

Liquidity Management Measures and Bank Performance in Nigeria: An Empirical Analysis

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Abstract

The paper is on the effectiveness of liquidity management measures on bank performance in Nigeria. The reoccurring liquidity crisis experienced in the industry in time past has raised doubts as per the effectiveness of existing liquidity management measures in enhancing bank performances. Also, dearth of empirical work in this regard all necessitated the need for this paper. Time series data for the research was sourced from the Central Bank of Nigeria Statistical Bulletin boardering on Banks Performing Loans and Advances (PLA), Bank Reserves (RSV), Investment in Government Securities (GOVS), Domestic InterBank Claims (DIBC) and Foreign Claims (FORC). The Augmented Dickey Fuller (ADF) Unit root test, Johansen Co-integration test, Pairwise Granger Causality test, Vector error Correction test and diagnostic tests (Heteroscedasticity, Multicollinarity, Normality and Autocorrelation) of the E-view 7.1 econometrics tools were used for data analysis. The result of the study indicated the existence of causality and long-run relationship between liquidity management measures and bank performances in Nigeria. This was further confirmed by the Vector Error Correction Model that was appropriately signed with a significant t-static. The ordinary least square (OLS) estimation found all the measures to be statistically significant and of positive impact except Foreign Claims (FORC) that was insignificant. Thus, the paper was of the view that policies that encourages existing liquidity management measures should be sustained and non-functional measures reviewed to strengthen their effectiveness.

Keywords: Liquidity Management, Measures, Bank Performance.

1.0 INTRODUCTION

It is obvious that a good banking system, everything being equal, is a panacea for economic growth and development of a nation. According to Aurangzeb (2012), it is crystal clear that nations that have good banking system have a tendency to develop their economic growth more quickly. The sector plays fundamental role in the economy through development activities and gives resources in form of loans and advances to general public, as well as to other development organizations (government, firms and households). This forms an integral part of the intermediation role of banks in an economy. The intermediary functions of banks cannot be attained in the absence of liquidity.

The ability of a bank to meet demand deposit withdrawals and other cash flow is a visible indicator of its liquidity and viability. If a bank cannot meet depositors withdrawal requirements or forced to dishonor new lending obligations, a lack of confidence ensues. The level of liquidity maintained by banks must meet minimum regulatory requirements and other routine financial obligations. Liquidity position and/or crisis does not do the banks any good if not well managed. Its management should be commensurate with banking operations, safety of deposits or principal among others. This underscores the reasons why the monetary authorities do not compromise on banks liquidity position, as illiquidity will not only amount to a doom but total collapse of the system in particular and the economy at large.

Liquidity is basic for efficient operations of a bank. A bank is said to be liquid when there is enough liquid assets and cash coupled with the ability to raise funds quickly from other sources, to meet its financial obligations on daily basis (Nzotta, 2004). Management of bank liquidity is of utmost importance for survival and profitable operations of the system. It helps sustain depositors confidence and keeps the industry as a going concern. Andrew and Osuji (2013) observed that liquidity management involves the strategic supply or withdrawal from the market or circulation the amount of liquidity consistent with a desired level of short-term reserve money without distorting the profit making ability and operations of the bank.

A greater percentage of banks profit is generated through lending and this is anchored on how liquid the banks are. This is why the Central Bank of Nigeria (CBN) mandatorily require banks in Nigeria to meet certain reserve requirements as part of liquidity management strategies. The ability of banks to honour new financial obligations in terms of loans and advances instills confidence in the minds of the public and tends to show the viability state of the banks. These performance indicators are vital to the shareholders and depositors who are the banks major markets (Enjelly, 2004).

The market turmoil that began in mid 2007 re-emphasized the importance of liquidity to the functioning of the banking sector. In advance of the turmoil, asset markets were buoyant and funding was readily available at low cost. The reversal in market conditions illustrated how quickly liquidity can evaporate and that illiquidity can last for an extended period of time. The banking system came under severe stress, which necessitated Central Bank action to support their functioning.

According to Nwankwo (2004), adequate liquidity is a sine qua non of banking. The significance of adequate liquidity lies in the fact that a bank can live for some time with an inadequate capital or an interest rate gamble that has gone sour, but cannot survive even in the short run without liquidity. Banks must therefore ensure the maintenance of commensurate part of its assets in cash and/or in liquid assets that can be easily converted to cash for it to remain in the business of banking, taking into cognizance the conflict between the maintenance of adequate liquidity and banks profitability.

