance impact on bank lending was tested and validated with the result. This

position gave rise to statistically significant t-statistics, which confirms the effects of the independent variables on the dependent variables.

Ogunbiyi and Ihejirika (2014) made efforts to determine how interest rates affect the profitability of deposit money banks in Nigeria. The study was based on country aggregate level annual data that covered a period of thirteen years, from 1999 to 2012 and made use of multivariate regression analysis under an econometric framework. The Augmented Dickey and Fuller unit root test results indicated that the series are either I(0), I(1) or I(2) stationary. The estimated results showed that maximum lending rate, real Interest rate and savings deposit rate have negative and significant effects on the profitability of Nigerian deposit money banks as measured by return on assets at the 5% level of significance. Also, the study found that real interest rate at the 8% level of significance has negative and significant relationship with Return on Equity of money deposit banks in Nigeria. On the other hand, the study found no significant relationship between interest rate variables and net interest margin of deposit money banks in Nigeria.

Ozigbu (2018) analyzed the long-term implication of interest rate deregulation on the productivity of the industrial sector in Nigeria between 1987 and 2016. Specifically, he focused attention on the impacts of prime lending rate, deposit rate, monetary policy rate and cash reserve ratio on industrial output. The datasets on each of the variables were culled from the Central Bank of Nigeria Statistical Bulletin. Autoregressive Distributive Lag (ARDL) model was adopted for the estimation of the long run behavior of the independent/explanatory variables. The Augmented Dickey-Fuller (ADF) stationarity test approach and ARDL based bounds test approach to co-integration were applied to test the null hypotheses of a unit root and no long run relationship respectively. It was found from the ADF tests results that the variables were fractionally integrated. The bounds test result also indicated that the variables have long run relationship, hence necessitating the rejection of the null hypothesis of no co-integration. The long run regression result showed that at 10 percent level of significance, prime lending is positively related to industrial output. It was equally uncovered from the result that monetary policy rate negatively impacted on industrial output at 5 percent level of significance. Similarly, deposit rate contracts the productivity of the industrial sector in the long run.

METHODOLOGY
Research Design
Quasi-experimental research design was adopted in this study to examine to relationship between interest deregulation and performance of deposit money banks in Nigeria. The quasi-experimental research design was adopted because of the need to establish the cause-effect relationship between interest rate deregulation and bank performance in Nigeria.

Sources of Data
Data for this study were collected from secondary sources. Prime lending rate, maximum lending rate and both deposit rates used data were collected from Central Bank of Nigeria (CBN) Statistical bulletin. However, data on deposit money banks' return on asset (ROA) were sourced from the World Bank.

Method of Data Analysis
The Autoregressive Distributed Lag (ARDL) model developed by Pesaran and Shin (1999) in analyzing the long-term impacts of explanatory variables on a dependent variable was adopted in this work. One of the reasons for utilizing the ARDL model among others is based on its robustness for estimating models with small and relatively large observations. More importantly, the ARDL is applied not withstanding whether the variables are integrated of the same order or fractionally integrated. Thus, the variables under investigation could be I(0), I(1) or a combination of I(0) and I(1) variables. Again, by allowing for the inclusion of the lagged variables including the lag value of the response variable as independent variable, the ARDL is adjudged to provide opportunity for overcoming the problem of endogeneity often associated with time series data. Hence, the entire process involved the following tests:

Stationarity Test
The stationarity process of each of the economic time series utilized in this work was captured using the Augmented Dickey Fuller (ADF) approach to unit root test as proposed by Dickey and Fuller (1981). This stationarity approach was applied intesting the null hypothesis of a unit root against the alternative hypothesis of no unit root at the conventional 5 percent level. For each of the variables included in the unit root model, it is expected to be I(0) or I(1), but not I(2). The specification of the unit root model is provided as:

$$\Delta Q_t = P_0 + P_1 Q_{t-1} + \sum_{i=1}^{n} hi \Delta Q_{t-1} + \mu_t$$

1

Where;

