



## Effect of Liquidity Management on the Performance of Deposit Money Banks in Nigeria

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### Abstract

In this study, we examined the effect of liquidity management on the performance of banks in Nigeria. Our sample comprised 18 banks included in the Nigerian Stock Exchange (NSE) from 2011 to 2017. Thus, the firm-year sample constitutes 90 (18 banks × 5 years) financial statements. We found that liquidity management positively and significantly affected banks' profitability. Capital adequacy significantly affected return on assets, return on equity, and return on capital employed. Similarly, we found a significant positive effect of asset quality on the performance indicators. The analyses also showed that the liquidity ratio effect is positive and significant on the performance indicators. This result shows that banks with proper liquidity management will increase their profitability over time. This suggests that to increase the overall network of shareholders, banks should place a strong emphasis on liquidity management. Thus, liquidity should be managed to minimise potential default risks.

**Keywords:** Liquidity; Liquidity management; Deposit money banks, Performance; Capital adequacy; Assets quality; Liquidity ratio; Return on assets.



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### 1. Introduction

The failure of banking firms on a global scale has been linked to liquidity crises, which, in turn, have led to bank runs. This means that there could be a significant link between liquidity management and banks' financial performance. This study uses evidence from Nigeria to provide the latest evidence of the effect of liquidity management on the performance of banking firms in Nigeria. We follow a multi-performance approach in which we examine the effect of liquidity management by using several bank performance indicators to detect the indicator that best responds to liquidity management. This will identify which performance indicators should be most strongly considered to make an informed decision, which, in turn, would mitigate consistent bank failures in Nigeria.

Liquidity management involves putting into circulation an amount of liquidity in accordance with the expected level of short-term reserve money without distorting the operations of such corporate firms (Andrew and Osuji, 2013). It also involves strategically adhering to regulatory cash reserve requirements. Banks require strong liquidity management competencies to continue playing essential intermediation roles in the financial system and enjoy a positive return on their investment (Nwankwo, 2014). The liquidity managerial skill is very important because there is always a trade-off between liquidity and profitability (Sufian and Habibullah, 2010). Profitability would fall if banks were to tie down excess liquidity that could have been profitably invested (Bernanke and Blinder, 2008). That means there is a need to maintain a balance that results neither in liquidity distresses nor in poor profitability. Strong liquidity management procedures can improve the reputation of banking firms, which can translate into higher equity returns. It can also suggest to investors that the bank is strong enough to withstand any potential forms of distress. Thus, having a strong liquidity standing can mitigate the risk of bank runs, which usually occur when depositors perceive banks as approaching liquidity crises.

Effective liquidity management also has market-related benefits. Investors account for a bank's liquidity management skills when considering the firms' stock price in the capital market. Moreover, investors judge the viability and riskiness of investing in a bank by examining banks' liquidity standing (Richard and Laughlin, 1980). This also suggests that banks that must fulfil their liquidity obligations must be able to harness their current assets to balance them against current liabilities. Balancing liquidity is important because it helps banks to mitigate financial strain and negative working capital (Jensen, 1986). When there is an imbalance between these two factors, liquidity

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disequilibrium occurs. Such excess or shortage of liquidity supply can adversely affect bank operations, which, in turn, may lead to poor key performance ratios (Janglani and Sandhar, 2013). Almeida and Campello (2002), highlight that good liquidity management entails having access to capital markets, which positively bears future investment returns for the firms. In their theory, they highlight that the price paid for cash shortages is greater for banks with larger investment opportunities. Some losses are always expected to follow from not being able to take up profitable investment opportunities. A firm that manages its liquidity well can always capitalise on their balanced liquidity to make viable investments through discounted and lower interest rates in the market. There is no doubt, however, that the market will discount firms' stock prices if banks' liquidity management is adjudged poor. Therefore, it is reasonable that deposit money banks' (DMBs') liquidity management strategies have continued to draw attention both locally and internationally. Hence, there is a relationship between cash holding management, investment opportunities, and financial performance.