Several liquidity management strategies have evolved in the Nigerian banking industry. These measures either originate from the regulatory and monetary authorities or ones adopted by banks in order to meet matured obligations, take advantage of profitable opportunities in the market and sustain existing public confidence. Management and maintenance of adequate liquidity enables a bank to meet commitments when due and to undertake new transactions when desirable. Most times, these liquidity management measures or strategies include reserve requirement by CBN, cash and balances due to other banks, short-term securities etc. It is expected that given some of the liquidity management strategies, the issue of liquidity crisis in the Nigerian Banking industry will become a thing of the past but the reverse is the case. Liquidity crises seem to have gained momentum and have taken centre stage of national discussions. Ndugbu (2013) noted the recent experience from the global financial crisis that led to the collapse of many world renowned financial institutions and even caused an entire nation to be rendered bankrupt. According to him, specifically in Nigeria, many of the banks sustained huge losses and had to be rescued through capital and liquidity injections by the Central Bank of Nigeria. Ademola (2005) said that despite establishing regulatory agencies and monetary policies, Nigeria banking industry has been suffering from liquidity problems, for sometime now. Often, banks in Nigeria have failed or at times required government assistance because they had inadequate capital, lack of liquidity, or combination of the two circumstances (Olawejaju and Adeyemi 2015).

Similarly, the announcement of the introduction and implementation of Treasury Single Account by President Muhammed Buhari in 2015, seems to have thrown the Nigerian banking industry into another era of liquidity crisis. The Treasury single account policy directs all federal ministries, departments and agencies (MDAs) to pay all government revenues, incomes and other receipts into a single account with the Central Bank of Nigeria. According to Sewa (2015), the policy will affect volume and flow of liquidity in the banking system. He affirmed that the liquidity in the banking sector will definitely be affected. This is because once the banks collect government's funds, they will be sent directly to the treasury single account. The free funds some banks used to enjoy will no longer be there. Giving this development, the nation's banks would be losing about N2 trillion deposits to the Central Bank of Nigeria with the implementation of the policy.

Enweagbara (2015) said that with the treasury single leading to the closure of about 10,000 multiple bank accounts operated by ministries, departments and agencies, banks will have to wake up from their slumber. This is because the era when government's money is either lent back to government or invested in FOREX speculations is over. Also, TSA will force banks to leave their comfort zone caused by dependence on government money to now become as creative and inventive as it is the case in modern economies around the world, which is to seek private deposits through investing in the real sector of the economy. In fact, with economics financialization soon over, banks will discover that their survival is dependent on their embracement of fractional reserve, which is leaving a fraction of private depositors' funds in reserve while using the main deposits to chase high profit yielding investments.

It is pertinent to state that the reduction in cash reserve ratio of banks from 31% to 25% in 2015 by Central Bank of Nigeria was an offshoot of the treasury single account policy. This is to aid liquidity management and enable banks begin to attract more private deposits. These trends have not only raised doubts but call for concern as regards the effectiveness of liquidity management measures adopted by banks on their performances. This paper therefore, is set to examine existence of relationship between liquidity management measures and bank performance in Nigeria with a view to ascertain their effectiveness.

Going by the above, the paper is organized thus: section one introduction, section two-review of related literatures, section three the methodology adopted; section four data analysis and results, section five dwelt on discussion of results, conclusion and recommendations.

2.0 CONCEPTUAL THEORETICAL AND EMPIRICAL REVIEW

Economic activities in any country depend largely on the availability and flow of financial resources from banks. An efficient banking system is widely accepted as a necessary condition for an effective functioning of a nation's economy as they exert a lot of influence on the pattern and trend of economic development through their lending and deposit mobilization activities. Lending and deposit mobilization objectives can only be achieved based on the confidence reposed on the system and of most important the state of liquidity of the banks. As earlier noted, bank liquidity is very important for survival and profitable operations.

Liquidity is a measure of the ability and ease with which assets can be converted to cash. Liquid assets are those that can be converted to cash quickly if needed to meet financial obligations. Examples of these include

cash, reserves, government debts/securities, etc. To remain viable, a bank must have enough liquid assets to meet its near-term obligations, such as withdrawals by depositors (URL, 2014). When they are faced with infrequent demands, taking new opportunities in the market, they fall back on these liquid assets as a cushion.

Ngwu (2006) observed that liquidity may be regarded as either a stock or a cash flow concept. As stock concept, it considers holdings of assets that may be turned or converted into cash easily, while as a cash flow concept, it incorporates the ability to convert liquid assets and the ability of the economic unit to borrow and to generate cash from operations. Virtually, all economic units need liquidity, and banks are no exception. Demand deposits, which represent a major portion of bank liabilities, constitute a large percentage of the nation's money supply. Each bank must therefore maintain a substantial part of its assets in cash or cash in assets that can be converted into cash quickly. Since demand deposits represent a high proportion of bank's liabilities, they at all times, try to prevent a rush on their liquid position (Articles, 2013).

