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Liquidity Management and the Performance of Deposit Money Banks in Nigeria.

[1'] Ighoroje, Ese James [2'] Akpokerere, Othuke Emmanuel (Ph.D)
Department of Banking and Finance,
School of Business Studies,
Delta State Polytechnic Ozoro,
Delta State, Nigeria.

Abstract
This study examines the effect of liquidity management on bank's performance in Nigeria from the period 1980-2017. The major aim of the study was to find empirical evidence of degree to which effective liquidity management affects bank performance and how to improve bank performance and liquidity position. The cointegration and error correction technique were produced from the ARDL technique of data analysis as well as Granger causality test was employed to investigate the relationship between liquidity management and banks' performance. The study reveals that there is a long run relationship between banks' performance and the selected key variables, although LQR was found to be the only significant variable in the model from the individual test, however, it was jointly shown that the liquidity components significantly impact on banks' performance in Nigeria in the long run. Based on the empirical findings, we recommend that central bank of Nigeria should ensure effectiveness and efficiency in the review and monitoring of liquidity policy tools in banks in order to stabilize deposit money banks performance and strengthen the financial sector of the economy.

Keywords*: Liquidity management, bank performance, autoregressive distributed lag model (ARDL) and Granger causality test.*

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I. Introduction

In recent years, liquidity management in commercial banks has generated serious attention and interest among financial economists, especially being a major factor in the current global financial crises. This could be attributed to the strategic role liquidity plays in financial markets in particular and the banking sector as a whole. The sensitivity of liquidity as a performance indicator and engine room of financial institution stability is very crucial because lack of it may incite fear, uncertainty and loss of confidence in the growth and progress of financial institutions and the economy at large.

A close examination of financial institutions in Nigeria shows that the banking sector witnessed serious liquidity challenges from 1989 to 1990. The crisis resulted in the collapse and distress of major banks with adverse effect on general economic activities. The negative impact of the crisis made the regulatory authorities to compulsorily increase the capital base of both national and international banks from N2 billion to the astronomical base of N25 billion in 2005. The landmark recapitalization exercise in 2006 which brought stability in the financial sector also helps to enhance and maintain public confidence of depositors. But the global economic and financial meltdown exerted devastating impact on liquidity and profitability in the global financial system generally and Nigeria in particular.

Basically, the deposit money banks in Nigeria are the dominant institutions that mobilize deposits from surplus economic units and channel it to deficit units for productive investment, thus earn an operational surplus. Okaro and Nwakoby (2015) argued that activity of the bank is not without problems since the deposits from those fund savers which have been invested by the bank for profit maximization, can be recalled or demanded when the latter is not in a position to meet their financial obligations. Okpara (2012) in his observation noted that banks have dual obligations of maximum liquidity to their depositors and maximum profitability to their shareholders. Maximum liquidity can be attained at the cost of no profit since idle cash is barren and does not yield any interest, while profitability can be achieved only at the cost of illiquidity since assets are usually the most illiquid of bank assets. Portfolio Liquidity is a major determinant of banks profitability and these two major indicators of banks performance are inversely related. In order to achieve these conflicting objectives, is the need to ensure efficient and proper assessment of the liquidity risk and profitability of banks to ensure the survival and growth of the banking industry in Nigeria. Adebayo, Adeyanju and Olabode

(2011) contend that these goals are parallel in the sense that an attempt for a bank to achieve higher profitability will certainly erode its liquidity position.

Efficient liquidity management involves planning and controlling the liquid current assets in such a manner as to eliminate the risk of the inability to meet due short term-term obligations on one hand, and avoid excessive investment in these assets, on the other hand. In this respect, some banks have not fully valued the importance of liquidity risk management and the implications of such risk (Shweta 2018).

According to Ibe (2013), the most challenging task is that corporate profit planning remains one of the most difficult and time consuming aspects of financial management because of many variables involved in the decision which are often outside the control of the company. Furthermore, some of the factors affecting the liquidity of banks cannot be forecast with precision, hence; the need to frequently determine their continuing validity, especially given the rapidity of change in financial market (Ogbulu and Eze, 2014).

The problem with these studies is that they focus on level of liquidity rather than in depth investigation on how to manage liquidity risk and return on capital. There are few studies that have been carried out by various authors to investigate the relationship between liquidity and performance of deposit money banks in Nigeria. This study aims at finding out the relationship between performance and liquidity with an attempt to critically examine the variables that have direct effect on bank performance. In doing so, it attempts to identify empirically and theoretically the relationship between liquidity and performance components to determine financial performance and the health of deposit money banks.

The remainder of this paper covered the four sections. Section two focuses on the relevant literature, while section three is on the methodology adopted. In section four, we test the hypotheses as well as discuss the results. In the final section, conclusions and recommendations are made.

1.1 Objectives of the Study

The study examined the effect of liquidity management on performance of banks in Nigeria. The specific objectives include:

i. To determine the effect of liquidity ratio on bank performance in Nigeria;
ii. To determine the effect of loan deposit ratio on bank profitability in Nigeria;
iii. To determine the effect of cash reserve ratio on bank performance in Nigeria; and lastly
iv. To determine if any causality exists between paired variables in relation to bank performance in Nigeria.

1.2 Research Questions

The study seeks to answer the following questions below:

i. To what extent does liquidity ratio affect bank performance in Nigeria?
ii. To what extent does loan deposit ratio affect bank performance bank in Nigeria?
iii. To what extent does cash reserve ratio affect bank performance in Nigeria? and lastly
iv. Is there any causality between paired variables in relation to bank performance in Nigeria?

1.3 Research Hypotheses

The following are considered relevant to the study:

Ho_1: There is no significant relationship between liquidity ratio and performance of banks in Nigeria at 5% level of significance.

Ho_2: There is no significant relationship between loan deposit ratio and performance of banks in Nigeria at 5% level of significance.

