The Economic Implication of Cash Reserve Requirement on the Profitability of Deposit Money Banks in Nigeria

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Abstract

This paper investigated the impact of cash reserve requirement on the profitability of deposit money banks in Nigeria over the period of 31years between 1988 and 2018. Quantitative secondary data from the Central Bank of Nigeria (CBN) Statistical Bulletin 2018 edition was considered in the study. The study employed Augmented Dickey-Fuller Unit Root Test, Co integration test, Granger Causality test and multiple regressions methods for the empirical test. It was revealed that there is long-run relationship between cash reserve requirement and the profitability of deposit money banks in Nigeria with the test of Johanson co integration. It was further revealed that there is no unidirectional or bidirectional relationship between cash reserve requirement and profitability of deposit money banks in Nigeria. The study revealed that cash reserve requirement has an inverse relationship with profitability of banks although, f-statistics indicated that cash reserve requirement with other variables included in the model have a significant impact on the profitability of banks in Nigeria for the period under review. Based on these findings, the study concluded that cash reserve requirement has a significant impact on the profitability of deposit money banks in Nigeria. Therefore, the study recommends among others that the monetary authority should ensure that the cost of funds such as interest rate and lending rate should be at a reasonable rate.

Key words: Return on asset; Cash reserve requirement; Deposit rate; Lending rate; Loan to deposit ratio; Inflation rate; BInterest rate; Money supply and credit to private sector

INTRODUCTION

Financial intermediation role is the key function of banks, which serves as an important feature of financial system all over the world. The existence of banks in the country contributed largely to the development process of any developing economies through financial intermediation role (Abid & Lodhi, 2015). To effectively perform intermediation role without any hiccups banks must ensure that liquidity level is strong enough to meet daily activities for the avoidance of sudden banks distress and subsequent banks failure. In the Nigeria banking system, monetary authority supervises and regulates the system through conventional policy. However, in the recent years, the Central Bank of Nigeria has adopted the usage of non-conventional policy such as reserve requirements ratio to complement the conventional monetary policy tools in maintaining the liquidity level of bank against any sudden bank runs or banks failure (Gray, 2011).

The major liquidity measure maintained by Nigerian banks is the cash reserve ratio, which is the minimum level of cash deposit expressed as a ratio of a bank's demand deposit or liability that a bank is expected to maintain with Central Bank of Nigeria (CBN). In the recent past, some conventional banks collapsed due to different factors that could be attributed to mismanagement of funds, corruptions, frauds, illiquidity, and gross incompetency of Board of Directors, bank runs and many other factors. For instance, in 2015, during economic recession, banks were badly affected as a result of over reliance on government funds. Although Monetary

Policy Committee (MPC) of the CBN intervened by reducing the reserve requirement of banks from 31.0 per cent to 25.0per cent while retaining monetary policy rate at 13per cent. This decision was attributed to the view of CBN to encourage more credit facilities in the economy and unequivocally increasing the liquidity position of deposit money banks to achieve economic stability and improve the performance of banks in the financial sector. Surprisingly, MPC increased cash requirement ratio from 22percent to 27percent after four years of sustaining it at 22.5percent while other parameters such as monetary policy rate are still holding at a constant rate (CBN, 2018). The implication of this decision is not farfetched as the available cash in the system was retracted and contracted.

Regrettably, the policy that could sustain and stimulate the profitability of banks remains unsettled in the literature. Despite the numerous policies in the banking system to improve banks profitability and maintain adequate liquidity position, banks are still exposed to liquidity related risk and ineffective policies to support banking business and sustain their profitability. The recent situation of banks failure unstable economic indicators, there are still some unclear issues surrounding the performance and profitability of banks, despite all the policies framework put in place to combat low performance of banks ditto the economy as a whole. The policy inconsistencies had affected banks performance in executing intermediation role effectively which negatively depletes their profitability (CBN, 2011). The increasingly reliance on cash reserve requirements ratio as a policy tool to measure the liquidity level of banks and its impact on bank profitability has not been extensively researched and explored. Admittedly, it has not been empirically ascertain whether the poor performance of deposit money banks in Nigeria could be explained with the previous adjustments of cash reserve requirements or there are other indicators inhibit the profitability. The recent financial crises in Nigeria have triggered an intense debate on the usage of cash reserve requirements to create more credits, stimulate the economy and improve the profitability of deposit money banks in Nigeria. This argument still continues as previous empirical studies had given mixed results as to what extent and whether liquidity position and policies revolves around it has any influence on the profitability of deposit money banks.

