INTEREST RATES AND DEPOSIT MONEY BANKS' PROFITABILITY NEXUS: THE NIGERIAN EXPERIENCE

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Abstract

This study examined 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 1999 to 2012 and made use of multivariate regression analysis under an econometric framework. The Augmented Dickey and Fuller unit root test results indicate that the series are either I(0), I(1) or I(2) stationary. The estimated results show 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 t*hat 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. The implication of the findings of this study suggests that the profitability of the banking sector is a function of changing interest rates. The study therefore recommends that government should adopt monetary policies that will help Nigerian deposit money banks to improve on their profitability and there is need to review and strengthen bank lending rate policies through effective and efficient regulation and supervisory framework. Banks can improve their profitability through charging moderate lending rates as against maximum rates as their circumstances may allow. Furthermore, the managers of money deposit banks are expected to create the conditions for an efficient banking system devoid of information asymmetry to adapt to changing macroeconomic variables of interest rates and inflation. Banks' management must efficiently manage their portfolios in order to protect the long run interest of profit-making.

Keywords: Interest Rates, Deposit Money Banks, Profitability

1.0 INTRODUCTION

Banking is an economic activity, which deals with the intermediation of funds between the surplus units and the deficit units of an economy and the channeling of such resources to profitable investments. Banks also facilitate the provision of an efficient payment system. A sound, profitable, efficient and well managed banking system contributes to the stability of the financial system and protects a country from any undesirable crisis (Athanasoglu *et. al.* 2005;

Aburime, 2008; and Ramlall 2009). Alper and Anbar (2011) posit that an efficient banking sector can promote economic growth, while credit insolvencies could result in systematic crisis. In Nigeria, banks are regarded as dominant financial institution thus, their health condition is crucial to the general health of the economy (Suffian, 2009). Therefore, having the knowledge of factors influencing commercial banks' profitability is not only important but also essential in stabilizing the economy. The importance of banks' profitability cannot be over emphasized. Profitability is considered as a crucial objective to conduct a business without which money deposit banks will not be in business. With good profit figures, banks are able to enhance the confidence of their stakeholders, maximize shareholders wealth as well as being able to stay competitive in the financial market. However, to achieve their desired level of profits, banks are confronted with several factors both internal and external. One of such external factors is the interest rate.

Over the years, interest rates have remained a subject for critical assessment with diverse implications for savings mobilization and investment promotion. Generally, interest rates are the rental payments for the use of credit by borrowers and return for parting with liquidity by lenders (CBN 1997). In the Nigerian economy, the minimum rediscount rate (MRR) now monetary policy rate (MPR) is the official interest rate of the Central Bank of Nigeria (CBN), which anchors all other interest rates in the money market and the economy. Historically, the interest rate regime in Nigeria has been very stochastic. In August, 1987 the CBN liberalized the interest rate regime and adopted the policy of fixing only its minimum rediscount rate to indicate the desired direction of interest rate. This was modified in 1989 when the CBN issued further directives on the required spreads between deposit and lending rates. In 1991, the government prescribed a maximum margin between each bank's average cost of funds and its maximum lending rates. Later, the CBN prescribed savings deposit rate and a maximum lending rate. Partial deregulation was, however, restored in 1992 when financial institutions were required to only maintain a specified spread between their average cost of funds and maximum lending rates. The removal of the maximum lending rate ceiling in 1993 saw interest rates rising to unprecedented levels in sympathy with rising inflation rate which rendered banks' high lending rates negative in real terms. In 1994, direct interest rate controls were restored. As these and other controls introduced in 1994 and 1995 had negative economic effects, total deregulation of interest rates was again adopted in October, 1996. Over the years, the MRR/MPR has been reduced, increased, reduced and increased and presently as at February 2014 stands at 12% for private sector deposits and 75% for public sector deposits.

Deposit Money Banks (MDBs) are an important channel for transmission of CBN's interest rate policy in Nigeria. This is because of the intermediation role which banks play in resource mobilization and allocation. Banks pay interest on deposits on one hand and on the other hand they charge interest on loans and advances lent to borrowers. The difference between these two interest rates defines the interest spread which constitutes a significant proportion of the profits of MDBs. Thus, interest rates unavoidably are an important factor in the survival of MDBs especially as it concerns their profitability. As Interest rates keeps on changing as can be seen from the unstable interest rate regime in Nigeria, such frequent changes could affect banks' overall profitability which, in turn, could impact on the general economy of a country. In other words, the profitability of the banking sector might become a function of changing interest rates. The question thus is: what truly is the relationship between interest rates and Money Deposit Banks' profitability?