Ho_3: There is no significant relationship between cash reserve ratio and performance of banks in Nigeria at 5% level of significance.

Ho_4: There is no joint impact of liquidity management variables on performance of banks in Nigeria at 5% level of significance.

II. Review of Related Literature

This chapter presents the literature review and is subdivided into three different sections namely: conceptual framework, theoretical review, and empirical review.

2.1 Conceptual and theoretical framework

The complexity of the concept of liquidity management seems difficult to understand and a major concern to the management of banks and regulatory authorities. Thus, efficient liquidity management strategically position of banks for effective operation and growth of the financial sector of the economy. It is an acceptable fact that the level of liquidity determines the tempo and pattern of growth in an economy.

Generally, liquidity is the speed with which an asset can be converted to cash. An asset is considered liquid if they have the ability to be quickly sold without significant loss of value. Bank liquidity can be defined as the ability of a bank to convert financial asset to cash at minimum cost in order to meet immediate, maturing and short-term obligations. Nzotta (2004) further explained that liquid assets are assets, which are highly liquid and specified as such by monetary authorities. They usually have the following characteristics:

- Ease of conversation to cash
- Low transactions cost
- Low risk
- The returns are low

In this context, for banks to pay for maturing obligations there is need for banks to maintain sufficient fund to meet its emergency needs.

The basis for determining and evaluating good performance of depositing institutions is based on efficient liquidity management. Therefore, liquidity management is defined as the process of planning, managing and control of cash and other liquid assets to meet bank's obligations to depositors. Idowu, Essien and Adegboyega (2017) contended that managing liquidity is a fundamental component in the safe and sound management of financial institutions. In fact, banks must maintain a certain proportion of its funds in liquid form to enable it meet depositors requirements. Therefore, it should be noted that bank liquidity position is the ability of bank to pay for its maturing obligations. This is where banks face serious problem because the more liquid an asset is, the less the rate of return on investment. There is no standard norm or measures on the optimal level of liquidity to be maintain by banks. It is worthy to note that most liquid asset generate no or less income to the bank and are composed of cash, call money, Treasury bill and Treasury certificate etc. However, since most of the liabilities of banks are payable on demand and to ensure adequate liquidity at all time, banks must invest their funds and grant loans on short term basis or what is called self liquidity loans (Nzotta 2018).

The fundamental objective of every business organization is profit maximization. Profits are maximized at the point where total revenues exceed total cost. Profitability can be defined as the relationship between financial input (cost) and output (sale) over a fixed period of time. In this context a bank is said to be profitable if it generate revenue in excess of cost by minimising financial input at a given level of output. Hence efficient management of profitability leads to higher returns on capital invested into the operation activity of the bank.

In essence, the existence of a bank depends on the ability to engage in efficient credit risk selection and thus; make profit from such process. Vaish (1977 cited by Okpara 2012) believes that the bulk of commercial bank profit-more than 75 percent of the profit, is however earned from interest on loan and investment which the bank make using the money belonging to their depositors. However, when the interest charges by banks are higher than the cost of funds as well as the overall cost of doing business, it will result to profit. The interest on loan is largely influenced by the degree of risk in the exposure, the length of time of the exposure (tenor) and the size of the loan, in addition to monetary policy rate prevailing (Nzotta 2018). In this vein, sustainable profit could be achieved by effective credit analysis and management.

Deposit money banks in Nigeria form the bedrock rock of economic development in the country. As a component of then Nigeria financial system, banks play a prominent role in channelling savings from surplus economic units into activities that create wealth for the growth of the economy. They accept deposits from customers, which are short term in nature and channel these to deficit units. The deposits are mostly repayable on demand. Therefore, there is need to ensure adequate liquidity of banks, while optimizing their profit performance. One of the main objectives of bank management is to efficiently manage and monitor liquidity and profitability. In view of this role liquidity level directly affect the level of risk. Risk is the difference between planned and actual outcome of investment decisions. Inability to meet short term obligations (the withdrawal needs of depositors) will increase the risk exposure of banks. Accordingly, an institution short of liquidity may have to undertake transaction at a heavy cost resulting in a loss of earnings or in the worst scenario could result in bankruptcy of the financial institution. Certainly, some of the bank failures are associated with liquidity management risk and inadequate risk management techniques as it continues to hurt both performance and profitability in the banking sector. Therefore, it is very paramount for every bank to effect a balance between the maximisation of profitability; arising from its lending operations and ensuring optimum liquidity to a level of safety. The conflicting issues between liquidity and profitability are crucial to shareholder, depositors, monetary authorities as well as depository institutions. The shareholders jointly own the bank and are generally concerned with profitability to help in evaluating the return on investment. The depositors are the main suppliers of funds used by the bank, and are more interested in the liquidity level in order to assess the ability of the bank to meet their withdrawal needs. In the same vein, the monetary authorities are interested in the level of liquidity in the banking system, so as to avoid distress and illiquidity in the banking

system and the economy. Also, depository institution management are more concerned with both liquidity and profitability because of the obligations to share holders, depositors and regulatory authority.