Olagunju et al (2011) saw liquidity as a financial term that means the amount of capital that is available for investment. Samiksha (2013) noted that it is the ability to meet anticipated and contingent cash needs. There is no doubt that for any bank to survive successfully and consequently maintain the public trust and confidence in banking operations, it has to employ liquidity management measures that shall put in place an adequate liquidity so that the various demand of customers shall always be met. If a bank fails to maintain enough liquid assets in their banking management, it stands the risk of jeopardizing its existence by loosing its various customers and public confidence in its operations.

Bank liquidity therefore refers to the ability of banks to hold stated bank cash balances, cash in vault, invest in government securities/assets that can be converted to cash with ease without loss in value and the capacity to meet daily obligations promptly. Obligations here include demand deposit on the part of customers, loan requests, taking now advantage of new opportunities in the market as well as possess the capability to raise funds from other sources easily. Amount of liquidity needed by individual banks depend on the amount of variations that occur in deposits and the demand of cash needs, the expected level of liquid assets and cash receipts. These would be considered to measure the liquidity that a bank needs over a given period of time.

ISSUES ON LIQUIDITY MANAGEMENT MEASURES IN NIGERIAN BANKS

Banks are financial institutions whose main goal is profit maximization in the course of their operations. They have portfolios of assets and given the characteristics and distribution of their liabilities, they attempt to structure these in such a manner as to yield the greatest returns, subject to certain constraints. The assets held by banks may be divided into earning assets and non-earning assets.

Earning assets are further classified into groups of balance sheet items called loans and investment. Non-earning assets consist of fiscal assets, the total reserves of the bank, and non-interest earning deposits with Central Bank of Nigeria. Banks generate returns (profits) by earning assets (loans and investments) while liquidity is provided partly by earning assets like short term investments and partly by non-earning assets (e.g. cash balances) held in the vault, or at Central Bank of Nigeria.

In the context of increased competition and decreased profit margins, the need to improve efficiency of operation through competent liquidity management has become imperative. Liquidity management consists of estimating the requirements for funds and meeting them. Funds requirement depends upon deposit inflows, outflows and loan commitments. A bank should devise a liquidity plan or strategy that balances operation risks and returns (Samiksha 2013).

According to Ebhodagbe (2015) liquidity management involves bank's programmes or strategies to be able to meet deposit and loan demands. Such strategies include holding of short-term financial assets (treasury bill and treasury certificate) which are highly marketable, maintaining avenues for short-term accommodation from the Central Bank or other banks and by bidding for a greater volume of deposits. Liquidity management, must of necessity involve liquidity planning. He further noted that adequate liquidity planning is lacking in many Nigerians banks and that few banks are able to plan for short, medium and long-term liquidity needs. To plan well, a bank must be able to forecast future demand and deposit supplies. Liquidity management programmes enable banks compensate for expected and unexpected balance sheet fluctuation and to provide funds for growth, accommodate the redemption of deposits and other liabilities and to cover funding increases in the loan and investment portfolio (Grueving and Bratanovic, 2003). A minimum operating liquidity level is essential to maintain a comfortable cushion beyond the minimum statutory requirement, in order to meet cash needs. A desired target maximum for operating liquidity also needs to be established to reflect the fact that too much liquidity is detrimental to earnings.

Natacha et al (2015) said that from a policy perspective, the results suggest that under normal circumstances, the crosschecking of liquidity ratios and liquidity flows could prove useful in designing a robust prudential approach to liquidity. Under extreme circumstances, when the provision of emergency liquidity is being contemplated, the traditional concept of "bank liquidity" could be complemented by considering the liquidity of monetary and other financial markets. Liquidity management lays emphasis on the need for daily

assessment of the liquidity conditions in banking system, so as to determine its liquidity needs and thus the volume of liquidity to allot or withdraw from the market. These liquidity needs are defined by the sum of reserve requirements imposed on daily liquidity forecasting of the Central Bank balance sheet to guide bank's management on the expected level of liquidity in the system over a period of time from the current period, so that appropriate measures are taken to prevent undesirable market developments, that may negatively impact on the objective of price stability and profitability in particular. A portfolio of short-term financial securities held by a bank can be easily sold or rediscounted for cash. This approach plus inter-bank borrowings as well as short term accommodation by CBN constitute major sources of liquidity for Nigerian banks. Improved liquidity planning, greater drive for deposits and injection of fresh capital are therefore some available avenues for banks to overcome their liquidity problems.