Despite this, most of the empirical evidence on the dimensions of the effect of liquidity management on DMBs' key performance ratios has been inconclusive. This is largely because liquidity management measurements (and other important driving factors) differ across countries and times (Alshatti, 2015). Sometimes, such adequacy ratio benchmarks that proxy liquidity management are influenced by regulations. For instance, minimum legal reserve requirements may increase or decrease with time and as new regulations are introduced. In developing countries, where most of the banking policies are politicised and subject to political capture, there is much inconsistency in banking practices. Indeed, the inauguration of a new central bank governor might lead to either a decrease or increase in liquidity quality benchmarks. In 2004, banks received an ultimatum to either merge or recapitalise in order to enhance their efficiency and liquidity status. This recapitalisation regulation led the merger of 89 banks into 24. However, with the emergence of a new apex bank governor, the idea of bank mergers was considered hazardous to the banks' efficient liquidity utilisation, especially regarding credit distribution. In addition, in times of global economic or financial crises, the liquidity adequacy threshold could change, thus rendering prior evidence irrelevant to present economic policies.

Moreover, the most important factor that has caused variations in results, and a factor that has largely been overlooked in previous literature, is the firm's performance measurement. While some scholars use accounting measures such as return on assets (ROA) (Hassan and Bashir, 2003; Rivard and Thomas, 1997), others consider measures based on a market perspective, such as return on equity (ROE) (Yasser et al., 2011) and Tobin's Q (Shah et al., 2011). Rivard and Thomas (1997), suggest that bank profitability is best measured by ROA because, unlike ROE, ROA is not distorted by high equity multipliers. In addition, they argue that ROA is the best measure because it represents a more accurate measure of the ability of a firm to generate returns on its portfolio of assets. In addition, ROA gives an idea of how skilled the management team of the firm is at utilising its assets to generate earnings.

However, critics have suggested that the use of accounting figures such as ROA usually lead to model misspecifications. The reason for this is that most accounting figures are subject to management bias and manipulation. Thus, such figures do not always accurately reflect corporate operations. As such, they are prone to estimation error, which results in misinterpretation and misapplication on the part of investors.)

In this case, a market approach is preferred because it is bias-free and reflects the overall market assessment of the liquidity fundamentals of DMBs. However, the market can be irrational at times and place unnecessary premiums on firms' stock prices. Considering all ramifications and the fact that each measurement approach has some positive and negative implications, the best approach to follow is an all-inclusive one that involves the use of both accounting and market measurements. In doing so, one would be able to reconcile increasing divergences in the outcomes of studies on the effect of liquidity management on firms' performance.

Overall, the timing and setting of the studies, the nature of the economic conditions, and variable measurement approaches affect the dimensional effect of liquidity management on firms' performance. Therefore, such factors should be considered in an empirical study.

## 2. Literature Review

### 2.1. Concept of Liquidity

In this section we provide definition of key concepts namely liquidity, liquidity management and some key performance indicators. Liquidity defines the ability, and the ease with which other current assets other cash and cash equivalent could be converted to cash. Liquid assets are mostly current assets, which can quickly be converted to cash when the need comes in order to meet financial and debt obligations (Okaro and Nwacoby, 2016). Graham (2013), defines liquidity as a bank's capacity to fund increase in assets and meet both expected and unexpected cash and collateral obligations at a reasonable cost and without incurring unacceptable losses. From capital perspective, researchers view liquidity as a financial term that describes the amount of capital that is available for investment. Liquid assets generally include cash, central bank reserves and government debt. Liquidity is essential because to remain viable firms should possess sufficient liquid assets to meet its short term obligations. Banks that could not meet withdrawal demands by depositors will definitely run into distress, which ultimately will lead to liquidation. In the banking firm, liquidity needs to be maintained in order to continually meet banks obligation. According to Okaro and Nwacoby (2016) adequate liquidity enables a bank to meet time, funding and lending risks. Liquidity management mechanism is the mandatory requirement imposed on DMBs by the Central Bank to ensure that DMBs do not become easily insolvent. Thus monitoring DMBs' liquidity reduces the possibility of raising loans under unfavourable loan agreements, restrictions and at a high interest bearing costs. Liquidity management in DMBs also reduces the incidence of bankruptcy and liquidation which are simply the result of illiquidity, and thereby, help to protect customers' deposits.

