ANALYSIS OF RELATIONSHIP BETWEEN LIQUIDITY MANAGEMENT AND FINANCIAL PERFOMANCE OF DEPOSIT MONEY BANKS (DBMs) IN NIGERIA

By

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Abstract
The study examined the relationship between liquidity management and the financial performance of Deposit Money Banks (DMBs) in Nigeria. The purpose was to determine how liquidity practices influence profitability and stability within the banking sector. A descriptive ex-post facto research design was adopted, relying solely on secondary data obtained from audited annual reports of 12 listed banks, the Nigerian Exchange Group, and the Central Bank of Nigeria for the period 2009–2023. The analysis employed panel data regression using common effect, random effect, and fixed effect estimators, with the most appropriate model determined through the Fixed Effect test, Breusch-Pagan Lagrange Multiplier test, and Hausman test. The findings reveal that the debt-to-equity ratio (DER) has a significant negative effect on return on assets (ROA), suggesting that higher leverage reduces profitability. The loan-to-deposit ratio (LDR) showed a negative but insignificant effect on performance, while the liquidity coverage ratio (LCR) had a weakly significant negative effect on ROA. Firm size (FSZ) exhibited no significant influence. Overall, the results highlight that excessive reliance on debt financing and holding excessive liquid assets may erode profitability, underscoring the need for balance between liquidity and investment. The study concludes that effective liquidity management is vital to ensuring solvency, profitability, and resilience among Nigerian banks. It recommends maintaining optimal liquidity levels, strengthening asset-liability management, diversifying funding sources, adopting advanced risk management practices, leveraging technology, and building staff capacity. This research contributes to understanding how liquidity strategies affect bank performance in Nigeria's dynamic financial environment.

Keywords: *Liquidity, management, Financial Performance, Deposit Money Banks*

1. Introduction

Liquidity management is central to the stability and performance of banks, as it ensures that financial institutions maintain sufficient liquid assets to meet short-term obligations. In the banking sector, the transformation of short-term deposits into long-term loans makes liquidity management a critical function, since any failure to meet withdrawal demands or interbank settlements can undermine confidence and solvency (CBN, 2021). For Nigerian deposit money banks, liquidity management is further complicated by macroeconomic challenges such as inflation, foreign exchange instability, and fluctuating oil revenues. These conditions often result in unpredictable cash flow demands that increase the risk of liquidity pressures. To mitigate systemic risks, the Central Bank of Nigeria (CBN) prescribes regulatory measures such as the Cash Reserve Ratio (CRR), Liquidity Ratio, and Standing Lending Facility (CBN, 2021). These instruments are designed to safeguard stability by ensuring banks maintain a buffer of high-quality liquid assets. However, meeting regulatory requirements alone does not guarantee optimal financial outcomes. Banks are often faced with a trade-off: holding too much liquidity can reduce profitability because liquid assets yield lower returns, while insufficient liquidity exposes them to solvency risk and regulatory sanctions. This balance is especially crucial in Nigeria's evolving financial environment, where technological innovations, digital banking, and real-time settlements have reshaped liquidity needs while also introducing new risks such as cyber vulnerabilities (IMF, 2020).

Challenges persist, despite existing regulatory frameworks, Nigerian banks continue to face liquidity-related challenges, including high non-performing loans and reliance on volatile funding sources. These issues raise concerns about the effectiveness of liquidity management in supporting financial performance and long-term stability. It is on this background this study seeks to examine the relationship between liquidity management and financial performance of Nigeria's deposit money banks.

1.1.1 Research Objective

i. To examine the relationship between debt to equity ratio and return on assets
ii. To examine the relationship between loan to deposit ratio and return on assets
iii. To examine the relationship between liquidity coverage ratio and return on assets

1.1.2 Research hypothesis

i. There is no significant relationship between debt to equity ratio and return on assets

1.2 LITERATURE REVIEW

1.2.1 Concept of Liquidity Management

Liquidity refers to the ability of a financial institution to meet its short-term obligations using cash or assets that can be quickly converted to cash without significant loss. In banking, this means ensuring funds are available to honor depositor withdrawals, extend credit, and settle interbank obligations (CBN, 2021). Since Deposit Money Banks (DMBs) borrow short term through deposits while lending long term, they face maturity mismatches that create liquidity risk. Liquidity management therefore involves forecasting and monitoring cash flows, holding sufficient liquid asset buffers, and preparing contingency plans for unexpected outflows (CBN, 2021). Globally, Basel III introduced two major standards: the Liquidity Coverage Ratio (LCR), which requires banks to hold high-quality liquid assets to withstand a 30-day stress scenario, and the Net Stable Funding Ratio (NSFR), which ensures stable long-term funding (BIS, 2013). These measures provide international benchmarks for prudent liquidity practices.