Thus to ensure for continuous survival of deposit money banks in Nigeria, banks should **maintain adequate liquidity and earn adequate profit from their activities to make the banking system more efficient and stable, avoid distressed institutions, enhance risk management practice and the forced sale of bank assets.**

2.2 Theoretical Framework

The theories of liquidity management relevant to this study include the following:

i. The Anticipated Income Theory

The anticipated income theory holds that liquidity can be sourced and maintained if loan repayments are based on continuous streams of payment from the borrower. According to Nzotta (2004) the theory emphasizes the earning potential and the credit worthiness of a borrower as the ultimate guarantee for ensuring adequate liquidity. Nwankwo (1991) posits that the theory points to the movement towards self-liquidating commitments by banks. This theory has encouraged many commercial banks to adopt a ladder effects in their investment portfolio.

ii. The Shiftability Theory

This theory according to Onyekwelu, Chukwuani and Onyeka (2018) contend that a bank's liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. This approach encourages the transferring of an asset to another party as a better option in meeting banks maturing obligations. Depository institutions held secondary reserves inform of low risk securities such as government securities and commercial papers as a contingency against liquidity problem. The theory emphasizes the need to invest on marketable assets and further highlights that shiftability, marketability or transferability of financial assets held by banks constitutes the foundation for efficient liquidity of the bank.

iii. Liability Management Theory

The liquidity theory stated that depository institutions should focus on liability side of balance sheet to meet its liquidity needs. Anyanwu (1997) noted that the bank can manage its liabilities so that they actually become a source of liquidity by going out to buy money when it needs it. The theory noted that using the old liquidity principles is relevant in determining the liquidity of the assets.

iv. The Commercial Loan Theory

The approach to keep a bank liquid is by supporting short term lending. According to Nzotta (2007) bank funds should primarily be invested in short term self-liquidating loans for working capital purposes, usually confined to financing the movement of goods through successive stages of production and consumption.

2.3 Empirical Review

Literature review includes the previous studies that are related to research study which is directed to look at the impact of independent variable on dependent variable. Previous studies play a significant role in conducting any type of research. Thus, the researchers by taking guidelines from such studies can make their research more valuable. The few studies that are related to our research are given below:

Shahchera (2012) examined the influence of liquid asset holdings on the profitability of Iranian banks. The study employed the Generalized Method of Moments (GMM) in which the authors analysed the profitability of listed banks using unbalanced panel data for the period 2002-2009 and used the liquidity asset and liquidity asset- square for estimating liquid asset and profitability relationship. The study found evidence of a non-linear relationship between profitability and liquid asset holdings.

Ashraf, Nabeel and Hussian (2017) conducted a study on liquidity management and its impact profitability in banking sector of Pakistan from 2006 to 2015. The study was tested using regression analysis. The research findings show that quick and capital adequacy ratio has positive impact on banks determinant earnings per share and return on asset. The cash and current ratio has a negative relationship with return on assets, while interest coverage ratio is positively associated with return on equity. The overall empirical result shows that liquidity management has positive impact on banks profitability.

Adebayo, David and Samuel (2011) by using quantitative methods of research, observed that many findings were reached through the analysis of both the structured and unstructured questionnaire on the management of banks and the financial reports of the tested banks. The data obtained from primary and secondary sources were analysed through collection, sorting and grouping of the data in tables of percentages

and frequency distribution. The hypothesis was statistically tested through Pearson correlation data analysis. Findings indicated that there is significant relationship between liquidity and profitability.

Saleem and Rehman (2011) also investigated the relationship between liquidity and profitability in their study. The results revealed that there is a significant impact of only liquid ratio on ROA while the impact of liquid ratio on ROE and ROI was not significant. The results also revealed no significant relationship between ROA and current ratio, quick ratio and liquid ratio while ROI is significantly affected by current ratios, quick ratios and liquid ratio. The main results of the study explained that each ratio (variable) has a significant effect on the financial positions of enterprises with differing amounts and that along with the liquidity ratios. Profitability ratios also play an important role in the financial positions of enterprises.

Victor, Lartey and Eric (2013) examined the relationship existing between liquidity and the profitability of banks in Ghana, with specific reference to those listed on the Ghana Stock Exchange. Their study adopted the longitudinal time dimension, specifically, the panel data method. Document analysis was the main research procedure adopted to collect secondary data for the study. The financial reports of the seven listed banks were studied and relevant liquidity and profitability ratios were computed. The trend in liquidity and profitability were determined by the use of time series analysis. The main liquidity ratio was regressed on the profitability ratio. It was found that for the period 2005-2010, both the liquidity and profitability of the listed banks were declining. Again, it was also found that there was a very weak positive relationship between liquidity and the profitability of the listed banks in Ghana.

Ogbulu and Eze (2017) examined the impulse response of bank performance to liquidity management indicators in Nigeria from 1990-2013. The paper employed OLS, the ECM and Granger causality techniques in addition to VAR, IRF and VDC methodology. The results of the study indicate that liquidity management has significant impact on return on total assets, whereas, its impact on return on equity and return on shareholders' fund respectively is found not to be statistically significant. In addition, the direction of causality between the various liquidity management indicators and the various measures of performance is found not to be statistically significant.

Alshaffi (2015) investigated the effect of liquidity management on profitability in Jordanian commercial banks from 2005 to 2012. The study employed Augumented Dickey Fuller(ADF) stationarity test model and regression analysis. The empirical results show that a positive effect of increase in the quick ratio and investment ratio of the available funds on profitability, while there is a negative effect of capital ratio and liquid assets ratio on profitability.

Ibrahim, (2017) examined the impact of liquidity on profitability in the banking sector using ordinary least square (OLS) model. The study observed that any increase in liquidity ratios lead return on asset to increase.

Ibe (2013) investigated the impact of liquidity management on the profitability of banks in Nigeria using Elliot Rothenberg Stock (ERS) stationary test model to test the run association of the variables under study while regression analysis was used to test the hypothesis. The result of this study showed that liquidity management is indeed a crucial problem in the Nigerian banking industry.

Agbada and Osuji (2013) employed the random sampling technique to analysis the efficacy of liquidity management on banking performance in Nigeria. The findings from the empirical analysis were quite robust and clearly indicate that there is a significant relationship between efficient liquidity management and banking performance and that efficient liquidity management enhances the soundness of banks. These findings which may have re-echoed results from similar researches re-emphasize that efficient liquidity management have important policy implications for banking institutions in developing and emerging economies.