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Q_t	=	Variable being investigated
P_1 and h_i=		Coefficients of the variable
n	=	Lag length
Δ	=	First Difference Operator
μ_t	=	White noise

Co-integration Test

Bounds test approach to co-integration was adopted to examine if long run relationship exists among the underlying variables. In this procedure, the null hypothesis of no co-integration was tested against the alternative hypothesis of co-integration with the application of Wald test or F-test. The formalization of the model for the bounds test is as follows:

$$y_t = \alpha + \sum_{i=1}^{k} \beta_i \, \chi_i + E_t$$

2

Where;

α_0	=	The intercept
$\chi_{i,t}$	=	The vector of the regressors
k	=	Optimal length
E_t	=	White noise

Model Specification

As said earlier, this study employed an Autoregressive Distributed Lag (ARDL) model with the disaggregation of interest rate deregulation into prime lending rate (PLR), maximum lending rate (MLR), three months deposit rate (TDR) and over 12-months deposit rate (ADR) as explanatory variables. On the other hand, banks' return on assets (BRA) served as the response variable. The model is expressed in a functional form as:

BRA = f (PLR, MLR, TDR, ADR)

The ARDL model of the above functional equation is formalized as:

$$BRA_t = P_0 + \Pi_1 BRA_{t-1} + \Pi_2 PLR_{t-1} + \Pi_3 MLR_{t-1} + \Pi_4 TDR_{t-1} + \Pi_5 ADR_{t-1} +$$

$$\sum_{i=1}^{m} Z_1 \Delta BRA_{t-1} + \sum_{i=1}^{m} Z_2 \Delta PLR_{t-1} + \sum_{i=1}^{m} Z_3 \Delta MLR_{t-1} + \sum_{i=1}^{m} Z_4 \Delta TDR_{t-1} + \sum_{i=1}^{m} Z_5 ADR_{t-1} + e_{it}$$

3

Where;

P_0	=	Constant Parameter
Π_1-Π_5	=	Long run multipliers
$Z_1 - Z_5$	=	Short run dynamic parameters of the regressors
e_{it}	=	Random disturbance
m	=	Optimal lag length
Δ	=	First difference operator

RESULTS AND DISCUSSION

Stationarity Test

The outcome of the Augmented Dickey-Fuller test for unit root for each of the variables is shown in the table below;

Table 1: Augmented Dickey-Fuller (ADF) stationarity test result

Variables	ADF Statistics	Prob. Value	Order of Integration
BRA	-5.055603	0.0006	I(0)
PLR	-3.557159	0.0159	I(0)
MLR	-6.555940	0.0000	I(1)

TDR	-5.858445	0.0001	I(1)	
ADR	-3.362348	0.0240	I(0)	

Source: Researcher's Computations from E-Views 9 Result

The stationary test result summarized in Table 1 reveals that deposit money banks' return on assets (BRA), prime lending rate (PLR) and over 12-months deposit rate (ADR) are stationary at levels or integrated of order zero [I(0)]; while maximum lending rate (MLR) and three months deposit rate (TDR) are stationary at first difference (difference stationary) or integrated of order one [I(1)]. However, none of the variables is integrated of order two [I(2)], thus indicating that they satisfy the requirement to be included in the ARDL model as suggested by Pesaran and Shin (1999).

Co-integration Test

For co-integration test, bounds test technique was adopted. The table below shows the outcome of this test;