## 2.2. Financial Performance of DMBs

The issue of financial performance in financial institutions has been widely discussed in the scientific literature, it has also been considered in a number of theoretical and empirical researches of different kinds. [Matolcsy and Wright \(2011\)](#), measured firm performance by return on assets which is EBIT / average total assets, return on equity that is net profit / equity, change in market value of equity, change in market value of equity, adjusted for dividends and risk. [Yasser and Ismail \(2011\)](#), used return on equity and profit margin for the measurement of firm performance. Market based measures of companies' performance were done by [Shah et al. \(2011\)](#) by market value of equity divided by book value of equity and Tobin's Q (market value of equity plus book value of debt/total of assets minus in book value), whereas financial reporting perspective was measured by Return On Equity (ROE) and return on investment which is net result plus interest over equity plus total debt. [Bhagat and Black \(1999\)](#), measured dependent variable firm performance by Tobin's Q, return on assets (operating income/assets), turnover ratio (sales/assets), operating margin (operating income/sales), and sales per employee and also by growth of assets, sales, operating income, employees and cash flows. [Obudho \(2014\)](#), refers Return on Assets (ROA) to the amount of net income returned as a percentage of total assets. [Bourke \(1989\)](#), was one of the first who discovered in his research that exactly the internal factors of financial performance for financial institutions especially banks, such as net income before and after tax against total assets and capital and reserves factors, have the greatest impact on profitability and performance indicators. Financial performance of financial institutions is usually expressed as a function of internal and external factors. The financial statement variables which determine performance include: expense management, loan composition and credit, composition of deposits, market interest rates, earning and operating efficiency, changes in capital and liquidity management. The non-financial statement variables which determine financial performance include number of branches, company size and location. The external determinants include: financial regulation, competitive condition, concentration, market share, market growth and ownership ([Goddard et al., 2004](#)).

One objective should not be at cost of the other because both have their importance. If we do not care about profit, we cannot survive for a longer period. On the other hand, if we do not care about liquidity, we may face the problem of insolvency or bankruptcy. For these reasons liquidity management in financial institution should be given proper consideration and will ultimately affect the financial performance.

## 2.3. Theoretical Framework

There are various theories underpinning liquidity management, namely liquidity preference theory, shiftability theory, commercial loan theory, Schumpeter's theory of profitability, and the buffer theory of capital adequacy (CADY).

### 2.3.1. Liquidity Preference Theory

The liquidity preference theory was postulated by John Maynard Keynes in his book "*Money*" in (1936) to explain determination of the interest rate by the supply and demand for money. The theory highlights three motives namely transactionary, speculative and precautionary behind holding cash. The demand for money as an asset was theorized to depend on the interest foregone by not holding bonds and other less liquid assets. Interest rates, he argues, cannot be a reward for saving as such because, if a person hoards his savings in cash, keeping it under his mattress say, he will receive no interest, although he has nevertheless refrained from consuming all his current income. Instead of a reward for saving, interest, in the Keynesian analysis, is a reward for parting with liquidity. This theory is significant in the study of bank liquidity management because every DMBs needs to understand the motives for tying down liquid capital and the implications on the profitability.

### 2.3.2. Commercial Loan Theory or Real Bills Doctrine

Adam Smith was among the scholars that propounded the theory of real bills doctrine or the commercial loan theory. He propounded this theory in 1776 in his book entitled "*Wealth of Nations*". The commercial loan or the real bills doctrine theory states that a commercial bank should forward only short-term self-liquidating productive loans to business organizations. Loans meant to finance the production, and evolution of goods through the successive phases of production, storage, transportation, and distribution are considered as self-liquidating loans. This theory also states that whenever commercial banks make short term self-liquidating productive loans, the central bank should lend to the banks on the security of such short-term loans. This principle assures that the appropriate degree of liquidity for each bank and appropriate money supply for the whole economy. This theory will be significant to this study because of the following reasons. These short-term self-liquidating productive loans acquire three major advantages. First, they acquire liquidity so they automatically liquidate themselves. Second, as they mature in the short run and are for productive ambitions, there is no risk of their running to bad debts. Third, such loans are high on productivity and earn income for the banks. This theory will also be relevant to DMBs because loans mature in the short run and are for productive ambitions, therefore there is no risk of their running to bad debts and such loans are high on productivity and earn income for the banks. Also the short-term commercial loans were desirable because they would be repaid with income resulting from the commercial transaction financed by the loan.

### 2.3.3. Shiftability Theory

This theory was developed by Harold G, Moulton in 1915. This theory states that, for an asset to be perfectly shiftable, it must be directly transferable without any capital loss when there is a need for liquidity. This is

specifically used for short term market investments, like treasury bills and bills of exchange which can be directly sold whenever there is a need to raise funds by banks. But in general circumstances when all banks require liquidity, the shiftability theory need all banks to acquire such assets which can be shifted on to the central bank which is the lender of the last resort. This theory maintains that banks could effectively protect themselves against massive deposit withdrawals by holding, as a form of liquidity reserve, credit instruments for which there existed a ready secondary market. Included in this liquidity reserve were commercial paper, prime bankers acceptances and, most importantly as it turned out, treasury bills. Under normal conditions all these instruments met the tests of marketability because of their short terms to maturity.