Onyekwelu, Chukwuani and Onyeka (2018) examined empirically the effect of liquidity on financial performance of deposit money banks in Nigeria for the period of 2000 to 2015.The results of the study show that Liquidity has positive and significant effect on banks' profitability ratios and that liquidity also has positive and significant effect on Return on Capital Employed.

Okara and Nwakoby (2016) appraised the effect of liquidity management on performance of deposit money banks in Nigeria from the period 2000 to 2015. The study employed regression analysis and discovered that a negative and significant relationship exist between liquidity ratio and DMB's profitability and there is a positive and significant relationship between cash to deposit ratio and profitability and DMB's

Adebayo, Samuel and David (2011) examined liquidity management and commercial banks' profitability in Nigeria. Findings of this study indicate that there is a significant relationship between liquidity and profitability. This means that profitability in commercial banks is significantly influenced by liquidity and vice versa.

Obi-Nwosu, Okara, Ogbonna and Atsanan (2017) conducted a research to explore the effect of liquidity management on the performance of DMBs in Nigeria. The study employs Augmented Dickey Fuller

Unit Root Test, OLS regression and Granger Causality. The result of the study revealed that liquidity indices are not significantly related to DMBs performance in the short and long run.

There are limited studies by various authors to investigate the relationship between bank liquidity and performance. The various empirical studies reviewed here show mixed results and conclusions. In some of the studies, a strong positive relationship is found between liquidity and **profitability** and in some, weak relationships exit. Other researchers report different other conflicting results. These conflicting findings and conclusions emanate from the different methodology and variables used and also the period of these studies. This study aims at utilizing a long time frame in finding out the relationship between liquidity and **profitability**. In doing so, it attempts to identify empirically and theoretically the relationship by disaggregating the liquidity management aggregates and relating same to various bank performance indices. The study would thus, bridge the gap created by some of the studies by looking at liquidity ratio, loan deposit ratio and cash ratio holistically as variables that have direct impact on commercial banks performance as a whole.

III. Methodology

3.1 Data Description

This study relied mainly on annual secondary data sourced from Central Bank of Nigeria (CBN), covering the period of 1980 to2017. **In this study, various variables are used to examine the relationship between liquidity management and profitability**. The parameters used in measuring liquidity are: liquidity ratio (LQR), loan deposit ratio (LDR), and cash reserve ratio (CRR) while profitability is represented by total bank asset (TBS). The summary of all the variables are provided in Table 1.

Table-1: List of variables used in the study

Variable	Definition	Source
Return of total asset (ROTA)	Return on Total bank asset *(ROTA)* is an aggregate of deposit banks' asset base. The Return on Total Asset is an indicator of how profitable a bank is relative to its total assets, and gives an idea as to how bank management is efficient in using its assets to generate earnings. It is determined by dividing net profit of banks by average total assets.	Central Bank of Nigeria (CBN) Statistical Bulletin
Liquidity ratio (LQR)	The Liquidity Ratio of a bank relates the liquid assets of the bank to its total deposit liabilities. The ratio examines the ability of a bank to honour its maturing obligations	Central Bank of Nigeria (CBN) Statistical Bulletin
Loan deposit ratio (LDR)	The Loan to deposit ratio is a measure of bank liquidity that ensure that banks acquire assets that would positively influence the liquidity position of the bank. The ratio shows a relationship between the total loans and total deposits of banks.	Central Bank of Nigeria (CBN) Statistical Bulletin
Cash reserve ratio (CRR)	Cash reserve ratio represents the ratio of a bank's cash reserves with the central bank relative to its total deposits liabilities. The cash reserve ratio is determined by the monetary policy posture of the bank	Central Bank of Nigeria (CBN) Statistical Bulletin

source: **Author's compilation (2017*)***

3.2 Method of data Analysis

The study employs a number of analytical techniques in the data analysis. The researcher first of all subjected the series to stationarity test using the Augmented Dickey-Fuller unit root test. This was done to avoid obtaining a spurious regression. The series were tested for cointegration having established that they were stationary employed. The Autoregressive Distributed Lag (ARDL) method of analysis which bears its own cointegration test and error correction mechanism was adopted as a result of the order of integration of the variables. Granger causality test was used to determine the nature of the causal long run relationship of series.

3.3 Model Specification

The following empirical model describes the relationship between liquidity management and performance of deposit money banks. The sample of this study is confined to banking sector aggregates and examined for the analytical purposes. The variables for this study can be expressed specifying in the following functional forms below:

ROTA = f (CRR, LDR, LQR) ……..... (1)

Based on this specification, an operational model will be specified as follows:
$ROTA = \alpha_0 + \alpha_1 CRR + \alpha_2 LDR + \alpha_3 LQR + \varepsilon_t$ ……..(2)
Where;
ROTA = Return on total asset of deposit money banks.
CRR = Cash reserve ratio.
LDR = Loan deposit ratio.
LQR= Liquidity ratio.
α_0 = Intercept
$\alpha_1 - \alpha_3$ = Coefficents of the exogenous variables to be estimated with a priori expectations: $\alpha_1>0$, $\alpha_2>0$ and $\alpha_3<0$
ε_t = error term of the observation assumed to be uncorrelated from independent samples drawn; hence, implying that autocorrelation anomaly would not occur. In this study the error term takes care of unstable polity and economic environment that were not taken into consideration in the model building.

IV. Presentation and Discussion of Results

4.1 Presentation of the data.

The aggregate data of the variables in the model from 1980 to 2017 are as presented in Table 2 in the Appendix attached at the end of the paper.