In Nigeria, the Central Bank of Nigeria (CBN) uses instruments such as the Cash Reserve Ratio (CRR) and Liquidity Ratio to regulate system liquidity. Recent Monetary Policy Committee reports confirm that the liquidity ratio has been maintained at 30 percent (CBN, 2023). In addition, the CBN issued Guidelines on Liquidity Coverage Ratio (LCR) in 2021 to align the banking system with Basel III standards (CBN, 2021). Proper measurement of liquidity helps businesses avoid financial stress, meet essential expenses, and take advantage of growth opportunities. Common measures used to assess liquidity include ratios and indicators that evaluate how easily a company can convert assets into cash and settle its liabilities. These measures provide insight into the balance between liquid assets and financial commitments, serving as important tools for both operational planning and regulatory compliance. The most widely recognized measures of liquidity management include the following:

1.2.2 Current Ratio

The current ratio compares a company's current assets with its current liabilities to show whether it can meet short-term obligations.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

1.2.3 Quick Ratio

The quick ratio, also known as the acid-test ratio, is a stricter measure than the current ratio since it excludes inventories and prepaid items. It focuses only on the most liquid assets such as cash, receivables, and near-cash investments.

$$\text{Quick Ratio} = \frac{\text{Current Assets - Inventories}}{\text{Current Liabilities}}$$

1.2.4 Cash Ratio

The cash ratio is the most conservative liquidity test, comparing only cash and cash equivalents to current liabilities. It answers whether an institution can meet obligations immediately with cash on hand.

$$\text{Cash Ratio} = \frac{\text{Cash + Cash Equivalents}}{\text{Current Liabilities}}$$

1.2.5 Cash Reserve Ratio (CRR)

The cash reserve ratio is a regulatory tool requiring banks to hold a certain percentage of their deposits as reserves with the central bank. It directly affects how much money banks can lend out.

$$\text{CRR} = \frac{\text{Cash Reserves with Central Bank}}{\text{Net Demand and Time Liabilities}} \times 100$$

1.2.6 Concept of Cash Management

Cash management is a central aspect of financial decision-making that ensures firms maintain sufficient liquidity to meet operational and financial obligations while avoiding excessive idle funds. It refers to planning, collection, handling, and disbursement of cash in a manner that supports organizational efficiency and stability. In contemporary business environments, the importance of cash management has grown as firms face volatile markets, rising operational costs, and increased competition. Effective cash management not only safeguards liquidity but also enhances profitability by minimizing financing costs and maximizing the return on surplus funds (Brigham & Ehrhardt, 2022).

In practice, cash management involves forecasting cash inflows and outflows, preparing budgets, managing receivables and payables, and investing excess funds in short-term, low-risk instruments. These activities are essential for reducing financial risks and ensuring uninterrupted operations. Poor cash management can expose organizations to liquidity shortages, increased borrowing costs, and even insolvency. Conversely, efficient management helps firms improve their creditworthiness, strengthen supplier and customer relationships, and take advantage of emerging investment opportunities (Ross et al., 2019).

The adoption of treasury management systems, real-time payment platforms, and data analytics tools has improved the speed and accuracy of forecasting, enabled quicker reconciliation of transactions, and provided firms with real-time visibility of cash positions (Salas-Molina, 2018, 2023). These advancements allow businesses to reduce the amount of idle cash while still maintaining security against unexpected demands. Furthermore, globalized operations and digital banking have

expanded the scope of cash management, requiring firms to coordinate liquidity across multiple markets and currencies. Cash management is not merely about holding funds but about striking a balance between liquidity, risk, and profitability. It integrates financial planning with operational efficiency, positioning it as a strategic tool that supports overall corporate performance. As firms adapt to complex financial environments, the quality of their cash management practices will continue to determine their resilience, competitiveness, and long-term sustainability.