The shiftability theory will be important to this study because it has some positive elements of truth. Now banks obtain sound assets which can be shifted on to other banks. Shares and debentures of large enterprises are welcomed as liquid assets accompanied by treasury bills and bills of exchange. This has motivated term lending by banks.

#### 2.3.4. Schumpeter Theory of Profitability

Following on the method of Clark, Schumpeter developed the 'circular flow model' in which a profit-less economy is described where perfect competition extinguishes surpluses of monopoly and friction. The analyses of the 'circular flow' economy differ in detail from the 'static state' model of Clark. So departures between an ideally competitive environment and actual economies yield the causes of profit. Schumpeter, however, is far more selective in his approach than Clark. Schumpeter identifies the single notion of innovation as paramount, so that changes based upon innovation are the cause of profit. Gradual changes in population and capital would easily be anticipated by the market and hence present no opportunity for the entrepreneur. This theory will be significant to this study because the five conditions that result to profit making as suggested by Schumpeter are observed by deposit money banks as profit making is the main reason for setting up any bank.

#### 2.3.5. Buffer's Theory of Capital Adequacy

Capital adequacy theory was postulated by Berger and DeYoung (1997). The view of Berger and DeYoung (1997) is that banks may hold large capital to explore future unforeseen investment opportunities. According to Berger and DeYoung (1997), banks can opt to have a capital buffer to reduce the likelihood of their capital dropping below the statutory requirement, mainly if the ratio is very unsteady. Another possible reason for holding buffer capital is related to the level of risk of the bank's total capital.

*Buffer's theory* postulates that banks with their capital marginally above the regulatory minimum ratios should always increase the capital ratio and cut risk to avoid compliance penalty by the regulator. According to Milne and Wiley (2001), buffer is a term used to show the excess capital held by the bank beyond the minimum requirement. This implies that banks are forced to raise the level of their capital ratio when coming close to the required minimum level assets. According to Milne and Wiley (2001), compared to banks with lower portfolio risk, banks with a highly risky portfolio hold a higher level of buffer capital because their capital is likely to fall below the statutory minimum requirement. During financial crises, banks with small amount of capital may escalate systemic risk and hence hamper financial stability. Conversely, if banks have already complied with the regulatory minimum capital as well as have buffer capital, then any changes in capital requirements will have less impact on bank behavior.

Banks may prefer to hold a 'buffer' of excess capital to reduce the probability of falling under the legal capital requirements, especially if their capital adequacy ratio is very volatile. Capital requirements constitute the main banking supervisory instrument in Nigeria.

This theory is relevant to this study because adequate capital helps DMBs in discharging effectively their primary function of preventing banking failure by absorbing losses. It is also seen as a way of providing the ultimate protection against insolvency arising from the risk in banking sector. It is the least amount necessary to inspire and sustain confidence in the banks, keep it open and operating so that time and earnings can absorb losses without being forced into costly liquidation and enable banking industry to take full advantage of its profitable growth opportunities.

### 3. Methodology and Research Design

This research used an *ex-post facto* design to maximise the accuracy of analysis and allowed for the retrospective examination of the independent variable proxied by CADY, liquidity ratios (LQTRs), and asset quality (AQCY). Thus, we have an authentic effect of the variable on the three key performance measures, namely ROE, ROA, and return on capital employed (ROCE) for the period between 2013 and 2017. During this period, we studied a sample of 21 banks that witnessed The International Financial Reporting Standard (IFRS) transitions and Treasury Single Account (TSA) implementation. This period is of specific interest because DMBs' liquidity management was thrown into disarray during this time, thus giving the researchers an opportunity to examine how DMBs responded to the situation and what implications it had on their profit performance.

We used a judgmental sampling technique to select 18 banks. Thus, our final firm-year sample is 90 (18 banks × 5 years) financial statements. We sourced data from the NSE database and CBN Statistical Bulletin. The data collected were analysed using basic statistical tools that provided descriptive analogies such as mean, median, standard deviation and ordinary least square (OLS). Multiple- linear regression was used to test the hypotheses. SPSS software was used to run the analysis. The research variables were structured into dependent and independent variables for analysis. The independent variable is liquidity management, proxied by CADY, LQTR, and AQCY. The dependent variables for profitability indices were ROA, ROE, and ROCE.