Table 2: Result of ARDL Bounds Test

	Value	K		
F-statistic	6.532217	4		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	2.45	3.52		
5%	2.86	4.01		
2.5%	3.25	4.49		
1%	3.74	5.06		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PLR)	-0.326184	0.589401	-0.553417	0.5894
D(TDR)	0.324855	0.642558	0.505565	0.6216
C	-8.298820	7.997678	-1.037654	0.3183
PLR(-1)	1.172224	0.751346	1.560166	0.1427
MLR(-1)	-0.019845	0.269897	-0.073527	0.9425
TDR(-1)	-0.327859	0.803865	-0.407853	0.6900
ADR(-1)	-0.711685	0.695147	-1.023791	0.3246
BRA(-1)	-1.361323	0.290461	-4.686763	0.0004
R-squared	0.756152	Mean dependent var		0.070952
Adjusted R-squared	0.624850	S.D. dependent var		5.063237
S.E. of regression	3.101207	Akaike info criterion		5.383792
Sum squared resid	125.0273	Schwarz criterion		5.781705
Log likelihood	-48.52981	Hannan-Quinn criter.		5.470149
F-statistic	5.758856	Durbin-Watson stat		1.948095
Prob(F-statistic)	0.003354			

Source: E-Views 9 Result

Table 2 shows the bounds test result of long run relationships among the underlying variables. The result shows that the calculated F-statistics (6.532217) exceeds the upper bounds critical value (4.01) at five percent level. This implies that long run relationships exist among the variables. Hence, the null hypothesis that no long run relationship exists is rejected. Sequel to the outcome of the bounds test, the long run parameters of the exogenous variables is estimated.

Estimation of the ARDL model

Owing to the stationarity process and evidenced long run relationship captured in tables 2 and 3, this paper employed the Akaike Information Criterion (AIC) for estimating the ARDL process (1, 1, 0, 1, 0). The long run parameters of the exogenous variables are reported in table 3 below;

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Table 3: Long Run Coefficients of the Exogenous Variables

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PLR)	-0.250937	0.637067	-0.393895	0.7000
D(MLR)	-0.174516	0.247031	-0.706453	0.4924
D(TDR)	0.911799	0.978122	0.932193	0.3682
D(ADR)	-0.527450	0.717570	-0.735050	0.4754
CointEq(-1)	-1.412518	0.300625	-4.698605	0.0004

Cointeq = BRA - (0.8731*PLR -0.1235*MLR -0.4022*TDR -0.3734*ADR
-3.5994)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PLR	0.873127	0.575290	1.517715	0.1530
MLR	-0.123550	0.177985	-0.694158	0.4998
TDR	-0.402205	0.659042	-0.610288	0.5522
ADR	-0.373411	0.494932	-0.754469	0.4640
C	-3.599418	6.037081	-0.596218	0.5613

Source: E-Views 9 Result

Table 3 presents the estimated long run coefficients of the exogenous variables. Firstly, the result shows that in the long run, only prime lending rate has a positive impact on the dependent (endogenous) variable. Hence, a percentage increase in prime lending rate increases banks' ROA by about 0.87% whereas same increase in maximum lending rate, three months deposit rate and over 12-months deposit rate reduces the ROA of deposit money banks by 0.12%, 0.40% and 0.37% respectively. Accordingly, only prime lending rate has the expected positive sign whereby an increase in this rate increases profit of banks which translates into increased return on assets. The negative sign associated with the other explanatory variables may be as a result of the poor development of the financial system and inconsistencies that often characterize the implementation of monetary policy in Nigeria. Secondly, none of the exogenous (explanatory) variables is statistically significant at 5 percent level of significance. This is because all their respective p-values are greater than 5% (0.05). Thirdly, these explanatory variables have a joint insignificant impact on deposit money banks' return on assets (ROA). This is because the p-value of F-stat is greater than 5% (i.e. 0.269602 > 0.05). Fourthly, prime lending rate, maximum lending rate, three months deposit rate and over 12-months deposit rate account for about 43.7% variation in the ROA of Nigerian deposit money banks. This gives a poor fit.