Emefiele (2015) noted that determination of banks liquidity position is usually based on the analysis of the following by bank examiners:

- (i) compliance with CBN guidelines on liquidity;
- (ii) asset liability mix and trends;
- (iii) dependence on market rate funds, and
- (iv) trends in interest margins and stability of interest margins under varying economic conditions.

These variables help to ascertain whether or not adequate funds are available to meet anticipated or potential cash needs of the bank. Also, it will aid NDIC management in determining and advising the banks accordingly on the options for reducing funding needs or attracting additional funds. The need to ensure adequate liquidity in the banking industry has been a preoccupation of government, CBN, NDIC and other stakeholders in the industry. This is in a bid to promote safe and sound banking practices in the economy.

MEASUREMENT OF BANKS LIQUIDITY POSITION

Ngwu (2006) noted that liquidity measurement entails finding a standard or benchmark which each bank should meet as to be regarded as being liquid. He further pointed that a standard for liquidity is difficult to determine since future demands are not known. To obtain a realistic appraisal of a bank's liquidity position would require an accurate forecast of cash need and expected level of liquid assets and receipts of cash over a period of time. The most widely used liquidity measures are derived from the stock flow or concept, which require the computation of vital ratios.

Nwankwo (1991) identified two approaches to liquidity management. These are the stock flow and cash flow approach. The stock flow approach as earlier noted incorporates essential ratio analysis while the cash flow approach emphasizes on the maturity structures of a banks assets and liabilities and on a measurement of liquidity based on a cash flow concept. The cash flow concept enables the measurement of the extent of the maturity mismatching over a given period of time with considerable flexibility in determining the conditions under which individual assets or liabilities should be included in specific maturity structures.

The stock flow approach, as the most widely used, considers most importantly the loan-deposit ratio (Nzotta, 2014). Here, all banks loans are lumped together and then compared with the total deposits as a proxy for total liabilities. A rise in the ratio means a less liquid position and thus the bank(s) would be less inclined to lend and vice-versa. Other prominent ratios notable under the stock flow concept include the liquidity ratio which relates liquid assets to total deposits, cash reserve ratio, etc.

Liquidity measures are calculated using current assets and current liabilities. Current assets includes cash and cash equivalents, short-term investments, account receivables, prepaid expenses, etc; whereas current liabilities include accounts payable, short-term debt, salaries, interest payments, etc. A low liquidity measure would indicate either that the bank is having financial crisis or that the bank is poorly managed, hence a fairly high liquidity ratio is good. However, it should not be too high because excess liquidity has its own consequences.

THEORETICAL AND EMPIRICAL LITERATURES

There are various theories on banks liquidity ranging from the liquid assets theory, commercial bills theory, shiftability theory, anticipated income theory and liability management theory. This paper dwells on the commercial bill theory and liquid asset theory common and embraced by banks in Nigeria, keeping all other theories constant.

In a study by Abubakar (2015), the author examined traditional measures of bank liquidity like cash reserve requirement and liquidity ratios, nature of liquidity management and financial ratio analysis. It was found that the level of liquidity and its management positively affect the profitability of the bank. However, it should be noted that the author in his study examined only a bank which is not a good yardstick for generalization.

Andrew and Osuji (2013) studied the efficiency of liquidity management and banking performance in Nigeria using a survey design. The findings indicate that there is significant relationship between efficient liquidity management and banking performance. Also revealed was the fact that efficient liquidity management

enhances the soundness of bank. One notable factor here is the fact that the authors failed to examine how effective the liquidity management measures are and the nature of relationships that exist.

Alshatti (2015) investigated the effect of the liquidity management on profitability in the Jordanian Commercial Banks between 2005 – 2012. Thirteen banks were selected to express the whole Jordanian banks. The liquidity indicators were investment ratio, quick ratio, capital ratio, net credit facilities/total assets and liquid assets ratio, while return on equity (ROE) and return on assets (ROA) were the proxies for profitability.

Ajibike and Aremu (2015) in their study, using a generalized method of moments (GMM) estimation technique found positive relationship between liquidity and bank performance.

Olagunju, Adeyanju and Olabode (2011) examined liquidity management and Commercial Banks' Profitability in Nigeria using survey method. Their findings showed the existence of relationship between liquidity and profitability. In other words, liquidity has a very strong influence on the profitability of banks.

Olarewaju and Adeyemi (2015) in their study, found a trace of unidirectional causality relationship running from liquidity to profitability of some of the selected banks.

3.0 METHODOLOGY

In order to ascertain the effectiveness of liquidity management measures on banks performance in Nigeria, the data for the study were sourced from the secondary means. The collected data were from the Central Bank of Nigeria Statistical Bulletin spanning the period of 25 years (1990 – 2014). Data on liquidity management measures of banks in Nigeria like reserve requirements, investment in short-term government securities, inter-bank loans and investment in money market securities, were regressed against total banks performing loans and advances of banks.