1.2.7 Concept of Working capital management

Working capital management refers to the strategic management of a firm's current assets and current liabilities to ensure efficient day-to-day operations and maintain financial health. It involves managing elements like cash, inventory, accounts receivable, and accounts payable to maintain adequate liquidity and profitability (Atrill & McLaney, 2021).

Effective working capital management ensures that a company has sufficient cash flow to meet its short-term obligations while minimizing the cost of capital tied up in current assets. The primary goal is to optimize the working capital cycle, which is the time taken to convert inventory and receivables into cash (Gitman et al., 2022).

In recent years, firms have begun integrating artificial intelligence into working capital practices. AI helps refine demand forecasting, automate invoice processing, and optimize inventory levels thereby tightening the cycle without jeopardizing liquidity (Abdul Rahman, 2024). Poor working capital management can lead to liquidity crises, reduced profitability, or even business failure especially in capital-intensive or seasonal industries (Ross, Westerfield & Jordan, 2021).

1.2.8 Concept of Financial Performance

Financial performance refers to how effectively a company uses its resources to generate income, manage costs, and sustain growth over time. It shows how well a firm is achieving its financial objectives and reflects operational efficiency and financial health. According to *Investopedia* (2023), financial performance involves examining revenues, costs, assets, liabilities, and stakeholder return to compare firms against peers or against their own benchmarks. In the context of banking, performance is often measured with indicators like Return on Assets (ROA) and Return on Equity (ROE), which reflect profitability relative to assets and shareholders' equity, respectively. A study of commercial banks in Nigeria found that financial performance is significantly influenced by bank-specific factors such as liquidity ratio, capital adequacy, credit risk, and management quality (Eneje, Nweze, & Udeh, 2020).

Thus, financial performance is multidimensional, it includes profitability, efficiency, and risk management. It is shaped by internal drivers (such as cost control, asset management, and capital structure) and external conditions (such as regulation and the economic environment). Monitoring financial performance helps stakeholders understand an institution's capacity to grow, remain solvent, and meet its obligations (Investopedia, 2023; Eneje et al., 2020).

1.2.8 Measures of financial performance

Measures of financial performance are tools used to evaluate how well an organization achieves its financial objectives. They indicate profitability, liquidity, solvency, efficiency, and market value. Profitability shows income generation, liquidity reflects the ability to meet short-term needs, solvency measures long-term stability, efficiency assesses resource use, and market value indicates investor perception. Together, they provide a snapshot of a firm's financi al health and prospects. Key categories include profitability, liquidity, solvency, efficiency, and market value ratios.

1.2.9 Profitability measure

Profitability measures are critical indicators used to assess the capacity of a business to generate income relative to its revenue, assets, equity, and other financial inputs over a specific period. These measures are essential because profitability is often the most direct and reliable indicator of an organization's overall financial success and sustainability. The most widely recognized measures of profitability include the following:

i. Net Profit Margin (NPM)

Net Profit Margin (NPM) is a key profitability ratio that shows the percentage of revenue remaining as profit after all expenses, taxes, and interest:

NPM = (Net Profit ÷ Revenue) × 100

ii. Return on Assets (ROA)

Return on Assets (ROA) is a profitability ratio that measures how effectively a company utilizes its total assets to generate net income. It reflects the firm's ability to convert investments in assets into profit and is considered a fundamental indicator of operational efficiency and management effectiveness.

$$\textbf{ROA} = \frac{\text{(Net profit)}}{\text{(Total Assets)}} \times 100$$

iii. Return in Equity (ROE)

Return on Equity (ROE) is a financial ratio which measures an organization's ability to generate profit from its shareholders' equity. It shows how effective management is using a company's equity base to generate earnings.

$$ROE = \frac{\text{Net Income.}}{\text{Shareholders' Equity}} \times 100$$

1.2.10 Leverage Measures

Leverage ratios are financial metrics used to evaluate the extent to which a business relies on debt financing to fund its operations and growth. They help determine the firm's financial structure, debt sustainability, and the potential risks associated with its capital strategy. These ratios form part of the broader set of financial ratios used to assess a company's long-term solvency and risk exposure.