### 3.1. Model Specification

The model specified in this study was adapted from prior models. Thus, we have a base model of the form:

$$Profitability = f(bank\ liquidity\ management, error) \tag{1}$$

The above equation can be rewritten as

$$Y = X(\beta_0 + \beta_1 + \beta_2 + \beta_3) + \mu \tag{2}$$

Where *Y* equals profitability (defined in terms of *ROA*, *ROE* and *ROCE*). *X* is a measure of bank liquidity management proxied by *CADY*, *LQTR*, and *AQCY*.  $\beta_0$  is the constant term (intercept), while  $\beta_1$ - $\beta_3$  measure the coefficient of efficient liquidity management proxy variables. Finally,  $\mu$  represents the error term.

To test the hypotheses, we use the specified model below:

$$Profitability\ (ROA_i, ROE_i, ROCE_i) = \alpha + \beta_1(a,b,c)CADY_{it} + \beta_2(a,b,c)LQTR_{it} + \beta_3(a,b,c)AQCY_{it} + \mu \tag{3}$$

Where *ROA<sub>i</sub>*, *ROE<sub>i</sub>*, and *ROCE<sub>i</sub>* are dependent variables that measure bank performance. *ROA<sub>i</sub>* is the ROA of bank *i* for year *t*, measured as the total profit after tax divided by total bank gross assets. *ROE<sub>i</sub>* is the return equity, measured as the profit of bank *i* after taxes in year *t* divided by the banks' shareholders' fund. *ROCE<sub>i</sub>* is the bank's ROCE, measured as the profit of bank *i* after taxes divided by total non-current assets in year *t*.  $\beta_1(a,b,c)$  is the coefficient of the liquidity measure *CADY* as associated with different performance measures.  $\beta_2(a,b,c)$  is the coefficient of *LQTR<sub>it</sub>* as associated with different performance measures.  $\beta_3(a,b,c)$  is the gradient of *AQCY<sub>it</sub>* as related to three performance measures. *CADY* denotes *CADY* and is measured as the bank's available capital and expressed as a percentage of the bank's risk-weighted credit exposures, which equals

$$CADY = \frac{\text{Tier One Capital} + \text{Tier Two Capital}}{\text{Risk Weighted Asset}}$$

*LQTR<sub>it</sub>* is a variable related to *LQTR*. It is determined by the total specified liquid assets of a bank divided by its total current liabilities. *AQCY<sub>it</sub>* is another liquidity-related variable that denotes *AQCY*, which is measured as the ratio of gross non-performing assets (NPAs) to gross advances.

Overall, we expect the signs of the coefficients to be positive. Thus, *CADY*, *LQTR*, and *AQCY* will have a positive effect on the performance measures, namely *ROA*, *ROE*, and *ROCE*. This is because an increase in the volume of *CADY*, *LQTR*, and *AQCY* will likely lead to an increase in performance measures. However, we do not rule out the possibility of accepting the null hypotheses, which postulate that liquidity management can form a trade-off with profitability.

## 4. Results

### 4.1. Descriptive Statistics

Table-1. Descriptive Statistics

Variables	N	Min. Stat	Max. Stat.	Mean Stat.	STD. Dev. Stat.
ROE	5	1.320	1.560	1.42	.090719
ROA	5	1.230	1.630	1.38	.148728
ROCE	5	1.280	1.650	1.390	.146048
CADY	5	.560	1.180	0.95	.288964
AQCY	5	.980	1.560	1.18	.218890
LQTY	5	.650	.940	.792	.135536

Source: Regression Result using SPSS, 2018

Table 1 shows the mean, standard deviation, minimum, and maximum values of the variables used in the study.

Table 1 indicates that during the period of the study, Model 1, Model 2, and Model 3 have, on average, returns on assets of about 1.42400, returns on equity of about 1.38200, and returns on capital employed of about 1.39400, respectively. In the same vein, *CADY*, *AQCY*, and liquidity on *ROA*, *ROE*, and *ROCE* have respective means of 0.95000, 1.18840 and 0.79200. Liquidity has the lowest standard deviation (0.135536), signifying its high contribution to the ROE of DMBs in Nigeria. *CADY* has the highest standard deviation (0.288964), which indicates that it contributes the least towards the ROE of DMBs in Nigeria. This can be confirmed by the significant F values of the individual contributions of the independent variables to the ROE of DMBs in Nigeria, as shown in the regression table. The following table presents tolerance and variance inflation factor values for the test of multicollinearity between the explanatory variables.