The analyses were made possible with the e-view statistical package of econometric techniques and the Ordinary Least Square (OLS) model was adopted. Some of the vital statistical test carried out include the unit root test for stationarity, co-integration test for the determination of nature of relationship in the model (long or short-run), heteroscedascity tests, normality tests, the granger causality for unidirectional, birectional relationship or otherwise, estimation of the OLS equation, joint and individual test of significance, etc. All these tests were carried out to ascertain the effectiveness of adopted liquidity management measures in Nigerian banks in recent time. However, it is pertinent to point out that economic relationship is not assumed to be exact. Other variables apart from the ones stated which exist, can influence liquidity management but are omitted in the model were considered by introducing the error term or random variable (disturbance term) in the OLS model to capture all kinds of disturbances that might distort the structure of the model.

The model is given in a functional form as

$$PLA = f(\text{RESV}, \text{GOVS}, \text{DIBC}, \text{FORC}) \text{-----equ (1)}$$

This was transformed into mathematical form as

$$PLA = a_0 + \text{RESV}X_{t1} + \text{GOVS}X_{t2} + \text{DIBC}X_{t3} + \text{FORC}X_{t4} \text{----- (2)}$$

From equation 2, the OLS model equation was give as

$$PLA = a_{01} + \text{RESV}X_{1t} + \text{GOVS}X_{2t} + \text{DIBC}X_{3t} + \text{FORC}X_t + \mu$$

Where

PLA = Deposit Money Banks Performing Loans and Advances at time t

RESV = Deposit Money Banks Reserves with CBN at time t.

GOVS = Deposit Money Banks Investments in government Securities

DIBC = Domestic Inter Bank Claims of Banks

FORC = Foreign Claims of Banks

μ = error term.

4.0 ESTIMATION AND ANALYSIS OF RESULTS

Unit Root Test:

A consistency or stationary test results for all parameters or variables used in the research is shown on the table below.

Table 1: Augmented Dickey Fuller Unit Root Test Results

Parameters	ADF – Statistics	Mackinnon Critical Values	Order of Integration or Stationarity
PLA	4.417261	1% = -3.831511 5% = -3.029970	1(0)
RESV	5.539538	1% = -3.737853 5% = 3.991878	1(0)
GOVS	-9.024506	1% = -3.808546 5% = -3.020686	1(2)
DIBC	-3.896706	1% = -3.769597 5% = -3.004861	1(1)
FORC	-8.398693	1% = -3.752946 5% = -2.998064	1(1)

Source: E-view 7.1 output 2016

The ADF Unit root test results on table I with maximum lag of 5 revealed that the variables were integrated at either order 1(0) 1(1) or 1(2). This is given that the ADF statistics value in absolute terms are either greater than the mackinnon critical values at 1% or 5%. Hence, we can rely on the data for estimations.

LONG-RUN RELATIONSHIP

The Johansen Co-integration test was applied to confirm and establish the existence of long-run relationship between the parameters under study. The summary of the result is as shown below

Table 2: Johansen Co-integration results.

Date: 02/22/16 Time: 01:46

Sample (adjusted): 1992 2014

Included observations: 23 after adjustments

Trend assumption: Linear deterministic trend

Series: PLA DIBC FORC GOVS RESU

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.994078	277.3345	69.81889	0.0000
At most 1 *	0.987161	159.3652	47.85613	0.0000
At most 2 *	0.876480	59.19348	29.79707	0.0000
At most 3*	0.379916	11.09237	15.49471	0.2059
At most 4*	0.004367	0.100660	3.841466	0.7510

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.994078	117.9694	33.87687	0.0000
At most 1 *	0.987161	100.1717	27.58434	0.0010
At most 2 *	0.876480	48.10111	21.13162	0.0000
At most 3*	0.379916	10.99171	14.26460	0.1546
At most 4*	0.004367	0.100660	3.841466	0.7510

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: E-view 7.1 Output 2016

Given the co-integration output result from table 2, the trace statistic indicated 3 Co-integrating

equations at 5% level of significance. This denotes the rejection of the null (Ho) hypothesis of non-existence of long-run relationship between the study variables. The trace statistic were lower than the 0.05 critical value for tests under the null hypothesis of 3 and 4. Therefore, this confirms the state of long run relationship between the variables.

Causality Tests

To establish causality relationship among the variables, the pairwise granger causality tests was employed as shown below.