1.2.11 Debt Ratio

The Debt Ratio is a fundamental financial leverage ratio that measures the proportion of a firm's total assets that are financed through debt. It reflects a company's solvency by showing how much of its asset base is funded by creditors rather than owners.

$$\text{Debt ratio} = \frac{\text{Total Debt (liabilities)}}{\text{Total Assets}}$$

1.2.12 Interest Coverage Ratio

The Interest Coverage Ratio (ICR) is a solvency ratio that measures a company's ability to meet its interest obligations on outstanding debt using its earnings before interest and taxes (EBIT). It evaluates how comfortably a firm can cover its interest expenses with its operating income.

$$\text{Interest Coverage Ratio} = \frac{\text{Earnings Before Interest and Taxes (EBIT)}}{\text{Interest Expense}}$$

1.3 METHODOLOGY

This study employed a descriptive ex-post facto research design to examine the relationship between liquidity management and financial performance of Deposit Money Banks (DMBs) in Nigeria using already existing data. The population comprised all 14 DMBs listed on the Nigerian Stock Exchange Group as of August 31, 2024, and purposive sampling was adopted to include 12 DMB banks with accessible financial data. The study relied solely on secondary data, covering the period 2009–2023, sourced from audited annual reports of the selected banks, the Nigerian Stock Exchange Group website, and the Central Bank of Nigeria (CBN) statistical bulletin, with relevant variables extracted manually for analysis.

Table 1.1 selected deposit money banks

S/No	Selected Deposit Money Banks Firms
1	FIRST BANK
2	ACCESS BANK
3	GT BANK
4	ZENITH BANK
5	ECO BANK
6	UNITED BANK OF ARICA
7	JAIZ BANK
8	STANBIC IBTC
9	FCMB
10	UNITY BANK
11	WEMA BANK
12	STERLING BANK

(Source: Developed / Adapted by the Author (2025)

1.3.1 Measurement of Variables

The variables for this study consist of both dependent and independent. The independent variable is that which is believed to affect the dependent variable, while the dependent is that which is affected. The variables of the study are explained in this section of the study.

Table 1.2: Dependent and Independent Variables

Variables	Variable Type	Proxy/Measurement
LIQUIDITY MANAGEMENT	Independent Variable	ξ Liquidity Coverage Ratio (LCR) ξ Loan Deposit Ratio (LDR) ξ Debt to equity ratio = = ————
Financial performance	Dependent Variable	ξ Return On Asset (ROA) = ————
Firm size	Control Variable	

Source: Researcher's compilation (2025)

1.3.2 Model Specification

The study examines the relationship between financial performance (dependent variable), proxied by return on assets, return on equity, and earnings per share, and liquidity management (independent variable), measured by liquidity coverage ratio, loan-to-deposit ratio, and debt-to-equity ratio, while controlling for financial leverage. It assumes a linear relationship between the dependent and independent variables. Based on the foregoing, the functional form of the model is given as:

ROA = *f* (DER, LDR, LCR, FSZ) ……. (1a)

Where:

ROA = Return on Assets (computed as Total Net Income/Total Asset)
DER = Debt to equity ratio (Total Liabilities/equity)
LCR = Liquidity Coverage Ratio
LDR = Loan to Deposit Ratio (computed as Total Loan/Total Deposit)
FSZ = Firm size as the control variable.
The econometric model is functionally specified and re-stated as:

$$ROA_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 LDR_{it} + \beta_3 LCR_{it} + \beta_4 FSZ_{it} + \mu_{it1} \ldots\ldots\ldots\ldots\ldots (1)$$

Where:
β_0 = Constant parameter/Intercept
$\beta_1 - \beta_3$ = Coefficients of independent variables
μ_1 = Error term/White Noise/Stochastic Variables
Subscript i = 1, 2, …, 14 individual deposit money banks
Subscript *t* = individual time point (2009 – 2023)

1.3.4 Estimation Methods

The study used panel data regression analysis, combining time series data (2009-2023) with cross-sectional data from 12 listed deposit money banks in Nigeria. The analysis employed static panel estimators, including Common Effect (CE), Random Effect (RE), and Fixed Effect (FE) methods. The most efficient estimator was selected using the Fixed Effect test, Breusch-Pagan Lagrange Multiplier (LM) test, and Hausman Test. The estimators differ in their assumptions about cross-sectional heterogeneity: CE assumes homogeneity, while FE and RE assume heterogeneity. An indigeneity test was also conducted, and the analysis was performed using E-views version 12 software.