A good number of empirical study has been conducted for instance the works of Gray 2011; King, 2010, Cañón and Margaretic, 2014; Abid and Lodhi, 2015; Yimer, 2018, Oganda, Mogwambo, & Otieno (2018) evidenced that cash reserve requirement has an inverse relationship with profitability of banks. While some streams of empirical studies such as Okamoto (2011); Ma, Xiandong & Xi, 2011; Penzin, Nkang, and Okafor (2016) evidenced that Cash reserve requirement adjustments have a marginal effect on bank lending in Nigeria, and such adjustments

are more effective in controlling liquidity than influencing profitability. Yet there is no concrete evidence as regards the causal direction between cash reserve requirements and profitability of deposit money banks in Nigeria. Thus, this current study bridged the gap created in the previous studies by providing clear understanding of the effect of cash reserve requirement on the profitability of deposit money banks in Nigeria and relationships existed between the said variables using ordinary least square approach. This research covers the period of 31years between 1988 and 2018 which help to assess the extent to which the reserve requirement has impacted on the profitability of banks in Nigeria while controlling for other monetary policy tools to aid the effect of reserve requirement. The period was chosen to cover the recent economic recession and development in banking industry.

BRIEF LITERATURE REVIEW ON THE STUDY

The argument which advocates that conventional and unconventional monetary policy leads to profitability of banks and eventually to economic growth is based on the theoretical framework of financial intermediation theory. It was argued that the existence of many banking sectors is driven by the reserve requirement of the Central Bank (Peydr´o, 2010; Robitaille, 2011). Invariably, the central bank's reserve requirement is a primary security measure that serves as a warranty for the existence of commercial banks. This regulation requires each commercial bank to maintain minimum cash reserves of customer's deposits with Apex bank. Santos, (2000) revealed that most of the world's banking sectors are regulated and control by reserve requirement policy. This necessitated reserve requirement as one of the important policies of Central Banks to prevent sudden liquidation, banks failure and bank runs (Bianchi & Bigio, 2013). Glocker & Towbin, (2012), stated that reserve requirement characteristically affects the liquidity of banks. Liquidity to customers or depositors is basically needed to avoid bank runs caused by a situation where banks use too much of deposits to finance their operational activities.

Meanwhile reserve requirement provides systems for making customers' deposits accessible to them, while ensuring that banks make substantial funds for their operational activities through the discount window. Through the reserve requirement the Central Bank is able to implement its monitory policies towards a stable economy (Gray, 2011). In simpler term, reserve requirement ratio is the minimal percentage of deposits to be kept up with central bank by the banks. Therefore, central bank or monetary authority determines banks' reserve requirements. This policy was introduced to control the banks activities and the maintenance of their liquidity. Reserve requirement is one of the monetary

management tools available to central banks to regulate and control the level of banking system liquidity with the overall objectives of sound financial system stability and ensuring that banks contribute maximally to the growth of the economy.   Penzin, Nkang and Okafor (2016), stated that reserve requirement is an assurance tool of monetary authorities uses to regulate domestic liquidity and influence the cost of credit. To a large extent, it determines the available loanable capital to banks as it stipulates the amount of cash reserves that should be held by deposit money banks for their day to day activities (Muhammad, Yakub & Maimuna, 2015).

Excesses over the stipulated cash reserve ratio are kept with the central bank. The adjustment of the reserve requirement by the monetary authority has implications for the growth of monetary aggregates and banks' capacity to advance credit to the economy. Reserve requirements protect banks against insolvency by limiting their risk capacities and ensuring that they have adequate funds to meet the needs of depositors. Reserve requirements also assist the monetary authority in achieving macroeconomic stability by ensuring that monetary growth is consistent with the absorptive capacity of the economy; and is a tool used by the central bank for manipulating money supply (Okamoto, 2011). The underlying principle of this requirement is to maintain bank from its liquidity. This mean that when losses occur on a bank's loans the amount lost is first covered from profits then from regulatory capital. If these are not sufficient, bank failure and loss of bank deposits can occur. Reserve requirement ratios vary across different types of deposits. From the perspective of Central Banks, the reserve requirement secures banks, their customers, shareholders and the economy at large (Glocker & Towbin, 2012). Until the period carrying out this research, there is no clear evidence that cash reserve requirements have a significant influence on banks' financial performance and their contribution to economic growth.

Theoretically, several theories have tried to explain how bank reserve requirements could influence bank lending, and possibly prevent financial crisis that may hinder their profitability. Most of these theories assume market imperfections, thus refuting the Modigliani-Miller theory which was based on the premise of perfect competition. The Modigliani-Miller theory, states that banks' lending will depend on banks' capital structure, lending advancements and capacities, as well as prevailing market conditions. This means that banks' lending behaviour is influenced by the capital base, risk capacities, loan repayments profile, as well as the prevailing market conditions which are usually determined by domestic and external economic environments. The CBN (2010) notes that the effects of monetary policy on bank lending would, therefore, depend on the capital adequacy requirements of banks. The requirements varied from time to time depending on prevailing situations. An increase in the reserve requirement is expected to limit bank lending. Also, if the shareholders' fund of the bank capital is small, banks may reduce their lending, otherwise they will not be able to meet the capital adequacy and liquidity ratio requirements.