Table 3: Pairwise Granger Causality Test Results

Pairwise Granger Causality Tests

Date: 02/22/16 Time: 01:46

Sample: 1990 2014

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DIBC does not Granger Cause PLA	23	6.95037	0.0058
PLA does not Granger Cause DIBC		9.59528	0.0015
FORC does not Granger Cause PLA	23	16.5963	8.E-05
PLA does not Granger Cause FORC		1.56058	0.2371
GOVS does not Granger Cause PLA	23	8.71730	0.0023
PLA does not Granger Cause GOVS		6.10490	0.0095
RESU does not Granger PLA	23	10.2056	0.0011
PLA does not Granger Cause RESU		23.7002	9.E-06
FORC does not Granger Cause DIBC	23	5.23058	0.0162
DIBC does not Granger Cause FORC		1.02951	0.3773
GOVS does not Granger Cause DIBC	23	7.69162	0.0039
DIBC does not Granger Cause GOVS		0.51235	0.6076
RESU does not Granger Cause DIBC	23	1.68963	0.2126
DIBC does not Granger Cause RESU		9.40455	0.0016
GOVS does not Granger Cause FORC	23	2.44664	0.1148
FORC does not Granger Cause GOVS		11.5007	0.0006
RESU does not Granger Cause FORC	23	4.05641	0.0351
FORC does not Granger Cause RESU		4.37298	0.0283
RESU does not Granger Cause GOVS	23	7.95640	0.0033
GOVS does not Granger Cause RESU		1.91785	0.1758

Source: E-view 7.1 Output 2016

Table 3 reveals that granger runs bi-directionally from Domestic Inter Bank Claims (DIBC) to Performing Loans and Advances of Nigerian Banks (PLA). This was also the case between government securities (GOVS) and PLA, Reserves (RESV) and PLA, as well as Reserves (RESV) and Foreign Claims (FORC) of Nigerian banks.

However, granger was seen to run uni-directionally from FORC to PLA, FORC to DIBC, GOVS to DIBC, DIBC to RESV, FORC to GOVS and finally, from RESV to GOVS.

VECTOR ERROR CORRECTION ESTIMATES

The error correction model was used to estimate the long-run causality model between liquidity management measures and bank performances in Nigeria. The estimate obtained from the output result was -0.070629, t-statistic of -2.08521 and standard error of 0.03387.

The ECM is negatively and appropriately signed with -0.070629. This implies that about 7.06% of disequilibrium is corrected yearly by changes in liquidity management measures. The t-statistic value of -2.0851 supports the rejection of the null hypothesis of no co-integration and highly significant too.

DIAGNOSTIC TEST

HETEROSCEDASTICITY TEST

This was conducted to check whether the variance are constant or stable overtime. This was made possible using the Breusch-Pagan-Godfrey shown on table below.

Table 4: Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	13.24258	Prof. F(4,20)	0.0000
Obs*R-squared	18.14790	Prob. Chi-Square(4)	0.0012
Scaled explained SS	16.21608	Prob. Chi-Square(4)	0.0027

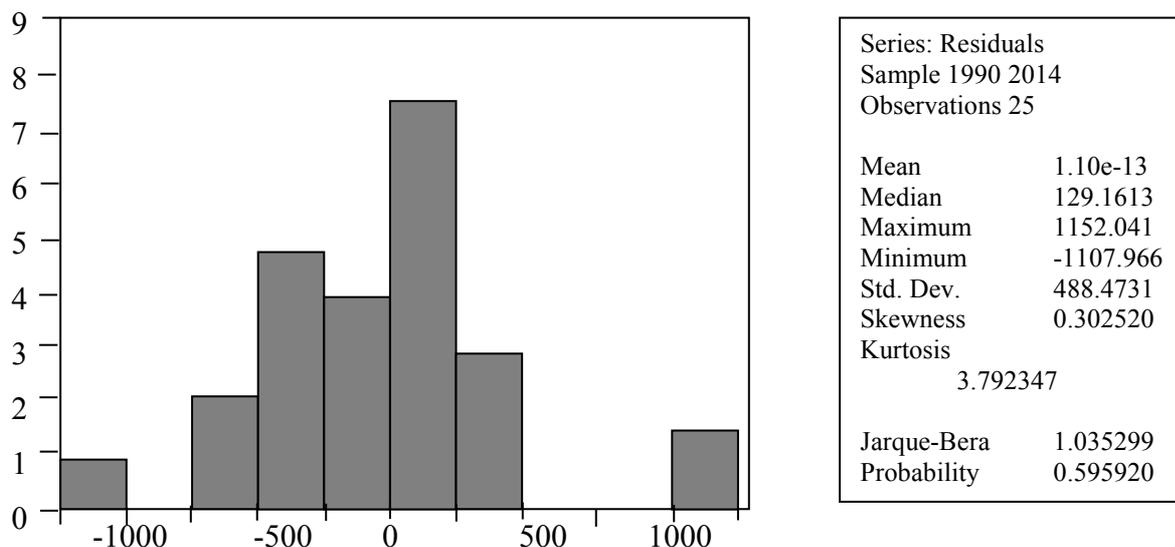
Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 02/22/16 Time: 01:48
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19545.22	62305.47	-0313700	0.7570
DIBC	754.5728	208.6096	3.617153	0.0017
FORC	766.4065	215.6084	3.554623	0.0020
GOVS	-518.9279	136.6876	-3.796452	0.0011
RESU	-34.20965	134.1458	-0255019	0.8013
R-squared	0.725916	Mean dependent var		229061.8
Adjusted R-squared	0.671099	S.D. dependent var		390662.5
S.E. of regression	224044.5	Akaike info criterion		27.65393
Sum squared resid	1.00E+12	Schwarz criterion		27.89771
Log likelihood	-340.6742	Hannan-Quinn criter.		27.72155
F-statistic	13.24258	Durbin-Watson stat		2.852594
Prob(F-statistic)	0.000005			