1.3.5 Post Diagnostic Tests

The post diagnostic tests are residual-based diagnostic tests conducted to ascertain the validity of the panel estimates. Primarily, cross-section dependence (CD) test using the Friedman's test (for $T < N$) and specification bias test was conducted using Ramsey RESET (regression specification error test) test type. For the given test, the null hypotheses of correct specification (*i.e.*, no omitted variables) and no cross-sectional dependence, respectively, are desired for efficient estimates and valid inferences.

1.4 THE 'A PRIORI' EXPECTATIONS

The study's a priori expectation is that liquidity management variables (LCR, LDR, and DER) will have a negative relationship with financial performance indicator (ROA). Mathematically, this is represented as $\beta_1, \beta_2, \beta_3 < 0$ and $\alpha_1, \alpha_2, \alpha_3 < 0$, implying that an increase in liquidity management variables will lead to a decrease in financial performance. Multiple regression analysis was used to examine the

relationships between variables and estimate the influence of each independent variable on the dependent variable.

1.5 RESULTS

Descriptive Analysis

This section provides an overview of the summary statistics for the variables under study, including return on assets (ROA), debt to equity ratio (DER), liquidity coverage ratio (LCR), loan to deposit ratio (LDR), and firm size (FSZ).

Table 2.1-: Summary Statistics
Sample Structure: $N = 12$, $T = 15$ (2009 – 2023)

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
ROA	180	0.457	0.173	0.092	1.217	1.108	6.463
DER	180	1.39	6.890	0.001	78.547	9.906	102.97
LDR	180	0.270	0.215	0.053	0.909	1.512	4.317
LCR	180	0.213	0.061	0.067	0.375	0.128	2.510
FSZ	180	8.782	0.880	6.075	9.711	-0.738	2.661

Source: Researcher's computation, (2025).

The summary statistics in Table 2.1 highlight unique features of the variables. Most variables, excluding DER, show low variability, with standard deviations lower than their means, indicating strong predictive power for financial performance and liquidity management. In contrast, DER exhibits high variability, with a standard deviation of 6.890 exceeding its mean of 1.390, suggesting limited predictive capacity.

The variables' distributions also display varying levels of skewness and kurtosis. All variables except FSZ have positively skewed distributions. Regarding peakedness, ROA, DER, and LDR have leptokurtic distributions (kurtosis > 3), while LCR, and FSZ have platykurtic distributions (kurtosis < 3). These findings offer valuable insights into the variables' behavior and potential predictive power, shedding light on their characteristics and potential applications in financial analysis.

1.5.1 Model Estimation Results

Given the study's data structure, we utilized static panel data estimators, including common effect (CE), random effect (RE), and fixed effect (FE) with the least square dummy variable (LSDV) estimator. Our panel consisted of 12 listed deposit money banks (N=12) over a 15-year period (T=15), spanning 2009 to 2023. Before model estimation, we conducted endogeneity tests using the two-stage least-squares (2SLS) instrumental variable (IV) regression method. The results of these tests for the ROA model are presented in Table 2.2 (see appendix 1 for details).

Table 2.2-: Endogeneity Test Results
Sample: *N* = 12, *T* = 15 (2009 – 2023)

Model	H_0	Durbin Chi2	*p*-value	Wu-Hausman F-stat.	*p*-value
ROA	Exogenous	6.7909	0.0789	2.2437	0.0860
Test of Over-identifying Restriction					
Model	H_0	**Sargan**	*p*-value	**Basmann**	*p*-value
ROA	Valid instruments	0.0086	0.9957	0.0082	0.9959

Source: Research's computation (2025)

The endogeneity test results in Table 2.2 show that both the Durbin chi-square and Wu-Hausman test statistics are insignificant for the ROA model. This suggests that endogeneity is not a concern, meaning the models are free from biases related to omitted variables, measurement errors, or simultaneity. Consequently, the pol icy variables are inherently exogenous. Furthermore, the insignificant over-identifying restriction tests confirm that the instruments used are valid. Overall, the results indicate that the policy variables in the model are exogenous.