Specifically, the amount of capital that is available for lending by banks is influenced by regulatory requirements on cash reserves ratio and liquidity ratio. The effects of these requirements on policy are transmitted into the economy through the credit channel of monetary policy transmission mechanism. From the bank lending channel perspective, banks issue liabilities (bank deposits) and hold assets (bank loans). It emphasizes that since deposits represent the major source of funds for lending, an expansionary monetary policy increases bank reserves and deposits, and invariably increases the availability of bank loans. Similarly, contractionary policy would result to a reduction in bank lending while an expansionary policy is vice versa (Penzin, Nkang & Okafor, 2016).

EMPIRICAL REVIEW ON THE STUDY

The study by Yimer(2018) determined the effect of cash required reserve on commercial bank lending in Ethiopia using panel data of eight purposively chosen commercial banks over the period of eleven years (2005 to 2015). The investigation tested the relationship between commercial bank lending and cash required reserve. Eleven years financial data of eight purposively chosen commercial banks were used for analysis purpose. Ordinary least square model was applied to test the impact of predictor variable on commercial bank lending. The result suggests that, there is no significant relationship between commercial bank lending and cash required reserve in Ethiopian commercial. The study suggested that commercial bank have to give less emphasis to cash required reserve because it doesn't weakens banks credit creation ability and does not leads a bank to be insolvent. Oganda, Mogwambo, Otieno (2018), assessed the effect of cash reserves on performance of commercial banks in Kenya. The study found that cash reserves had a strong negative correlation with return on equity giving a significant negative relationship with performance of Equity bank. The study recommended that banks should minimize cash reserves and instead invest this money in productive investments, diversify their sources of funding, diversify their investments of these funds.

The research work by Penzin, Nkang and Okafor (2016), uses monthly data from 2009 to 2015 to analyse the impact of CRR adjustment on bank lending with the aid of a modified reduced-form VAR model linking two transmission channels of CRR impulses to bank lending behaviour. Results show that CRR adjustments have a marginal effect on bank lending in Nigeria, and such adjustments are more effective in controlling liquidity than influencing lending. The study concludes that banks'

lending in Nigeria is based on factors other than CRR adjustments, some of which may include prevailing economic conditions, risk profile of the customers, returns on other alternative investments. In the study of MacCarthy (2016) examined the effect of cash reserve ratio on the financial performance of banks and their level of engagement in corporate social responsibility. Data on banks' cash reserve ratios from Bank of Ghana and data on corporate social responsibility engagement and return on investment from the 2013 annual reports of 20 commercial banks in Ghana are used. It is found that cash reserve ratio positively relates to the financial performance of commercial banks, but it negatively relates to banks' level of engagement in corporate social responsibility. Also, cash reserve ratio significantly and strongly predicts financial performance of commercial banks in terms of return on investment. It is recommended that banks enhance their engagement in corporate social responsibility activities that improve bank-customer relationship and customer patronage.

Similarly, Glocker and Towbin (2012) estimated a VAR model for the Brazilian economy and noted that discretionary increases in reserve requirements led to reduction in domestic credit, while very different effects were observed for other macroeconomic aggregates. The results further suggest that reserve requirements can complement interest rate policy in achieving financial stability, but cannot be its substitute with regards to ensuring price stability. Tovar, Mercedes and Martin (2012) examined the role of reserve requirements and other macro prudential instruments on real private bank credit growth in five Latin American countries (Brazil, Chile, Colombia, Mexico and Peru). Using two complementary methodologies - an event analysis and a dynamic panel data Vector Auto Regression (panel data VAR) and monthly data for the period 2004:M6—2011:M4. The empirical results showed that the instruments had moderate and transitory effects and were complementary monetary policy.

Okamoto (2011) used an autoregressive integrated moving average (ARIMA) model on data on the entire U.S. banking system covering the period 1971 to 2009. Two sets of regressions were considered; the first utilizing lending volume as the dependent variable, and the second, interest rate as the dependent variable. The results of the first regression indicated that Cash Reserve Requirement (CRR) influence Bank lending. For Nigeria, Otu and Tule (2002) examined the effects of reserve requirement on the behaviour of banks to intermediate from the period 1992 to 2001. They employed a combination of basic accounting conventions, the multiplier approach to monetary management and regression analysis. The empirical results showed a positive relationship between private sector credit and reserve requirement, which contradicted apriori expectations

METHODOLOGY

This study investigated the impact of cash reserve requirement on the profitability of banks in Nigeria between 1988 and 2018. The study used secondary data on return on asset, reserve requirements ratio, cash reserve requirement, interest rate, deposit rate, lending rate, inflation rate , money supply to GDP and Credit to private sector to GDP ratio were gathered from Central Bank of Nigeria (CBN) Statistical Bulletin. The nature of data used for this study is time series from 1988 to 2018.