4.1 Description of the Data

Table 2: Presents the data of liquidity management and bank's preformance variable . In the table above we have the Return on Total Asset (ROTA), Cash Reserve Ratio (CRR), Loan-to Deposit Ratio (LDR) and liquidity Ratio (LQR)

4.1.1 Graphical Representation of study data.

The graphical Representation of the study data are shown in figures 1-4

FIG 1: Graphical representation of CRR

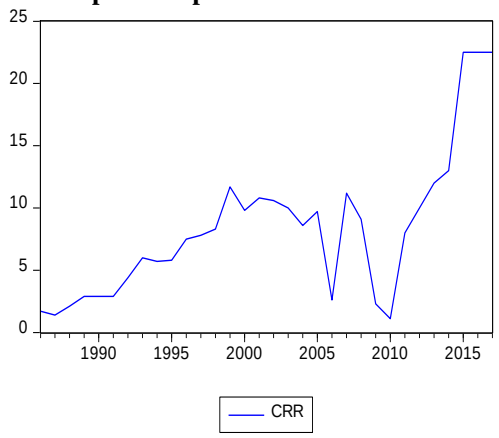
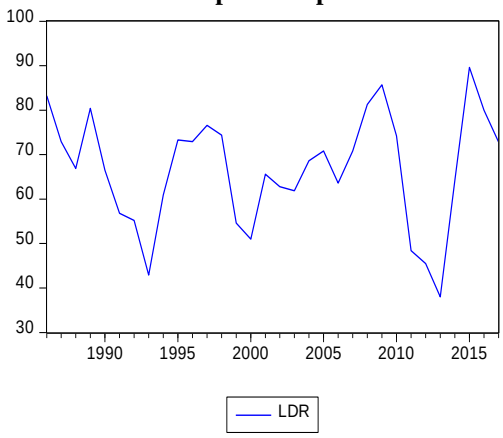


FIG 2: Graphical representation of LDR



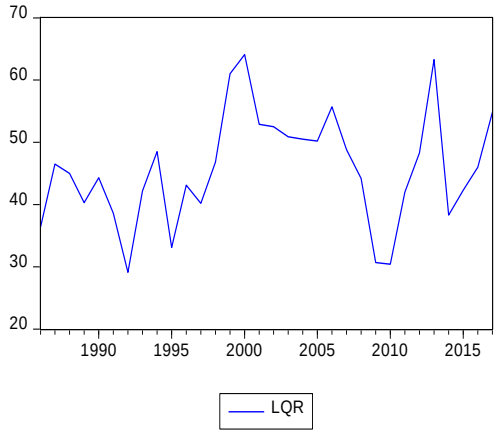


FIG 3: Graphical representation of LDR

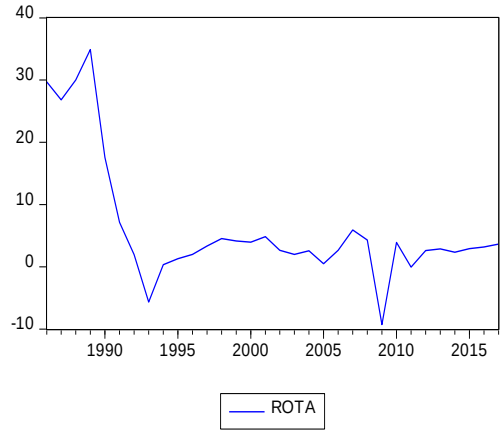


FIG 4: Graphical representation of ROTA

In the graph above, cash reserve ratio, loan to deposit rate and liqudity ratio moved from approximately 2%,82% and 38% respectively in 1986 to the peak of approximately 23%, 90% and 65% in 2017 respectively.

4.2 Descriptive statistic

Table 3

	CRR	LQR	LDR	ROTA
Mean	8.356250	45.65625	66.63438	6.235313
Median	8.150000	45.50000	67.75000	3.055000
Maximum	22.50000	64.10000	89.60000	34.90000
Minimum	1.100000	29.10000	38.00000	-9.280000
Std. Dev.	5.832995	8.895738	12.73850	10.15317
Skewness	1.068106	0.133161	-0.411464	1.665423
Kurtosis	3.884673	2.718644	2.570102	4.943297
Jarque-Bera	7.128058	0.200118	1.149366	19.82792
Probability	0.028324	0.904784	0.562883	0.000049
Sum	267.4000	1461.000	2132.300	199.5300
Sum Sq. Dev.	1054.739	2453.159	5030.352	3195.690
Observations	32	32	32	32

Source: **E-views 10 result output.**

The table above shows the mean where the mean value and standard deviation of LQR and LDR to be high in value when compared with lower values for CRR and ROTA respectively. With respect to skewness, it was shown that only LDR was found to be negatively skewed. The Jarque-Bera probability values revealed that LQR and LDR were not normally distributed since their probability values were greater than 5% i.e. Prob.value > 0.05(0.904784 and 0.562883) respectively. However, CRR and ROTA were found to be normally distributed since their probability values were less than 5% i.e. Prob.value < 0.05 (0.028324 and is 0.000049) respectively.

4.3 Correlation Matrix

Table 4: Correlation results for paired variables.

	CRR	LDR	LQR	ROTA
CRR	1	0.0540	0.0854	0.2309
LDR	0.0540	1	-0.5750	0.3741
LQR	0.0854	-0.5750	1	0.1231
ROTA	0.2309	0.3741	0.1231	1

Source: E-View 10.0 result Output.

The table above shows the correlation matrix of variables used in the regression. LDR, LQR and ROTA have positive and very weak correlations with CRR respectively. CRR, LQR and ROTA have a very weak positive, negative and weak positive correlation with LDR respectively. Also, it was found that CRR, LDR and ROTA have a positive weak, negative and weak positive correlation with LQR respectively. Lastly, CRR, LDR, and LQR were found to have positive though very weak correlations with ROTA respectively. In summary, the paired variables have a poor correlation with each other when cross paired.

4.4 Unit Root Test (ADF Tests)

Unit Root Test was applied to determine whether those variables are stationary. Stationary variable can be defined as variable with a constant mean, constant variance and constant covariance overtime. A variable is stationary if its t-statistic is greater than Mckinnon critical value at 0.05% and at absolute term. Stationary property also means when there is a change in a variable during a particular time, the effect will continue for the following time which is t+1, t+2.