The central objective of this study is to examine how interest rates affect the profitability of money deposit banks in Nigeria. The specific objectives include: (a) To determine the nature of relationships between interest rate variables namely: minimum rediscount rate, lending rate, deposit rates, treasury bills rates, as well as interbank rates and deposit money banks profitability as measured by return on assets, return on equity and net interest margin. Following the above introduction, the paper is organized as follows. Section two deals with review of related literature. Section 3 explores our methodology while section four deals with data analysis and results. Finally, the conclusion is presented in section 5.

2.0 REVIEW OF THE LITERATURE

2.1 Objectives/Essentials of Sound Banking

What are the objectives of Banks? According to Jhingan (2004) there are three main objectives, which a wise bank pursues, and these include, Liquidity, Safety and Profitability. In the same light, Crowther (n.d) in Jhingan (2004) recognized certain essentials of a sound banking system. According to Crowder (Ibid) "the secret of successful banking is to distribute resources between the various forms of assets in such a way as to get a sound balance between liquidity and profitability, so that there is cash to meet every claim, and at the same time enough income for the bank to pay its way and earn profits for its shareholders".

2.2 Profitability

One principal objective of Banks is to earn more profit. It is essential for the purpose of paying corporation tax like any other company, pay interest to depositors, wages to the staff, dividend to shareholders and meeting other expenses. So, unless Banks earn profits, they cannot perform their role effectively. Profitability is essential for a bank to maintain ongoing activity and for its investors to obtain fair returns; but it is also crucial for supervisors, as it guarantees more resilient solvency ratios, even in the context of a riskier business environment.

Profitability is a bank's first line of defense against unexpected losses, as it strengthens its capital position and improves future profitability through the investment of retained earnings. An institution that persistently makes a loss will ultimately deplete its capital base, which in turn puts equity and debt holders at risk. Moreover, since the ultimate purpose of any profit-seeking organization is to preserve and create wealth for its owners, the bank's return on equity (ROE) needs to be greater than its cost of equity in order to create shareholder value.

2.3 Empirical Review of Literature

There have been some studies relating to the profitability of commercial banks in Nigeria. Okoye, and Eze, (2013) study 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 performance of Nigerian Deposit Money Banks and analyzed how bank lending rate policy affects the performance of Nigerian deposit money banks. They found that lending rate and monetary policy rate has significant and positive effects on the performance of Nigerian deposit money banks. Akabom-Ita, (2012) examined the impact of interest rate on net assets of multinational companies in Nigeria from 1995 - 2010. The regression analysis showed that an increase in interest rate results in reduction in net assets.

Enyioko (2012) examine the performances of banks in Nigeria based on the interest rate policies of the banks. The study analyzed 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). Applying regression and error correction methods to analyze the relationship between interest rates and bank performance the study found that interest rate policies have not improved the overall performances of banks significantly. Aburime (2008) used a sample of banks with 1255 individual observation on unbalanced panel data over the period 1980-2006 to investigate the macroeconomic determinants of bank profitability in Nigeria. The result revealed that real interest rate, inflation, monetary policy and foreign exchange regime are positively associated with banks' return on assets. Ahmad (2003) reported that interest on loan is the largest constituent of income for Nigerian banks as evidenced from available data and that movement from one interest regime to another could have some effects on the profitability of banks in the system. Ogunlewe (2001) in a study of the monetary policy influence of bank's profitability, using data from Nigerian banks found the determinants of bank profitability to include reserve ratio, permissible credit growth, stabilization securities and exchange rate. The study also found determinants of banks' profitability to include total deposits, Treasury bill rates and lending rates. Uchendu (1995) investigated the effect of monetary policies on the performance of Nigerian commercial banks. He found that the dominant factors influencing bank profitability are interest rates, exchange rate, bank reserves, banking structure and unit labour costs, particularly when return on capital is used as measure of profitability. He concluded that stable and realistic monetary and banking policies are important for the profitability of commercial banking business in Nigeria.