METHOD OF DATA ANALYSIS

Data Analysis is the task of methodical using arithmetical and rational methods to define, demonstrate, condense, review and assess data. This task is developed to deal with manipulation of the information that has been gathered so as to present the evidence. The study made use of Econometric Measure (E-views) version 9.0 to analyse the data. The researcher relies on Ordinary Least Square Estimator (OLS), Co-integration test and Causal techniques in evaluating the relationship and impact between the selected variables.

MODEL SPECIFICATION

Theoretical Modeling

The transmission process is given as follows: Bank Reserve Requirement↑→ Money Supply↓→ Bank Reserves/Deposits↓ Bank Loans↓ →↓ Profitability. This model holds when there is an increase in reserve requirement. Bernanke and Blinder (1988) posit that there are three necessary conditions to be satisfied for bank lending channel to effectively transmit monetary policy. The elasticity of substitution between bank loans and bonds for borrowers should be perfectly inelastic; the ability of the central bank to affect the supply of bank loans through reserve requirements; and the existence of imperfect price adjustment that prevents monetary shocks from being neutral. This study adopted the model of Penzin, Nkang and Okafor(2016) and augmented it with additional variables. The researcher used a multiple regression model to validate the hypothesis.

$Y=f(Xn)$

$Y=f(X_1, X_2, X_3……Xn)$

ROA = CRR +DR + INF + INT + LR + LTDR + MS/GDP + CPS/GDP

$ROA= f$(CRR +DR + INF + INT + LR + LTDR + MS/GDP + CPS/GDP)………… Equ (1)

$Y = \alpha +\beta$ CRR + β DR + β INF + β INT + β LR + β LTDR + β MS/GDP + β CPS/GDP+e

Where:ROA= Return on Assets, CRR= Cash Reserve Requirement, DR = Deposit Rate, INF= Inflation Rate, INT = Interest Rate, LR= Lending Rate, LTDR= Loan

to Deposit Ratio,MS/GDP= Money supply to Gross Domestic Product Ratio,CPS/GDP = Credit to Private Sector to Gross Domestic Product Ratio.β_0=Constant term

,β_1- β_8 =Coefficients of explanatory variables.μ=Error term.

DATA ANALYSIS AND INTERPRETATION

Table 1
Descriptive Statistics

	ROA	CRR	DR	INF	INT	LR	LTDR	MS_GDP	CPS_GDP
Mean	1.714839	4.669355	12.29341	20.808	13.83871	46.62143	64.90502	14.91783	11.93365
Median	1.840000	0.000000	10.44000	12.168	13.5000	45.95000	66.50000	13.25046	8.255015
Maximum	3.260000	22.50000	28.02000	76.758	26.0000	65.90000	85.66147	21.30726	20.77330
Minimum	0.220000	0.000000	5.460000	0.2236	6.00000	29.10000	37.96500	9.151674	6.217349
Std. Dev.	0.958784	8.178067	5.449914	19.394	3.96944	9.575306	12.07844	4.010659	5.585114
Skewness	-0.054759	1.419154	1.151594	1.5723	0.68875	0.151517	-0.563862	0.281219	0.570533
Kurtosis	1.621572	3.306968	3.772930	4.2518	4.63071	2.618034	2.679775	1.571939	1.503693
Jarque-Bera	2.469742	10.52737	7.623544	14.797	5.88583	0.307065	1.775142	3.042772	4.573746
Probability	0.290872	0.005176	0.022109	0.0006	0.05271	0.857673	0.411654	0.218409	0.101584
Sum Sq. Dev.	27.57797	2006.423	891.0468	11284.	472.693	2750.595	4376.663	482.5617	935.8051
Observations	31	31	31	31	31	31	31	31	31

Source: Authors' computation.

Table 1, presented above shows the descriptive statistics of the variables employed in the study, which explains the average value of each variable, deviation each variable from its mean and the normality test value for each variable. As shown in the descriptive statistics table above, Mean value of return on asset is 1.714839 and corresponding standard deviation is 0.958784. Cash reserve requirement 4.669355 and the standard deviation is 8.178067. Deposit rate is 12.29341and corresponding standard deviation is 5.449914. Inflation rate shows a mean value of 20.80895 and standard deviation of 19.39459, Interest rate is 13.83871 and corresponding standard deviation is 3.969440. Lending rate is 46.62143 with standard deviation of 9.575306,

loan to deposit ratio is 64.90502 and standard deviation is 12.07844, money supply to gross domestic product ratio is 14.91783 and standard deviation is 4.010659, and credit to private sector to gross domestic product ratio 11.93365 and corresponding standard deviation is 6.217349. It all indicates that on average each bank maintain 1.7percent of its total asset to meet cash reserve requirement as well as to maintain its liquidity. However, the value of standard deviations indicates a deviation from its average value at their respective mean value. To sum up the descriptive statistics, probability value of Jacque bera shows that all the variables are normally distributed and are good for decisions.