### 4.2. Correlation Matrix

The correlation matrix is used to determine the relationship between the dependent and independent variables of a study. Table 2 below presents a correlation matrix for the sample observations.

The correlation matrix is used to determine the relationship between the dependent and independent variables of the study. Table 2 below presents the correlation matrix for the sample observations.

**Table-2.** Pearson Correlation Matrix for ROA

<i>Variables</i>	<i>ROA</i>	<i>CADY</i>	<i>AQCY</i>	<i>LQTY</i>
<i>ROA</i>	1.000	.646	.547	.912
<i>CADY</i>	.646	1.000	.732	.604
<i>AQCY</i>	.547	.732	1.000	.523
<i>LQTY</i>	.912	.604	.523	1.000

Source: Regression Result using SPSS, 2018

Table 2 indicates that there is a positive relationship between ROA, CADY, AQCY and LQTR. This implies that liquidity management is contributing positively to the profitability of DMBs in Nigeria. The association between these factors is positive and highly significant. On the other hand, the relationship between the independent variables, as shown by the correlation matrix, indicate that the association between these variables is above 50% thus reaffirming the absence of multicollinearity.

**Table-3.** Pearson Correlation Matrix for ROE

<i>Variables</i>	<i>ROE</i>	<i>CADY</i>	<i>AQCY</i>	<i>LQTY</i>
<i>ROA</i>	1.000	.697	.556	.760
<i>CADY</i>	.697	1.000	.732	.604
<i>AQCY</i>	.456	.732	1.000	.523
<i>LQTY</i>	.760	.604	.523	1.000

Source: Regression Result using SPSS, 2018

Table 3 indicates that there is a positive relationship between ROE, CADY, AQCY and LQTR. This implies that liquidity management contributes positively to the profitability of DMBs in Nigeria. The association between them is positive and highly significant. On the other hand, the relationships between the independent variables, as shown in the correlation matrix, indicate that the association between these variables is above 50%, again reaffirming the absence of multicollinearity.

Table 3 indicates that there is a positive relationship between Return on Equity, Capital Adequacy, Asset quality and Liquidity ratio. This implies that Liquidity Management is contributing positively to the Profitability of Deposit Money Banks in Nigeria. The association between them is positive and highly significant. On the other hand, the relationship between the independent variables, as shown by the correlation matrix, indicate that the association between them is above fifty percent (50%) reaffirming the absence of multicollinearity.

**Table-4.** Pearson Correlation Matrix for ROCE

<i>Variables</i>	<i>ROCE</i>	<i>ROCE</i>	<i>CADY</i>	<i>AQCY</i>	<i>LQTY</i>
<i>ROA</i>	1.000	1.000	.934	.730	.587
<i>CADY</i>	.934	.934	1.000	.732	.604
<i>AQCY</i>	.730	.730	.732	1.000	.523
<i>LQTY</i>	.587	.587	.604	.523	1.000

Source: Regression Result using SPSS, 2018

Table 4 indicates that there is a positive relationship between ROCE, CADY, AQCY and LQTR. This implies that liquidity management contributes positively to the profitability of DMBs in Nigeria. The association between these variables is positive and highly significant. On the other hand, the relationships between the independent variables, as shown in the correlation matrix, indicate that the association between these variables is above 50%, once again reaffirming the absence of multicollinearity.

### 4.3. Multiple Regression Analysis

Table 5 below presents the regression of the liquidity variables on profitability measures. The results are interpreted and discussed in the subsequent section. Our conclusions regarding the effects of liquidity management were drawn based on these results.