Elsewhere, Kanwal and Nadeem (*2013)* investigate the impact of macroeconomic variables on profitability of public limited commercial banks in Pakistan for years 2001- 2011. Pooled Ordinary Least Square (POLS) method is used to examine the effect of 3 major external factors; inflation rate, real gross domestic product (GDP) and real interest rate on profitability indicators; return on assets (ROA), return on equity (ROE) and equity multiplier (EM) ratios in 3 separate models. The empirical findings indicate a strong positive relationship of real interest rate with ROA, ROE and EM. Secondly, real GDP is found to have an insignificant positive effect on ROA, but an insignificant negative impact on ROE and EM. Inflation rate on the other hand, has a negative link with all 3 profitability measures. Overall, the selected macroeconomic factors are found to have a negligible impact on earnings of commercial banks.

Riaz and Mehar (2013) investigate the impact of bank specific variables: Asset size , Credit Risk, Total deposits to total assets ratio, and macroeconomic indicator : interest rate(Discount rate) on the profitability measures, ROE and ROA of commercial banks in Pakistan during the period of 2006-2010.. There are two measures of profitability Return on equity (ROE) & Return on assets (ROA). All 32 commercial banks were selected and by using regression the results show that there is a significant impact of bank specific variables(asset size, total deposits to total assets, credit risk) and macroeconomic indicator (interest rate) on ROE and credit risk and interest rate have also a significant impact on ROA.Amer Azlan et. al. (2012) in their paper "Determinants of Commercial Banks' Return on Asset: Panel Evidence from Malaysia" investigated the possible macroeconomic factors that influence the profitability of domestic and foreign commercial banks in Malaysia. They use an unbalanced panel dataset of 16 commercial banks and panel data regression technique over the period of 2004-2011. The result indicates that all the external factors namely inflation, interest rate and GDP have a positive impact on all commercial bank's

return on assets. They also found that interest rate appears to influence foreign bank's profit positively but shows no impact on domestic bank's performance.

Sufian (2011) examined the impact of bank specific and macroeconomic variables on the performance of Korean banking sector during the pre- and post-Asian financial crisis. A total of 251 bank year observations consisting of 11 commercial banks over the period 1993- 2003 were employed and tested using panel fixed and random effect regression technique. In regards to macroeconomic perspectives, the result shows that inflation has positive association with banks' return on assets. Alper and Anbar (2011) investigated bank specific and macroeconomic determinants of commercial bank profitability in Turkey over the period of 2002-2010. The study uses both return on asset (ROA) and return on equity (ROE) as proxy for bank profitability. By employing balanced set of panel data and fixed effect model, the result shows that only real interest rate is positively related with profitability in regards to macroeconomic variables. In other words, an increase in real interest rate would lead to an increase in commercial banks' profitability in Turkey. Ramadan *et. al.* (2011) examined the determinants of bank performance of 10 Jordanian banks over the 2001-2010 periods. They discovered that both inflation and economic growth were found to be negatively insignificant on both return on asset (ROA) and return on equity (ROE) of the banks. However, Khwarish (2011) which focusing more on determinants of commercial bank performance in Jordan for 2000-2010 periods found that both inflation rate and annual growth rate for gross domestic product have negative and significant effects on both ROA and ROE of the commercial banks.

An empirical study by Damena (2011), on the profitability determinants of Ethiopian commercial banks uses 10 years balance sheet data of 7 leading banks confirms positive affect of GDP, inflation and interest rate. Deger and Anbarb (2011) examine the bank-specific and macroeconomic determinants of bank's profitability in Turkey over the time period from 2002 to 2010. The bank profitability is measured by return on assets (ROA) and return on equity (ROE). Using a balanced panel data set, the results show that real interest rate affects the performance of banks positively. Bennaceur and Goaied, (2008) study The Determinants of Commercial Bank Interest Margin and Profitability: Evidence from Tunisia and find that interest rate liberalization has contrasting effect on net interest margins. In fact, partial liberalization has a negative impact on the interest margin whereas complete liberalization strengthens the ability of Tunisian banks to generate profit margins. Staikouras and Wood (2004) reviewed the performance of European Banking industry for years 1994-1998. Using ordinary least square method and fixed effects model they concluded that interest rate has a significant positive impact on ROA. Demirgur – Kunt and Huizinaga (1999) posits that high interest rate is associated with higher interest margins and profitability especially in developing countries. To conclude the literature review, Molyneux and Thorton (1992) investigated a multi-country setting by examining the determinants of bank profitability for a panel of 18 European countries for the 1986-1989 time periods. They found a significant positive association between the return on equity and the level of interest rates in each country.