Table 2
Correlation Matrix

	ROA	CRR	DR	INF	INT	LR	LTDR	MS_GDP	CPS_GDP
ROA	1.000000	0.237500	-0.541226	-0.543890	-0.238523	0.351607	0.124895	0.484878	0.423019
CRR		1.000000	-0.476158	-0.261836	-0.282087	0.215827	-0.061331	0.695935	0.780246
DR			1.000000	0.539550	0.519283	-0.301701	-0.108139	-0.538758	-0.545635
INF				1.000000	0.433067	-0.316585	-0.066911	-0.294479	-0.330436
INT					1.000000	0.223849	-0.209645	-0.536721	-0.570536
LR						1.000000	-0.400405	0.038552	0.003189
LTDR							1.000000	-0.019556	-0.012679
MS_GDP								1.000000	0.951611
CPS_GDP									1.000000

Here, the correlation coefficient between cash reserve requirement and return on asset is 0.24percent, this means that there is positive association between the two variables but weak correlation. The correlation coefficient between deposit rate, inflation rate, interest rate and return

on asset is negative at 54.1percent, 54.3percent and 24 percent respectively. The relationship between lending rate, loan to deposit ratio money supply to gross domestic product and credit to private sector to gross domestic product is 35percent, 12percent, 48percent and 42percent respectively.

Table 3
Unit Root Testing

Null Hypothesis: Unit root (individual unit root process)

| Method	Statistic	Prob.**
ADF - Fisher Chi-square	191.295	0.0000
ADF - Choi Z-stat	-11.9566	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(UNTITLED)

Series	Prob.	Lag	Max Lag	Obs
D(ROA)	0.0000	0	6	29
D(CRR)	0.0003	0	6	29
D(DR)	0.0000	0	6	29

Series	Prob.	Lag	Max Lag	Obs
D(INF)	0.0000	3	6	26
D(INT)	0.0000	0	6	29
D(LR)	0.0001	0	6	29
D(LTDR)	0.0011	0	6	29
D(MS_GDP)	0.0004	0	6	29
D(CPS_GDP)	0.0016	1	6	28

Recent literature suggests that panel-based unit root tests have higher power than unit root tests based on individual time series
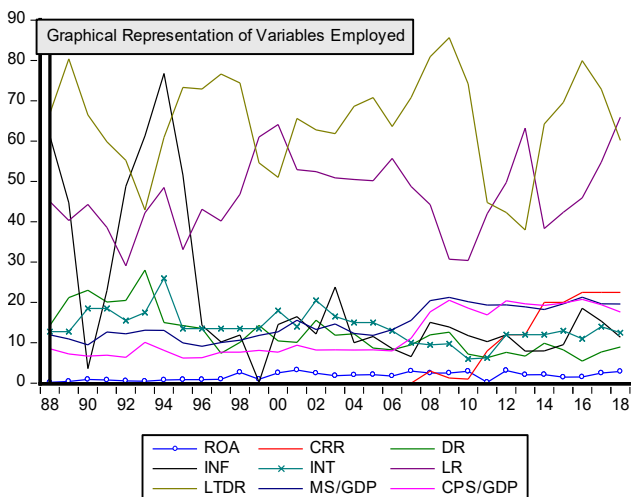
The upper part of the summary output gives the main test results, organized both by null hypothesis as well as the maintained hypothesis concerning the type of unit root process. All of the results indicate no unit root in the model at first difference.
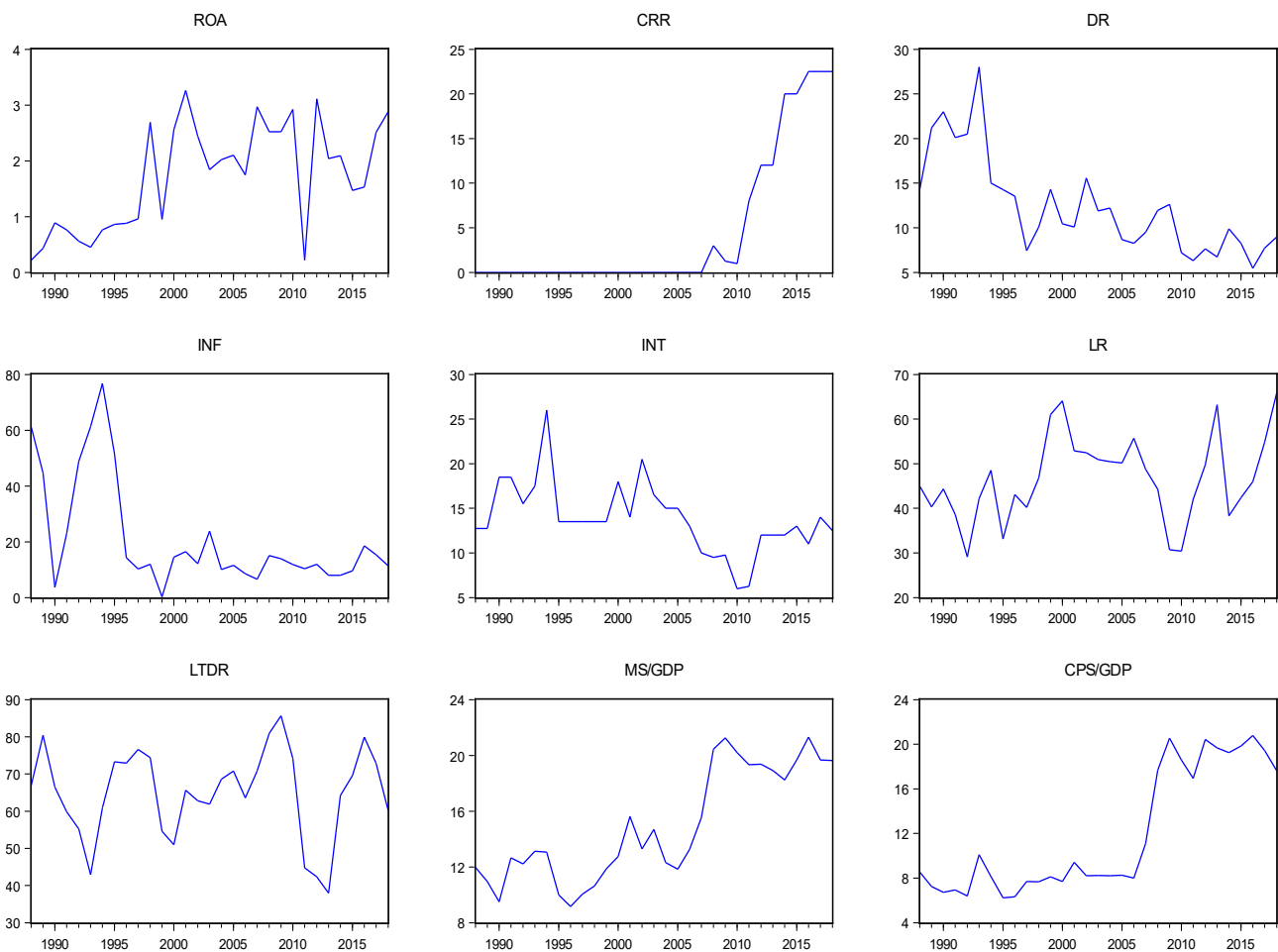
Figure 1
The trends of Return on Asset, Cash Reserve Requirements, Deposit Rate, Inflation rate, Interest rate, Lending rate, loan to deposit ratio, money supply to GDP ratio and Credit to private sector to GDP ratio.