Table 5: Augmented Dickey Fuller Unit Root summary Results

Variables	ADF test statistic at level	5% Critical Value	ADF test statistic at first difference	5% Critical Value	Order of Integration
ROTA	-2.602807	-2.960411	-5.794822	-2.963972	I(1)
CRR	-3.32341	-2.960411	-6.324049	-2.963972	I(0)
LDR	-4.330755	-2.963972	-4.731507	-2.967767	I(0)
LQR	-0.905514	-2.960411	-6.384367	-2.963972	I(1)

source: **Author's compilation from E-view 10 ADF test results**

The results presented in from the Table above showed that CRR and LDR were stationary at level, while ROTA and LQR were differenced once to achieve stationarity at first difference. Based on the mixed order of integration, the ARDL model estimation technique was adopted. We now proceed to test for presence of long run relationship in the model via ARDL Bounds test.

4.5 Test for long run relationship: ARDL Bounds Test.

H_0 : There is no long run relationshipin the model.

H_1: There is a long run relationship in the model.

Table 6: F-Bounds Test **Null Hypothesis: No levels relationship**

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.142376	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: **Author's compilation fromJohansen co-integration test result**

The table above shows that the F-statistic value i.e. 9.142376 greater than the I (0) and I(1) bounds at 5% respectively i.e.2.79 and 3.67; hence there is the presence of long run relationship in the model. Next we estimate the model parameters.

4.6 ARDL Model Estimation.

Table 7: ARDL Model output

Dependent Variable: ROTA
Method: ARDL
Date: 04/15/20 Time: 10:18
Sample (adjusted): 1990 2017
Included observations: 28 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): LQR LDR CRR
Fixed regressors: C
Number of models evalulated: 500
Selected Model: ARDL(3, 2, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ROTA(-1)	0.346456	0.150126	2.307774	0.0415
ROTA(-2)	0.391751	0.176406	2.220734	0.0483
ROTA(-3)	-0.276549	0.130949	-2.111878	0.0584
LQR	0.165816	0.098302	1.686809	0.1198
LQR(-1)	0.084307	0.113944	0.739900	0.4749
LQR(-2)	-0.194596	0.130885	-1.486776	0.1652
LDR	0.015276	0.110373	0.138401	0.8924
LDR(-1)	0.064850	0.112919	0.574301	0.5773
LDR(-2)	-0.188494	0.130891	-1.440090	0.1777
LDR(-3)	0.210371	0.089025	2.363066	0.0376

LDR(-4)	-0.173788	0.088505	-1.963603	0.0753
CRR	0.144245	0.190758	0.756166	0.4654
CRR(-1)	-0.411539	0.218012	-1.887692	0.0857
CRR(-2)	-0.069141	0.235915	-0.293075	0.7749
CRR(-3)	0.957444	0.318869	3.002620	0.0120
CRR(-4)	-0.631885	0.239930	-2.633626	0.0233
C	3.435113	14.00948	0.245199	0.8108

R-squared	0.860369	Mean dependent var	2.790357
Adjusted R-squared	0.657269	S.D. dependent var	4.318229
S.E. of regression	2.528032	Akaike info criterion	4.972736
Sum squared resid	70.30043	Schwarz criterion	5.781575
Log likelihood	-52.61831	Hannan-Quinn criter.	5.220006
F-statistic	4.236180	Durbin-Watson stat	2.431857
Prob(F-statistic)	0.009790		

*Note: p-values and any subsequent tests do not account for model selection.

source: **Author's compilation from E-view 10.0 output**

The table above shows LQR having a positive relationship with ROTA in the current and 1st time lag,implying a unit increase in LQR will increase ROTA by 0.165816 and 0.084307 units respectively. Looking at the 2nd time lag, it is shown that a negative relationship with ROTA exists which reduces ROTA by 0.194596 units with a unit increase in LQR .

Examining LDR; the current,1st, and 3rd time lags showed a positive relationship with ROTA,implying that a unit increase in LDR increases ROTA by 0.015276,0.064850and 0.210371 units respectively. However, LDR has a relationship with ROTA in the 2nd and 4th time lags. Thus, implying a unit increase in LDR reduces ROTA by 0.188494 and 0.173788 units respectively.

Examining CRR, it can be seen that it has a positive relationship with ROTA at the current and 3rd time lags respectively; implying that a unit increase in CRR will increase ROTA by 0.144245 and 0.957444 units respectively. however,the 1st, 2nd and 4th time lags showed a negative relationship with ROTA, implying a unit increase in CRR will reduce ROTA by 0.411539, 0.069141 and o.631885 units respectively.

ARDL Error Correction Model
Table 8: Dynamic short run regression
Dependent Variable: D(ROTA)
Selected Model: ARDL(3, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 04/15/20 Time: 10:23
Sample: 1986 2017
Included observations: 28

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROTA(-1))	-0.115202	0.094712	-1.216349	0.2493
D(ROTA(-2))	0.276549	0.084449	3.274764	0.0074
D(LQR)	0.165816	0.074504	2.225604	0.0479
D(LQR(-1))	0.194596	0.078186	2.488870	0.0301
D(LDR)	0.015276	0.064390	0.237238	0.8168
D(LDR(-1))	0.151911	0.063115	2.406908	0.0348
D(LDR(-2))	-0.036583	0.042235	-0.866178	0.4049
D(LDR(-3))	0.173788	0.041942	4.143488	0.0016
D(CRR)	0.144245	0.142192	1.014434	0.3322
D(CRR(-1))	-0.256418	0.149863	-1.711018	0.1151
D(CRR(-2))	-0.325559	0.142886	-2.278461	0.0437
D(CRR(-3))	0.631885	0.165060	3.828204	0.0028
CointEq(-1)*	-0.538341	0.068186	-7.895212	0.0000

R-squared	0.922819	Mean dependent var	-1.116429
Adjusted R-squared	0.861074	S.D. dependent var	5.808197
S.E. of regression	2.164878	Akaike info criterion	4.687022
Sum squared resid	70.30043	Schwarz criterion	5.305545
Log likelihood	-52.61831	Hannan-Quinn criter.	4.876111
Durbin-Watson stat	2.431857		

* p-value incompatible with t-Bounds distribution.