**Table-5.** Multiple Regression Output of All the Variables

<i>Variables</i>	<i>Coef. (model 1; ROA)</i>	<i>T</i>	<i>Sig</i>	<i>Coef. (Model 2: ROE)</i>	<i>T</i>	<i>Sig</i>	<i>Coef. Model 3: ROCE)</i>	<i>T</i>	<i>Sig</i>
<i>Conss</i>	.757	.721	.002	1.048	2.506	.0242	.352	.278	.027
<i>CADY</i>	.184	.346	.048	.004	.019	.009	.336	.525	.0262
<i>AQCY</i>	.014	-.02	.015	.067	-.286	.023	.352	.496	.007
<i>LQTY</i>	.590	.725	.041	.570	1.757	.039	.384	.392	.046
<i>R-Value</i>	.926	-	-	.817	-	-	1.706	-	-
<i>R-Square</i>	.958	-	-	.817	-	-	.98	-	-
<i>AdjR-square</i>	0.631	-	-	.732	-	-	82.008	-	-
<i>F-Value</i>	2.009	-	-	.667	-	-	.331	-	-
<i>Sig</i>	.0469	-	-	.692	-	-	.820	-	-
<i>DW</i>	1.499	-	-	1.499	-	-	1.499	-	-
<i>VIF</i>	3.185; 2.260; 1.652	-	-	3.185; 2.260; 1.652	-	-	3.185; 2.260; 1.652	-	-

#### 4.4. Interpretation and Discussion of Results

Based on the regression results, the model for ROA, (i.e., Model 1) shows that a 0.184-point increase in CADY, a 0.014-point increase in AQCY, and a 0.590-point increase in LQTY will lead to a 1-point increase in ROA. The absence of the other variables in the final model could explain why those variables significantly affect the ROA of DMBs, as realised from the model summary. It is also clear from the equation that in the absence of the two variables, banks will have a positive ROA of 0.757. The Durbin-Watson statistic (1.499) indicates the absence of auto-correlation, which means that the estimate unbiased, consistent, and reliable for policy formulations. The F statistic (.0469) reveals that the explanatory variables are jointly significant in explaining changes in the profitability of DMSs in Nigeria. The results also show that CADY has a significantly positive effect on the profitability of DMBs in Nigeria. Thus, we accept the hypothesis that liquidity management significantly affects ROA.

AQCY is statistically significant in explaining the profitability of DMBs. This finding is in line with the a priori expectation. This implies that liquidity management (CADY, LQTR, and AQCY) affect the profitability (i.e., ROA) of DMBs in Nigeria. The results also reveal that liquidity has a positive and significant effect on the profitability of Nigerian DMBs. A 1% increase in liquidity will lead to a 59% increase in the profitability of DMBs in Nigeria. This implies that LQTR strongly affects the profitability of DMBs in Nigeria. Overall, R-values are consistent and show that the models provide a good explanation of the behaviour of independent variables.

#### 4.5. Discussion of the Findings and Implications of the Study for Policymaking

CADY has a positive and significant effect on the ROA of DMBs in Nigeria. The p-value of 0.048 was less than the  $\alpha$ -value of 0.05. Therefore, CADY significantly affects the ROA of DMBs in Nigeria, with CADY = 0.184. This finding is in line with the results of previous research, such as that of Kosmidou *et al.* (2008); Gul *et al.* (2011), who found that the CADY of banks determines profitability because without profits, no firm can survive or attract outside capital to meet its investment targets in a competitive environment. However, the results of the present study contrast the findings of Rajan and Zingales (1998), and Cetorelli and Gambera (2001), who found that CADY influences the financial sector's profitability and that it is essential not only for the managers of banks but for numerous stakeholders (e.g., central banks, bankers associations, governments, and other financial authorities).

We also found that LQTR has a significant effect on the ROA of DMBs in Nigeria, with LQTY = 0.590. The p-value of 0.041 is less than the  $\alpha$ -value of 0.05. Therefore, we conclude that LQTR has a positive and significant effect on the ROA of DMBs in Nigeria. This finding implies that any increase in LQTR will lead to an increase in the ROA of DMBs in Nigeria. This has confirmed our a priori theoretical expectation. Similarly, our results are in line with those of Godwin and Comfort (2015), as they maintain in their study that there is a statistically significant positive relationship between bank liquidity measures (i.e., CR, LR, CR LDR, LAR) and ROE; however, when ROA was used as a proxy for profitability, the relationship became statistically insignificant. Raymond *et al.* (2015), produced similar findings, as their study showed that there is a significant positive correlation between liquidity position and debtors' turnover for companies in Nigeria. However, the results of the present study are in contrast with the study of Jeevarajasingam (2014), who indicated that there is no significant relationship between liquidity and the profitability of the banking sector in Sri Lanka. Moreover, Rajan and Zingales (1998) Cetorelli and Gambera (2001), and Beck *et al.* (2004) posit that CADY influences the financial sector's profitability and that it is essential not only for the managers of banks but for numerous stakeholders (e.g., central banks, bankers associations, governments, and other financial authorities). Also, in contrast to what was found here, Alshatti (2015) indicated that an increase in capital ratio and liquid assets ratio lead to a decrease in the profitability of Jordanian commercial banks.