The above graphs show the trends and pattern of each variable in their individual over the period under consideration in the study. it was observed that only cash reserve requirement has experienced steady increase over the years before a slight decline in 2015 as a result of economic recession. The other variables have been fluctuating over the period which could be attributed to environmental factors and economic instability.

Figure 2
Graphical representation of variables

Figure 1 and 2 show trends in the variables considered in this study. Theoretically, monetary policy tools influence the activities of banks and take a turn on profitability of banks. Any policy that increases reserve of money in the bank will reduce inflation because it will reduce amount of funds in the circulation. Meanwhile an increase in the CRR is expected to lead to a downward in the loan and advances and reduce money supply in the circulation while a decrease in the CRR leads to a upward trend in money supply. For ROA, the trends indicate that the performances of deposit money banks have not been stable over the years. Cash reserve requirements has been on increase over the years but there was a change in 2015 while interest rate was on the low compare to CRR. Money supply has been increasing throughout the years under review. Credit to private sector has been increasing for years.

Table 4
Regression Analysis

Variable	Coefficient	Coefficient Remarks	Std. Error	t-Statistic	Prob.	Remarks 5%
C	3.125479	Negative	1.972896	-1.58421	0.1274	
CRR	-0.051123	Negative	0.029643	-1.72462	0.0986	Insignificant
DR	-0.035064	Negative	0.036154	-0.96986	0.3427	Insignificant
INF	-0.01679	Negative	0.008821	-1.9034	0.0702	Insignificant
INT	0.06488	Positive	0.050448	1.28608	0.2118	Insignificant
LR	0.029161	Positive	0.019997	1.458266	0.1589	Insignificant
LTDR	0.019049	Positive	0.012562	1.516444	0.1436	Insignificant
MS_GDP	0.13848	Positive	0.11308	1.224612	0.2337	Insignificant
CPS_GDP	0.025131	Positive	0.10102	0.248777	0.8058	Insignificant
R-squared	0.600138					
Adjusted R-squared	0.454734					
Durbin-Watson stat			2.890008			
F-statistic	4.127381		Prob(F-statistic)	0.003894		Significant

Assumption 1: Goodness of Data Fit. Data must be fitted reasonably well. The coefficient of correlation R and Coefficient of determination R2 measure the explanatory variables of the multiple regression models. In this model we observed that R^2 is 0.600138. The implication is that the variables in the equation are fitted reasonably well in explaining the variation in return on assets between 1988 and 2018. The overall fit of the regression model measured by the F- statistic, since the p-value 0.003894 is less than 5% it means that is statistically significant at 5% percent level of significance. The Durbin Watson (DW) statistic Of 2.890008 indicates that there is no problem of serial correlation in the regression model. This is a case of positive serial correlation. Also, multicollinearity which often presents in time series data seems to be non-existent in this model, which evidenced by the reliability of the result for better decision making.