Short run analysis:

From the table above,the dynamic short run regression shows LQR to be significant at the current period and at 1st lag respectively. LDR was found to be significant at the1st and 3rd lags ,while they were insignificant at current and 2nd time lags respectively. CRR was found to be significant in the 2nd and 3rd time lags, but was insignificant at the current and 1st time lags respectively. The coefficient of the Error correction term was -0.538341 which is negative and significant; thus satisfied the condition for error correction. The speed of adjustment to the long run is 53.8% and will take approximately 2 years to adjust the short run disequilibriumin in the model to converge to the long run.

Test of Significance:

i. Test of significance of CRR

Ho: There is no significant relationship between cash reserve ratio and performance of banks in Nigeria at 5% level of significance.

H_1: There is a significant relationship between cash reserve ratio and performance of banks in Nigeria at 5% level of significance.

Decision: since the prob.value of 0.3322 is greater than 5% level of significance, it is concluded that there is no significant relationship between cash reserve ratio and performance of banks in Nigeria at 5% level of significance.

ii. Test of significance of LQR

Ho: There is no significant relationship between liquidity ratio and performance of banks in Nigeria at 5% level of significance.

H_1: There is a significant relationship between liquidity ratio and performance of banks in Nigeria at 5% level of significance.

Decision: since the prob.value of 0.047901 is less than 5% level of significance, it is concluded that there is no significant relationship between liquidity ratio and performance of banks in Nigeria at 5% level of significance

iii. Test of significance of LDR

Ho: There is no significant relationship between loan deposit ratio and performance of banks in Nigeria at 5% level of significance.

H_1: There is a significant relationship between loan deposit ratio and performance of banks in Nigeria at 5% level of significance.

Decision: since the prob.value of 0.8168 is greater than 5% level of significance, it is concluded that there is no significant relationship between loan deposit ratio and performance of banks in Nigeria at 5% level of significance.

TABLE 9: Summary of a priori expectations

EXPLANATORY VARIABLES	DEFINITION	EXPECTED SIGN	OBTAINED SIGN	REMARKS
LQR	Liquidity ratio	(+)	(+)	Conforms
LDR	Loan-deposit ratio	(+)	(+)	Conforms
CRR	Cash reserve ratio	(+)	(+)	Conforms

***Source*: Author's compilation (2017).**

Joint test of significance

Ho: There is no joint impact of liquidity management variables on performance of banks in Nigeria at 5% level of significance.

H_1: There is a joint impact of liquidity management variables on performance of banks in Nigeria at 5% level of significance.

Decision: since the F-prob.value of 0.009790 is less than 5% level of significance, it is concluded that there is a joint impact of liquidity management variables on performance of banks in Nigeria at 5% level of significance.

4.7 Granger Causality Test

The purpose of the pair-wise granger causality test is to ascertain the direction of causality between each of the independent variables and the dependent variables. The a priori expectation is that the independent variables should cause changes in the dependent variable both in the short and long run. But in reality, the relationship could be the other way round. The table below summarizes the direction of causality of changes in the variables representing liquidity indicators and bank performance.

Table 10: Pairwise Granger Causality Test.

Sample: 1986 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LDR does not Granger Cause CRR	30	0.56841	0.5736
CRR does not Granger Cause LDR		0.61686	0.5476
LQR does not Granger Cause CRR	30	0.30269	0.7415
CRR does not Granger Cause LQR		1.41028	0.2628
ROTA does not Granger Cause CRR	30	1.35380	0.2765
CRR does not Granger Cause ROTA		0.15517	0.8571
LQR does not Granger Cause LDR	30	1.79676	0.1866
LDR does not Granger Cause LQR		0.23361	0.7934
ROTA does not Granger Cause LDR	30	0.10150	0.9039
LDR does not Granger Cause ROTA		0.47107	0.6298
ROTA does not Granger Cause LQR	30	0.98150	0.3887
LQR does not Granger Cause ROTA		0.36392	0.6986

Source: **Author's compilation from E-view 10.0 output**

From the table above, the paired variables show that their probability values were greater than 5%; hence no causality exists between the paired variables of the model.

Breusch- Godfrey Test for Serial autocorrelation.

H_o: There is no serial autocorrelation in the model.

H_1: There is presence of serial autocorrelation in the model**.**

Table11: Breusch-GodfreySerialCorrelation LM Test

F-statistic	1.067204	Prob. F(1,10)	03259
Obs*R-squared	2.700024	Prob. Chi-Square(1)	0.1003

Decision: Since prob.chi-square (1) value of 0.1003 is greater than 5% level of significance, it is concluded that there is no serial autocorrelation in the model.