Ware (2015), revealed clearly that all three measures have no significant relationship with the profitability of companies listed on the Ghana Stock Exchange. Egbide *et al.* (2013), showed that there is a strong negative relationship between the cash conversion cycle and profitability of firms. Our study submits that AQCY has a positive and significant effect of on the ROA of DMBs in Nigeria, with AQCY = 0.014. The p-value of 0.015 is less than the  $\alpha$ -value of 0.05. This finding implies that any increase in AQCY will lead to an increase in the ROA of DMBs in Nigeria. This also confirmed our a priori theoretical expectation.

This result is in line with the results of other researchers, such as Kadioglu *et al.* (2017), who showed that the higher the non-performing loans, the lower the AQCY and the lower the ROA, while the lower the non-performing loans, the higher the AQCY and the higher the ROA.

The present study shows that CADY has a significant effect on the ROE of DMBs in Nigeria, with CADY = 0.590. The p-value of 0.041 is less than the  $\alpha$ -value of 0.05. This finding implies that any increase in CADY will lead to an increase in the ROE of DMBs in Nigeria. This also confirmed our a priori theoretical expectation.

This finding corroborates the findings of Beck *et al.* (2004), who maintained that CADY influences the financial sector's profitability and that it is essential not only for the managers of banks but also for numerous stakeholders (e.g., central banks, bankers associations, governments, and other financial authorities). Also, Alshatti (2015) maintained that increases in the capital ratio and liquid assets ratio lead to decreases in the profitability of Jordanian commercial banks.

The current study shows that LQTR has a significant effect on the ROE of DMBs in Nigeria, with LQTY = 0.570. The p-value of 0.039 is less than the  $\alpha$ -value of 0.05. This finding implies that any increase in capital LQTR will lead to an increase in the ROE of DMBs in Nigeria. This also confirmed our a priori theoretical expectation. This result is in line with that of Raymond *et al.* (2015), who determined that there is a significant positive correlation between liquidity position and debtors' turnover of Nigerian companies. The result presented here

contradicts that of Egbide *et al.* (2013), who showed that there is a strong negative relationship between the cash conversion cycle and the profitability of firms.

The present study shows that AQCY has a significant effect on the ROE of DMBs in Nigeria, with AQCY= 0.067. The p-value of 0.023 is less than  $\alpha$ -value of 0.05. This finding implies that any increase in AQCY will lead to an increase in the ROE of DMBs in Nigeria. This also confirmed our a priori theoretical expectation. Similarly, Kadioglu *et al.* (2017) maintained that the higher the non-performing loans, the lower the AQCY and the lower the ROE; also, the lower the non-performing loans, the higher the AQCY and the higher the ROE.

The present study shows that CADY has a significant effect on the ROCE of DMBs in Nigeria, with CADY= 0.336 and a p-value of 0.0262, which is less than the  $\alpha$ -value of 0.05. This finding implies that any increase in CADY ratio will lead to an increase in the ROCE of DMBs in Nigeria. This also confirmed our a priori theoretical expectation. This finding is in agreement with the results from a study conducted by Beck *et al.* (2004) who maintained that CADY influences the financial sector's profitability and that it is essential not only for the managers of banks but for numerous stakeholders (e.g., central banks, bankers associations, governments, and other financial authorities). Also, the study of Alshatti (2015) maintained that increases in the capital ratio and liquid assets ratio lead to decreases in the profitability of Jordanian commercial banks.

## 5. Conclusions

There are positive and significant relationships between the components of liquidity management (CADY, AQCY, and LQTY) and the components of profitability (ROA, ROE, and ROCE). In particular, this study provides the following conclusions: CADY significantly affects the ROA of DMBs in Nigeria. LQTRs significantly affect the ROA of DMBs in Nigeria. AQCY has a significant effect on the ROA of DMBs in Nigeria. CADY significantly affects the ROE of DMBs in Nigeria. LQTRs significantly affect the ROE of DMBs in Nigeria. AQCY has a significant effect on the ROE of DMBs in Nigeria. CADY has a significant effect on the ROCE of DMBs in Nigeria. LQTRs significantly affect the ROCE of DMBs in Nigeria. AQCY significantly affects the ROCE of DMBs in Nigeria.

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