T- Test Most of the independent variables should be individually significant. This could be checked using t-test. If the p-value of t-statistics is less than 5 percent (0.05) we can reject the null and accept alternative hypothesis.

If otherwise, we do the inverse. All the independent variables employed in the study shows insignificant effect on the profitability of banks in Nigeria. The implication of these findings is that cash reserve requirement, interest rate, inflation rate, loan to deposit ratio, deposit rate, lending rate, money supply to GDP ratio and credit to private sector to GDP ratio have not been efficient in the profitability f banks in Nigeria. Although the monetary policy tools generally influenced the level of profitability of banks

COEFFICIENT OF VARIABLES

The sign of the coefficients should follow economic theory or expectation, experiences of others or intuition. The column labeled "Coefficient" depicts the estimated coefficients. The least squares regression coefficients b are computed by the standard OLS formula.For the simple linear models considered here, the coefficient measures the marginal contribution of the independent variable to the dependent variable, holding

all other variables fixed. The other coefficients are interpreted as the slope of the relation between the corresponding independent variable and the dependent variable, assuming all other variables do not change.

$ROA = 3.1254 - 0.0511*CRR - 0.0350*DR - 0.0167*INF + 0.0648*INT + 0.0291*LR + 0.0190*LTDR + 0.1384*MS\_GDP + 0.0251*CPS\_GDP$

The value of constant is **3.1254,** this means that return on asset will be increasing at **3.1254** units, if other variables remain constant. The coefficient of cash reserve requirements, deposit rate and inflation rate is - **0.0511**, -0.0350 and 0.0167 which means that for 1% increase in cash reserve requirement, deposit rate and inflation rate there will be **- 0.05,0.03 and 0.01** percent decrease in return on asset. The coefficient of interest rate, lending rate and loan to deposit ratio is 0.0648, 0.0291 and 0.0190 which connotes that for every 1% increase interest rate, lending rate and loan to deposit rate it will increase return on asset by 0.06, 0.02 and 0.01 percent respectively. The coefficient of the ratio of money supply relative to GDP which is the proxy for M2/GDP shows that 1% increase in M2/GDP would result to 0.14 unit increases in return on assets. Similarly, 1percent increase in CPS to GDP would result into 0.03 % increase in return on asset.

Table 5
Co-integration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.999247	556.8990	197.3709	0.0001
At most 1 *	0.985669	348.3459	159.5297	0.0000
At most 2 *	0.926071	225.2322	125.6154	0.0000
At most 3 *	0.809051	149.6973	95.75366	0.0000
At most 4 *	0.770556	101.6806	69.81889	0.0000
At most 5 *	0.693405	58.98978	47.85613	0.0032
At most 6	0.468585	24.70521	29.79707	0.1722
At most 7	0.193077	6.371071	15.49471	0.6517
At most 8	0.005151	0.149775	3.841466	0.6987

Trace test indicates 6 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The major aim of this test is to find out if a linear combination of the integrated variable is becomes stationary over the long-run, if it is, then it means cointegration exists among the variables, this further implies that there exist a long run relationship among the variables. The Johansen co integration test commenced with the test for the number of co integrating relations or rank using Johansen's maximum Eigen value and the trace test.

The result of this Johansen cointegration test presented in the table above indicates at least 6 co-integrating

equation by trace test. The result therefore, confirms the existence of cointegration among the variables by Max-eigenvalue test. Hence, we concluded that there exists a long run relationship among variables.

Table 6
Granger Causality Test

Pairwise Granger Causality Tests
Date: 07/27/20   Time: 08:05
Sample: 1988 2018
Lags: 2

| Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
CRR does not Granger Cause ROA	29	0.45726	0.6384	accepted
ROA does not Granger Cause CRR		2.0127	0.1556	accepted
DR does not Granger Cause ROA	29	3.66234	0.0409	rejected
ROA does not Granger Cause DR		0.22689	0.7987	accepted
INF does not Granger Cause ROA	29	1.6886	0.206	accepted
ROA does not Granger Cause INF		2.59366	0.0955	accepted
INT does not Granger Cause ROA	29	0.84002	0.444	accepted
ROA does not Granger Cause INT		1.72429	0.1997	accepted
LR does not Granger Cause ROA	29	3.66235	0.0409	rejected
ROA does not Granger Cause LR		1.24069	0.3071	accepted
LTDR does not Granger Cause ROA	29	0.12228	0.8854	accepted
ROA does not Granger Cause LTDR		1.71636	0.2011	accepted
MS_GDP does not Granger Cause ROA	29	0.64977	0.5311	accepted
ROA does not Granger Cause MS_GDP		0.85323	0.4386	accepted
CPS_GDP does not Granger Cause ROA	29	0.75072	0.4828	accepted
ROA does not Granger Cause CPS_GDP		0.62544	0.5435	accepted

We observed in the result that there is no bidirectional relationship in the model; however, there is existence of unidirectional relationship in the model. It was revealed that only deposit rate and lending rate granger cause return on asset while cash reserve requirement , interest rate ,inflation rate ,loan to deposit ratio, money supply to GDP and credit to private sector to GDP ratio does not granger cause return on asset for the period under review. These finding ascertain the insignificant result in OLS.