Breusch-Godfrey-PaganTest for heteroscedasticity.
H_o: There is no heteroscedasticity in the model.
H_1: There is presence of heteroscedasticity in the model**.**

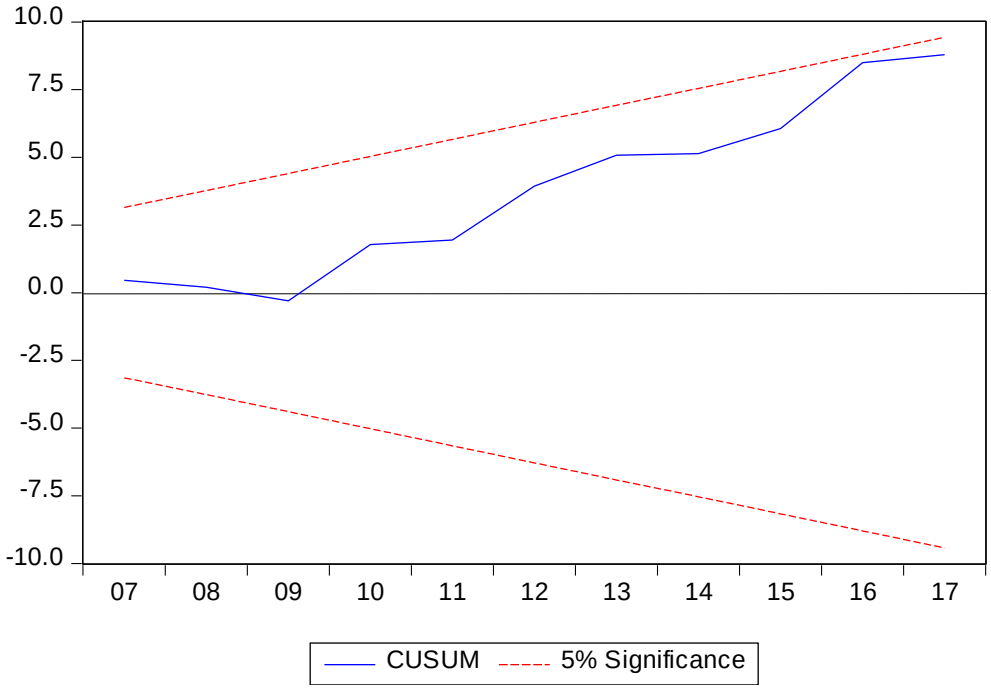
Table 12:**Heteroskedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	0.417201	Prob. F(16,11)	0.9453
Obs*R-squared	10.57446	Prob. Chi-Square(16)	0.8350
Scaled explained SS	0.808676	Prob. Chi-Square(16)	1.0000

Decision: Since prob.chi-square (16) value of 0.8350 is greater than 5% level of significance, it is concluded that there is no heteroscedasticity in the model

Goodness of Fit of the model.
Adj.R^2 =0.861074x 100% = 86.1%
From the result of the regression, the Adjusted R-squared shows that about 86.1% variation in economic growth can be explained by liquidity management components in the model. This means the model has a strong explanatory power in relation banks' performance in Nigeria.

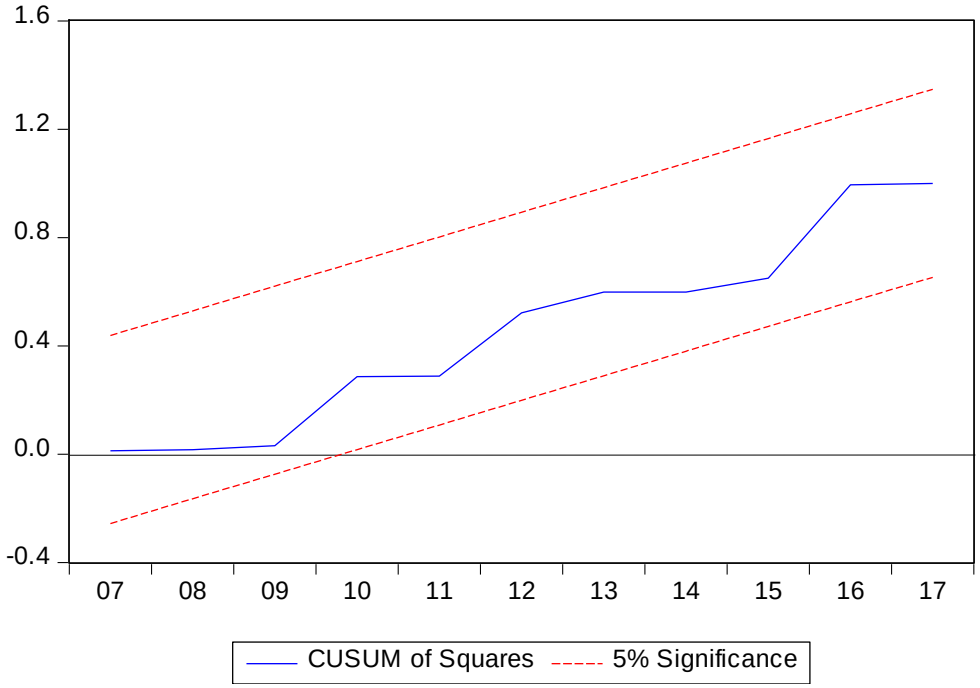
Fig 1: **Model Stability via CUSUM analysis**



Source: **Author's compilation from E-view 10.0 output**

From the figure above, the model stabilty isseen to be stable since the CUSUM line lies within the 5% bands.

Fig 2: Model Stability via CUSUM of SQUARES analysis



Source: **Author's compilation from E-view 10.0 output**

From the figure above, the model stabilty is seen to be stable since the CUSUM of SQUARES line lies within the 5% bands.

V. Summary of Findings and Conclusion

The Effect of Liquidity Management on Bank Performance can never be over emphasized. From the results of the study only one of the liquidity management components (LQR) bears a significant relationship with the level of banks' performance in Nigeria. However, they jointly impact on banks' performance represented by Return on Total Assets (ROTA) in the long run.

The Granger causality test showed no causality running from LQR, LDR, CRR to ROTA. The above results give indication of the nature of growth and efficacy of monetary policy management by the monetary authorities which poses questions as to the growth direction of the banking system for improved performance.

5.1 Recommendations

Based on the results from data analysed, the study recommends that central bank of Nigeria should ensure effectiveness and efficiency in the review and monitoring of liquidity policy tools in banks in order to boost the performance of deposit money banks (DMBs). Also there are needs for regulatory authorities to help build institutions in order to stabilise the financial sector of the economy.

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