Source: E-view 7.1 output 2016

The observed chi-square (χ^2) value of 18.14790 revealed that the model or equation is constant overtime. That is, it is free from heteroscedasticity.

TABLE 5: NORMALITY TEST



Source: E-view 7.1 Output 2016

The above test was conducted using the Jargue – Bera. The Jargue – Bera value of 1.035299 is greater than the probability value of 0.595920. This shows that this model or equation is normally distributed.

TABLE 6: MULTICOLLINEARITY TEST

Variance Inflation Factors

Date: 02/22/16 Time: 01:52

Sample: 1990 2014

Included observations: 25

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	22143.52	1.933410	NA
DIBC	0.248235	5.452340	3.301454
FORC	0.265171	23.07386	4.392234
GOVS	0.106574	19.89518	7.630207
RESU	0.102647	9.870283	6.620978

Source: E-view 7.1 Output 2011

Given that the centred variance inflation factor (VIF) for all the variables are all less than 10 as seen on the table above, this depicts the absence of multicollinearity.

TABLE 7: AUTOCORRELATION TESTS/OLS ESTIMATES

Dependent Variable: PLA
 Method: Least Squares
 Date: 02/22/16 Time: 01:44
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-286.2195	148.8070	-1.923428	0.0688
DIBC	3.187836	0.498232	6.398300	0.0000
FORC	0.437299	0.514947	0.849212	0.4058
GOVS	0.889030	0.326457	2.723267	0.0131
RESU	1.494495	0.320386	4.664665	0.0001
R-squared	0.980355	Mean dependent var		2752.772
Adjusted R-squared	0.0976426	S.D. dependent var		3485.108
S.E. of regression	535.0955	Akaike info criterion		15.57962
Sum squared resid	5726544.	Schwarz criterion		15.82340
Log likelihood	-189.7453	Hannan-Quinn criter.		15.64724
F-statistic	249.5195	Durbin-Watson stat		1.638711
Prob(F-statistic)	0.000000			

Source: E-view 7.1 output 2016

The Durbin – Watson statistic from the output result is 1.638711 and it is close to 2 than 0. This depicts the absence or weak autocorrelation.

5.0 FINDINGS, CONCLUSION AND IMPLICATIONS OF THE STUDY

The research work examined the effectiveness of liquidity management measures and bank performances in Nigeria. The study which was necessitated by liquidity crisis witnessed in recent times in the Nigeria banking industry (especially after the implementation of the Treasury Single Account in Nigeria) and also the need for empirical investigations in this regard, revealed that there has been increasing study on the area of such. However, most of the works were carried out with survey design using a particular bank as a case study, as observed on the review of empirical literatures. Though majority of the work found liquidity management to have positive impact on bank performance but were silent on the nature of relationship and effectiveness of adopted measures. Also, considering the fact that one bank as a case study cannot serve as a good yardstick for measuring the impact of liquidity measures on bank performance of almost 24 banks in Nigeria, the study empirically set out to identify the liquidity management measures adopted, their effectiveness, nature, direction of relationship and causality in order to add to the growing literature on the aspect of this work.

The data for the study were sourced from the Central Bank of Nigeria Statistical Bulletin on liquidity management measures and banks performances in Nigeria. The variables examined included reserves, investment in government securities, domestic interbank claims and foreign claims which were regressed against performing loans and advances of banks (as a measure of performance). The times series data were examined for stationarity using the Augmented Dickey (ADF) fuller Unit Root test and were found to be stationary at First or Second difference 1(1) or 1(2), hence its reliability for estimations.