3.0 RESEARCH METHODOLOGY

3.1 Sources of Data

The data for this study were obtained mainly from: (1) Central Bank of Nigeria (CBN) Statistical Bulletins and Annual Reports and (2) World Bank Global Financial Development Data available at "data.worldbank.org". All the data used are country aggregate level annual data. For instance, the data on bank "return on assets" refers to ROA for all banks in Nigeria and so on. The data cover a period of thirteen years 1999 to 2012.

3.2 Measurement of Variables

Bank Performance Variables as defined by World Bank Global Financial Development Data used in this study include:

Return on Assets (ROA) = Net Income / Average Total Assets

Return on Equity (ROE) = Net Income / Average Total Equity

Net Interest Margin (NIM) = Net Interest Income / Assets (Or Interest-Bearing Assets)

The study incorporates other determinants of bank performance as follows:

Bank capital to total assets (BCTTA), Bank credit to bank deposit ratio or loan deposit ratio (BCTBDR), Bank overhead costs to total assets (BOHCTTA).

Interest rate is captured by:

Real interest rate (RI), Minimum rediscount rate/monetary policy rate, Prime/Maximum lending rate (PLR/MLR), Savings deposit rate (SDR), T-bills rate (TBR), Interbank rate (IBR). Other factors include: Inflation (INF) (measured by Consumer Price Index (CPI) and US/Nigeria exchange (this captures a major component of MDB's operations)

3.3 Model Specification and Analytical Procedure

Following from the above discussion, the banks' profitability interest rates models for estimation in this study are specified as follows.

$$ROA = \beta_0 + \beta_1 RIR + \beta_2 TBR + \beta_3 MRR + \beta_4 PLR + \beta_5 MLR + \beta_6 SDR + \beta_7 IBR + \beta_8 INF +$$

$$\beta_9 BCTTA + \beta_{10} BCTBDR + \beta_{11} BOHCTTA + \beta_{12} ROA_{t-1} + \beta_{13} USNIGEXC + e_t \ldots\ldots\ldots\ldots 1$$

$$ROE = \beta_0 + \beta_1 RIR + \beta_2 TBR + \beta_3 MRR + \beta_4 PLR + \beta_5 MLR + \beta_6 SDR + \beta_7 IBR + \beta_8 INF +$$

$$\beta_9 BCTTA + \beta_{10} BCTBDR + \beta_{11} BOHCTTA + \beta_{12} ROE_{t-1} + \beta_{13} USNIGEXC + e_t \ldots\ldots 2$$

$$NIM = \beta_0 + \beta_1 RIR + \beta_2 TBR + \beta_3 MRR + \beta_4 PLR + \beta_5 MLR + \beta_6 SDR + \beta_7 IBR + \beta_8 INF +$$

$$\beta_9 BCTTA + \beta_{10} BCTBDR + \beta_{11} BOHCTTA + \beta_{12} NIM_{t-1} + \beta_{13} USNIGEXC + e_t \ldots\ldots.. 3$$

4.0 DATA ANALYSIS, RESULTS AND DISCUSSION

The models specified above were analyzed using multivariate regression analysis employing e-views 7.0 econometric software.

4.1 Unit Root Tests and Econometric Issues

VARIABLES	STATIONARITY I(d)	ADF statistic	McKinnon critical values
ROA	I(0)	-3.279967	5% level -3.144920 10% level -2.713751
ROE	I(1)	-5.124912	5% level -3.175352 10% level -2.728985
NIM	I(1)	-3.771175	5% level -3.175352 10% level -2.728985
RIR	I(1)	-11.52845	5% level -3.175352 10% level -2.728985
TBR	I(1)	-3.222374	5% level -3.175352 10% level -2.728985
MRR	I(1)	-4.004891	5% level -3.175352 10% level -2.728985
PLR	I(1)	-4.221121	5% level -3.175352 10% level -2.728985
MLR	I(1)	-4.237761	5% level -3.175352 10% level -2.728985
SDR	I(1)	-5.001953	5% level -3.212696 10% level -2.747676
INF	I(1)	-4.002989	5% level -3.175352 10% level -2.728985
BCTTA	I(2)	-3.236844 139	5% level -3.259808 10% level -2.771129
BCTBDR	unstable		