STABILITY DIAGNOSTICS

This option shows a plot of the recursive residuals about the zero line. Plus and minus two standard errors are also shown at each point. Residuals outside the standard error bands suggest instability in the parameters of the equation.

The CUSUM test is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.
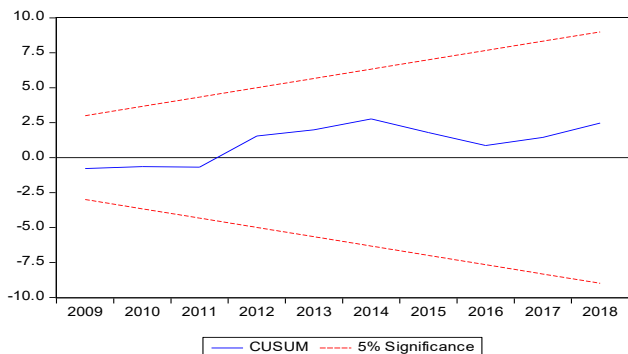
The cumulative sum of squares is generally within the 5% significance lines, suggesting that the residual variance is somewhat stable. This means that the graph above indicates that parameters are stable and there is no structural break

Discussion of Findings

In the above results, the unit root test indicates that all data were subjected to unit root test, which later revealed that all the variables are good to be used as they are stationary at the same order I(1). The cointegration test result revealed the existence of long-run relationship between cash reserve requirement and the profitability of banks in Nigeria. It was revealed that cash reserve requirement has a significant impact on the profitability of banks in Nigeria but has negative relationship. Although, t-statics indicated that all the variables have no significant impact individually on the profitability of deposit money banks.

In order to avoid spurious regression analysis, the residuals of the OLS result were subjected to various diagnostic checks such as normality test and stability test. Normality test: In order to test whether the residuals of the ECM regression model was normally distributed, Jarque-Bera test statistic was employed. The result shows that the Jarque-Bera value is not significant at 5% significance level resulting in the failure to reject the null hypotheses which states that our model is normally distributed. The results of Granger Causality test illustrate that there is no direct causal relationship between the variables.

CONCLUSION

The study investigated the impact of cash reserve requirement on the profitability of deposit money banks in Nigeria using time series data between 1988 and 2018. The study incorporates the relevancy of other economic indicators in Nigeria economy by controlling for the effect of interest rate, inflation rate , deposit rate , lending rate , loan to deposit ratio, money supply to GDP ratio and credit to private sector to GDP ratio in the cash reserve requirement and profitability of banks arguments. Given the result of the estimated model, there exists an obvious correlation between cash reserve requirement and return on asset. The study concluded that reserve requirement has a significant effect on the profitability of deposit money banks in Nigeria. The study adopted a cointegration analysis based on the Johansen and Juselius (1988) Maximum Likelihood approach to ascertain the relationship between cash reserve requirement and the profitability of deposit money banks. While casuality test was adopted to know the direction of causal relationship between cash reserve requirement and profitability of deposit money banks in Nigeria. The study revealed that there is a long run relationship in the model and there is no any existence of uni directional relationship in the model as revealed by the causal test. The study further revealed that there is a negative relationship between cash reserve requirement and banks profitability. The outcome of this study substantiate previous studies such as Gray 2011; King, 2010, Cañón and Margaretic, 2014; Abid and Lodhi, 2015; Yimer, 2018, Oganda, Mogwambo, & Otieno (2018) which revealed that CRR has an inverse relationship with the profitability of deposit money banks in Nigeria.

RECOMMENDATIONS

Based on the findings and conclusion, the following recommendations were outlined

CRR has a negative and insignificant effect on the profitability of deposit money banks in Nigeria. Therefore, the monetary authority should be wary of changes in cash reserve requirement especially when increasing the CRR as the increase in CRR leads to a decrease in the amount of cash available for commercial banks to be given out as loan and advances. This hampers tremendous returns and influence economic growth.

Since policy that increase reserve of money in CBN will reduce inflation, there should be a clear policy that will accentuate the trends of inflation in the country.

To further stress the level of growth in Nigeria, the monetary authority must ensure proper management of monetary policies and other prudential guidelines in the banking system in order to enhance productive capacity and accelerate the growth process. This attributed to the effect of credit to private sector and money supply ratio.

The cost of funds such as interest rate and lending rate should be moderated and be at a reasonable level.

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