Diagnostics Tests

The reliability of the estimated ARDL model is examined through the diagnostics tests. Specifically, higher order serial correlation and autoregressive conditional heteroscedasticity tests were applied to determine if the errors are serially correlated and have a constant variance. In addition to these, the model was subjected to normality test to check whether the errors are normally distributed. The results of these tests are reported in the tables below;

Table 4: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.115653	Prob. F(2,11)		0.8919
Obs*R-squared	0.432489	Prob. Chi-Square(2)		0.8055
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BRA(-1)	0.064359	0.540555	0.119061	0.9074
PLR	0.107977	0.757876	0.142473	0.8893
PLR(-1)	-0.003323	0.577431	-0.005755	0.9955
MLR	-0.021311	0.271237	-0.078569	0.9388
TDR	-0.248524	1.246752	-0.199337	0.8456
TDR(-1)	-0.013861	0.632955	-0.021899	0.9829
ADR	0.073581	0.812321	0.090582	0.9295
C	0.518221	9.329933	0.055544	0.9567

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RESID(-1)	0.028124	0.535233	0.052545	0.9590
RESID(-2)	0.188561	0.427720	0.440851	0.6679
R-squared	0.020595	Mean dependent var		-3.98E-15
Adjusted R-squared	-0.780737	S.D. dependent var		2.508551
S.E. of regression	3.347517	Akaike info criterion		5.560069
Sum squared resid	123.2646	Schwarz criterion		6.057460
Log likelihood	-48.38072	Hannan-Quinn criter.		5.668015
F-statistic	0.025701	Durbin-Watson stat		2.106429
Prob(F-statistic)	0.999997			

Source: E-Views 9 Result

The above table shows that the model is not serially correlated at 5 percent level of significance because the probability value (0.8055) of the Chi-Square (X^2) statistic of the Breusch-Godfrey Lagrange Multiplier (LM) test is greater than 0.05.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This work empirically examined the long standing theoretical relationship between interest rate deregulation and deposit money banks' performance in Nigeria for the period 1996-2018. Data for the study were sourced from CBN statistical bulletin and the World Bank. As such, the work adopted quasi-experimental research design whereby return on assets (ROA) was regressed on prime lending rate (PLR), maximum lending rate (MLR), 3-months deposit rate (TDR) and over 12-months deposit rate (ADR). The Autoregressive Distributed Lag (ARDL) model was used in analyzing the long-term impacts of these explanatory variables on the dependent variable ROA. In addition, the data generated for the study were subjected to stationarity test using ADF criterion, co-integration test using bounds approach, and diagnostic tests which covered testing for the presence of serial correlation, heteroscedasticity and distribution of the error term. Stationarity test result revealed that all the variables were integrated of order zero or one. Co-integration test result showed that a long-run relationship exists between the said variables. Diagnostic test results revealed that our model was not serially correlated; the variance of the random variable was homoscedastic; and the errors of our model were not normally distributed. Nevertheless, the ARDL model for parameter estimation process revealed that only prime lending rate was positively related to ROA of these banks while none of prime lending rate, maximum lending rate, 3-months deposit rate (TDR) and over 12-months deposit rate was statistically significant. On this backdrop, the conclusion and recommendations from the study emerged.

In specifics, prime lending rate, maximum lending rate, 3-months deposit rate and over 12-months deposit rate were statistically significant. However, only prime lending rate showed a positive impact. Generally, the study shows that interest rate deregulation does not have a significant relationship with the performance of Nigerian deposit money banks for the period under consideration. From all indications, our findings support the position expressed by Afza et al. (2018), Obagunwa and Akinwale (2018), and Ogunbiyi and Ihejirika (2014); who at different points captured the adverse relationship between interest rate deregulation using related variables and various performance indicators of deposit money banks.

Recommendations

i. Deposit Money Banks should strive to mobilize adequate savings from surplus spenders by offering them deposit rate capable of inducing the savers to increase their savings and boost the availability of loanable funds. This is down to the inverse relationship observed between deposit rates and ROA of banks.

ii. There is urgent need to restructure the Nigerian financial system whereby policies by the monetary authorities will achieve pre-determined goals. In essence, to make interest rate policies meaningful, there is need to curtail financial transactions that escape the banking system.

iii. Given the place of interest rate in monetary policy implementation, it is imperative that measures are put in place to drastically address the inconsistencies that often characterize the implementation of monetary policy in Nigeria.

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