BOHCTTA	I(0)	-3.659785	5% level -3.144920 10% level -2.713751

Data points are often non-stationary or have means, variances and covariance that change over time. Non-stationary behaviour can be trends, cycles, random walks or combinations of the three. Non-stationary data, as a rule, are unpredictable and cannot be modeled or forecasted. The results obtained by using non-stationary time series may be spurious in that they may indicate a relationship between two variables where none exist. In order to receive consistent, reliable results, the non-stationary data needs to be transformed into stationary data. In econometrics, a unit root test tests whether the time series of a variable is non-stationary using an autoregressive model. This study used E-views 7.0 to compute the Augmented Dickey and Fuller (ADF) unit root test for all the variables in this study and the results are presented below in table 1. From table 1, the results indicate that the series are either I(0), I(1) or I(2) stationary. This study used the data at their stationary levels.

Table 1: ADF Unit Root Tests

The descriptive statistics of variables used in this study show that real interest rate is the most volatile with about 17.9% standard deviation followed by return on equity with about 10.4% standard deviation while the savings deposit rate is the least volatile at about 0.4% standard deviation. The Jarque-Bera statistic show that all the variables are normally distributed and this is as a result of the differenced data applied in the study. The correlation analysis shows that some of the variables are highly correlated. For instance, Maximum lending rate has a positive correlation of 93% with Prime lending rate and 61% with Minimum rediscount rate. Minimum rediscount rate has a positive correlation of 80% with Treasury bill rate while Banks' overhead costs to total assets have a positive correlation of 90.8% with US/Nigeria exchange rate.

4.2 Estimation of the return on assets (ROA) equation (eq. 1)

The results of the estimated equation show that only Prime lending rate has a positive and significant relationship with return on assets at the 5% level. The model has an overall fit or explanatory power R^2 of 98.3% and adjusted R^2 of 90.6% with a marginal significant F-statistic probability of 0.0749 and Durbin-Watson statistic of 1.229 indicating that there might be serial correlation problem. The Breusch-Godfrey Serial Correlation LM Test confirms that indeed the estimated equation has Serial Correlation problem though it passed the Jarque- Bera normality test. The addition of the first lag of the dependent variable roa1 (-1) rather than help address the serial correlation problem compounded it as the estimated equation returned a "Near singular matrix." Result. To address the Serial Correlation problem, we follow the suggestion by Hossain (2012) that between the highly correlated variables eliminate the variable with the highest probability figure in the estimated equation and re- estimate. Following this suggestion, among the highly correlated variables MRR was removed. Table 2 below is the re- estimated equation result.

Table 2: Estimation Result

Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOHCTTA	-1.287262	0.916505	-1.404534	0.2548
INF1	0.369261	0.105460	3.501450	0.0394
MLR1	-4.425816	0.903108	-4.900649	0.0163
PLR1	5.660621	1.187740	4.765875	0.0175
RIR1	-0.074046	0.028177	-2.627876	0.0785
SDR1	-1.781062	1.585461	-1.123372	0.3431
TBR1	0.798240	0.195219	4.088950	0.0264
USNIGEXC1	-0.004306	0.001368	-3.146521	0.0514
C	0.136317	0.061899	2.202248	0.1149

R-squared 0.976116, Adjusted R-squared 0.912425, F-statistic 15.32577, Prob(F-statistic) 0.023200, Akaike info criterion -5.504642, Durbin-Watson stat 1.487538

The re-estimated equation 1 above was again subjected to serial correlation test, normality and specification tests using the Breusch-Godfrey Serial Correlation LM Test, the Jarque- Bera normality test and the Ramsey Regression Specification Error Test. All the tests show that the model passed the serial correlation test, the normality test and the specification test as is shown in the summarized statistics below in Table 3.