In order to ascertain the nature of relationship or examine whether a long-run relationship exists between liquidity management measures and bank performances in Nigeria, the Johansen co-integration tests was employed. The trace and maximum Eigenvalue tests indicate 3 co-integrating equation(s) at the 0.05 level of significance; thus, confirming the existence of long-run relationship between liquidity management measures and bank performances in Nigeria. The Vector Error Correction Model (ECM) was also used to ascertain the direction of causality between these management measures and bank performances. The Vector Error Correction Mechanism was properly and appropriately signed with a coefficient of -0.070629, thus indicating that about 7.06% of disequilibrium is corrected yearly by changes in liquidity management measures. The ECM t-statistic of -2.08521 was observed to be significant with a standard error of 0.03387 at 5% level of significance.

Other diagnostic tests employed using the heteroscedasticity, multicollinearity, normality and autocorrelation test revealed impressive results. The heteroscedasticity conducted with the chi-square (χ^2) shows that the observed value 18.14790 is greater than the calculated as shown on Table 4. This means the time series variances are not large and constant overtime. Multicollinearity conducted using centred VIF, revealed that the values were all less than 10. This reveals that multicollinearity is not strong or near absence of multicollinearity.

The normality test indicates that the parameters are normally distributed given Jargue – Bera value of 1.035299 and probability value of 0.595920 at 0.05 level of significance. The Durbin – Watson statistic for autocorrelation was 1.638711. This is closer to 2 than 0, which indicates near absence of autocorrelation or autocorrelation is weak.

Furthermore, the effectiveness of the liquidity management measures in providing a boost to bank performances was further evaluated by looking at the level of changes the former causes in the latter. This was conducted looking at the R-Squared Adjusted on table 7. The value of 0.9764260 suggests that liquidity management measures account for about 97.64% (approximately 98%) changes in bank performances. All the variables were found to have positive relationship with bank performances which is in tandem with the findings of Abubakar (2015), Andrew and Osuji (2013), Ajibike and Aremu (2015) and Adeyanju and Olabode (2011). However, reserves (RSV), Government securities (GOVS) and Domestic Inter Bank Claims (DIBC) were found to be statistically significant with probability values of 0.0001, 0.0131 and 0.0000 (See table 7) at 0.05 level of significance, but Foreign Claims (FORC) was observed to be insignificant and may not be unconnected with the bureaucracies and time it takes to convert such claims into cash.

Based on the foregoing, the researchers are of the view that existing liquidity management strategies or measures should be reviewed to further strengthen the non-operational measures and deepened in order to accord banks variety of ways/markets for liquidity management.

Stringent regulatory policies in this regard should be revisited such that they are either relaxed or expunged to pave way for policies that stimulate effective liquidity management measures. The recent implementation of the Treasury Single Account by the Nigerian government is a step in the right direction. This move will enhance the seriousness of banks management in managing their liquidity affairs and as well do away with over-dependence on government funds.

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APPENDIX I

YEAR	PLA (₦'b)	RESV (₦'b)	GOVS (₦'b)	DIBC (₦'b)	FORC (₦'b)
1990	25.8	4.8	8.7	3.2	6.6
1991	31.3	13.7	6.8	4.6	10.4
1992	42	27.1	5.9	14.9	19.4
1993	44.6	40.2	29.8	20.7	24.9
1994	37.3	47.1	39.2	25.5	17.9
1995	126	54.1	20.8	31.6	57.3
1996	157.7	62.7	47.5	27.5	47.6
1997	217.9	64.6	29.6	51.8	53.3
1998	246.4	62.7	49.1	54.7	75.1
1999	314.5	118.5	188.6	69.8	135.2
2000	437.8	167.6	278.6	123.2	194.6
2001	747	319	208.3	139.4	305
2002	829.6	321.5	467.5	142.4	398.2
2003	1040.3	362.2	378.2	170.1	437.7
2004	1307.6	364.2	609.1	247.6	481.3
2005	1656.9	515.2	630.8	206.3	463.2
2006	2197.8	670.5	993.5	208.2	1358.3
2007	4013.2	659.6	1960.4	527.8	930.7
2008	6331.9	910.7	1717.1	1311.1	1506.8
2009	8039	521.8	1826.7	1322.5	1265.6
2010	6929.8	531.4	2377.9	1097.1	1296.4
2011	6642.7	1222.5	3162.4	543.8	1702.5
2012	7702.9	1847.2	2233.5	407.2	2005.5
2013	8720.65	2486.4	2595.1	548.73	2055
2014	10978.653	3657.68	3696.2	575.78	2132.18

Source: Central Bank of Nigeria, 2014