Table 3

Breusch-Godfrey Serial Correlation LM Test: Null: there is no serial correlation

F-statistic	0.221495	Prob. F(2,1)	0.8325
Obs*R-squared	3.683932	Prob. Chi-Square(2)	0.1585

Ramsey RESET Test: Null: the model does not include all relevant variables (Incorrect functional form)

	Value	df	Probability
t-statistic	5.489704	2	0.0316
F-statistic	30.13685	(1, 2)	0.0316
Likelihood ratio	33.32227	1	0.0000

4.3 Estimation of the return on equity (ROE) equation (eq. 2)

The results of the estimated equation (not shown) show that there is no significant relationship between ROE and all the variables that entered into the equation. The model has an overall fit or explanatory power R-squared of 84.5% and adjusted R-squared of 14.6% with an insignificant F-statistic probability of 0.532 and Durbin-Watson statistic of 0.936722 indicating that there might be serial correlation problem. Furthermore, the adjusted R-squared value of 14.6% in light of an R-squared of 84.5% suggests that the model may have specification problem. Thus, we investigate the serial correlation, normality and specification problems using the Breusch-Godfrey Serial Correlation LM Test, the Jarque- Bera normality test and the Redundant variable tests. Both the Breusch-Godfrey Serial Correlation LM Test and the Redundant variable tests confirm that the model has serial correlation and specification issues though the model passed the normality test. The redundant variables test allows the researcher to test for the statistical significance of a subset of variables included in the study. More formally, the test is for whether a subset of variables in an equation all have zero coefficients and might thus be deleted from the equation. The redundant variable test reveals that several of the variables in the model had coefficients that add nothing to the model and therefore can be comfortably removed. Thus, the re- specified and estimated return on equity equation result is shown in table 4 below.

Table 4 Estimation Result

Dependent Variable: ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.272373	0.132130	-2.061408	0.0849
TBR	1.455192	0.938163	1.551108	0.1719
MLR	-1.065850	0.818961	-1.301466	0.2408
MRR	-2.915590	1.691195	-1.723982	0.1355
USNIGEXC	0.000999	0.002647	0.377417	0.7189
C	-0.040494	0.025063	-1.615707	0.1573

R-squared 0.740163 Adjusted R-squared 0.523633 Prob(F-statistic) 0.083290 Durbin-Watson stat 1.853787 Akaike info criterion -2.126097

First, the global utility of the model improved as can be seen from the Akaike information criterion (AIC) of -2.126097 compared to the previous AIC of -1.974294. Furthermore, the re-estimated equation above was again subjected to serial correlation test, normality and specification tests which show that the model passed the serial correlation test, the normality test and the specification test. The results of the re-estimated equation 2 show that Real interest rate, maximum lending rate and minimum rediscount rate have negative but insignificant relationship with Return on Equity of Banks in Nigeria. However, Real interest rate shows a marginal negative and insignificant relationship with Return on Equity at the 8% level of significance. On the other hand, Treasury bill rate and the US/Nigeria exchange rate have positive but insignificant relationship with Return on Equity of Banks in Nigeria.

4.4 Estimation of the net interest margin (NIM) equation (eq. 3)

The results of the estimated equation reveal that none of the variables that entered into the equation have any significant relationship with Net Interest Margin of Money Deposit Banks.

The result of the estimated equation also show an R-squared of 53.12% with a negative Adjusted R-squared of -1.58% and Durbin-Watson statistics of 0.9679 indicating that there might be serial correlation problem with the model. The negative Adjusted R-squared also indicate that the model might have specification problem. The Breusch-Godfrey Serial Correlation LM Test confirms that indeed the estimated equation has Serial Correlation problem though it passed the Jarque- Bera normality test.

To address the Serial Correlation problem, we again follow the suggestion by Hossain (2012) that between the highly correlated variables eliminate the variable with the highest probability figure in the estimated equation and re- estimate. Following this suggestion, among the highly correlated variables MRR/TBR, SDR/MRR, MLR/PLR and BOHCTTA/USNIGEXC with correlations of 82.8, 74.1, 94.2 and 90.9 percent respectively MRR, SDR, MLR and USNIGEXC were removed. Table 5 below is the result of the re- estimated equation 3.

Table 5 Estimation Result

Dependent Variable: NIM1

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR1	0.021472	0.031679	0.677799	0.5232
MRR1	0.428377	0.248750	1.722118	0.1358
PLR1	-0.411085	0.263533	-1.559897	0.1698
INF1	-0.058567	0.102654	-0.570529	0.5890
BOHCTTA	0.543171	0.356113	1.525277	0.1780
C	-0.037231	0.026778	-1.390364	0.2138

R-squared	0.458285	Mean dependent var	0.001536
Adjusted R-squared	0.006855	S.D. dependent var	0.017912
S.E. of regression	0.017850	Akaike info criterion	-4.906745
Sum squared resid	0.001912	Schwarz criterion	-4.664292
Log likelihood	35.44047	Hannan-Quinn criter.	-4.996510
F-statistic	1.015186	Durbin-Watson stat	1.111732
Prob(F-statistic)	0.482727		

Although the results of the re-estimated equation 3 show no significant relationship between interest rate variables and Net Interest Margin of Banks, and the fit of the model reduced from 53% to 48%, the global statistics using the Akaike information criterion show that the re-estimated model is better with AIC -4.9067 compared to -4.384536 of the previous equation. The re-examined Breusch-Godfrey Serial Correlation LM Test indicates that the re-estimated

equation3 is free from serial correlation. Finally, the study applied the Wald Test to investigate whether the coefficients of the variables in the re-estimated equation3 have any significant contribution in the determination of Net Interest Margin of Deposit Money Banks in Nigeria. The results in table 6 show that the coefficients of the variables in the re-estimated equation 3 have no significant contribution in the determination of Net Interest Margin of Deposit Money Banks in Nigeria.

Table 6 Wald Test:

Equation: EQ01NIM

Test Statistic	Value	df	Probability
t-statistic	1.358331	6	0.2232
F-statistic	1.845062	(1, 6)	0.2232
Chi-square	1.845062	1	0.1744

Null Hypothesis: C(1) + C(2) + C(3) + C(4) + C(5) =0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1) + C(2) + C(3) + C(4) + C(5)	0.523368	0.385302

The study found that Bank Overhead Costs to Total Assets expectedly have a negative but insignificant relationship with return on assets. Inflation which theoretically may have positive or negative relationship with bank profitability depending on its predictability by economic agents here have a positive and significant relationship with return on assets. Maximum lending rate, Real Interest rate and Savings deposit rate all have negative and significant relationship with return on assets. These agree with theoretical apriori expectations on their relationship with bank profitability as well as some previous studies such as Okoye, and Eze (2013), Aburime (2008) and Uchendu (1995). These studies show that Lending at the maximum interest rate has a crowding effect on borrowers and thus reduces the interest earning activities of banks thereby reducing profit. Also, increasing deposit rates all other things being equal will narrow the interest spread thereby reducing bank profitability. The exchange rate variable also shows that depreciating exchange rates negatively and significantly affect bank profitability at the 5% level of significance. For real interest rates, an increase in the value of money would lead to higher deposit rates and will narrow the interest spread thereby reducing bank profitability. On the other hand, Prime lending rate and Treasury bill rate all significantly and positively affect bank profitability as measured by return on assets. Overall, the return on asset (ROA) model has an explanatory power of 97.6% (R-squared 0.976116) with Adjusted R-squared of 91.2%

(0.912425), an F-statistic of 15.32577with Prob.(F-statistic) 0.023200 showing that the model is good enough to explain changes in return on assets of money deposit banks in Nigeria.

5.0 CONCLUSIONS

The estimated results show 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 t*hat 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 (minimum rediscount rate, prime lending rate, savings deposit rate, maximum lending rate as well as treasury bills rate) and Net Interest Margin of Deposit Money Banks in Nigeria. The implication of the findings of this study suggests that the profitability of the banking sector is a function of changing interest rates. The study therefore recommends that government should adopt monetary policies that will help Nigerian deposit money banks to improve on their profitability and there is need to review and strengthen bank lending rate policies through effective and efficient regulation and supervisory framework. The results of this study also suggest that banks can improve their profitability through charging moderate lending rates as against maximum rates as their circumstances may allow. Furthermore, the managers of money deposit banks are expected to be able to create the conditions for an efficient banking system devoid of information asymmetry to adapt to changing macroeconomic variables of interest rates and inflation. Banks' management must efficiently manage their portfolios in order to protect the long run interest of profit-making. Finally, this study covered the period between 1999 and 2012. Further research is needed to clear the grey areas especially over a longer period of time. Quarterly data can be analyzed to reveal more precise results. Other econometric techniques can be applied to verify the relationships.

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