Table 2.3 presents the estimates and statistics from the study's model estimation using various estimators. The fixed effect test (F-stat = 4.530, $p < 0.05$) suggests that the Fixed Effect (FE) estimator is more suitable than the Common Effect (CE) estimator. The random effect test (BP-LM stat = 27.580, $p < 0.05$) indicates that the Random Effect (RE) estimator is more efficient than the CE estimator. However, the Hausman test (χ^2 = 329.72, $p < 0.05$) reveals that the FE estimator is more appropriate than the RE estimator. Therefore, the FE estimator is adopted for inferential analysis, suggesting homogeneity among the selected deposit money banks.

Table 2.3-: Panel Model Estimation Results
Panel Structure: *N* = 12, *T* = 15 (2009 – 2023)
Dependent Variable: *ROA*

Estimator:	**FE: LSDV**	**RE**	**CE**
Independent Variables			
Intercept (C)	0.861** (0.0108)	0.405** (0.0398)	0.275** (0.0457)
DER	-0.0037** (0.0379)	-0.0031* (0.0799)	-0.00125 (0.495)
LDR	-0.0358 (0.683)	-0.0665 (0.366)	-0.0939 (0.116)
LCR	-0.346* (0.0927)	-0.387* (0.0552)	-0.406* (0.0530)
FAZ	-0.0358 (0.350)	0.0179 (0.410)	0.0337** (0.0200)
Further Statistics and Tests			
Effect Tests			

CE-FE: Fixed Effect test (F-Stat.)	4.530*** (0.000)	-	-
CE-RE: BP-LM Test (X^2)	-	27.580*** (0.000)	-
RE-FE: Hausman Test (X^2)	-	329.72*** (0.000)	-
Explanatory Power			
R-squared	0.2033	0.1250	0.0742
Adj. R-squared	-	-	0.0531
F-statistic (or Wald Test)	2.390* (0.0526)	109.00*** (0.000)	5.510*** (0.0088)
Diagnostics			
CD Test:			
Friedman's test	6.104 (0.8051)	5.052 (0.7022)	-
Specification test (RESET)	-	-	0.209 (0.7442)

Source: Researcher's computation (2025)

***Note*:** The values in the parentheses **()** are *p*-values of the respective coefficients and statistics while ***, ** & * denote statistical significance at the conventional 1%, 5% and 10% levels of significance, respectively.

1.5.2 Test of Hypothesis 1

According to the Fixed Effect (FE) estimator results in Table 2.3, an increase in debt-to-equity ratio (DER) has a significant and negative impact ($\beta_1 = -0.0037$, $p = 0.0379 < 0.05$) on return on assets (ROA) of the selected deposit money banks in Nigeria. This suggests that ROA responds negatively and significantly to changes in DER. Given the significance of the results, the null hypothesis (H0: $\beta_1 = 0$) is rejected at the 5% level, indicating a statistically significant relationship between DER and ROA.

1.5.3 Test of Hypothesis 2

According to the Fixed Effect (FE) estimator results in Table 2.3, changes in loan-to-deposit ratio (LDR) have a negative but insignificant impact ($\beta_2 = -0.0358$, $p = 0.683 > 0.1$) on return on assets (ROA) of the selected deposit money banks in Nigeria. This suggests that ROA responds negatively but not significantly to LDR. Given the insignificance of the results, the null hypothesis (H_0: $\beta_2 = 0$) is retained at the 10% level, indicating no statistically significant relationship between LDR and ROA.

1.5.4 Test of Hypothesis 3

According to the Fixed Effect (FE) estimator results in Table 2.3, changes in liquidity coverage ratio (LCR) have a negative and weakly significant impact ($\beta_3 = -0.346$, $p = 0.0927 < 0.1$) on return on assets (ROA) of the selected deposit money banks in Nigeria. This suggests that ROA responds negatively and somewhat

significantly to LCR, indicating a mild level of significance. Given the results, the null hypothesis (H_0: $\beta_3 = 0$) is rejected at the 10% level, indicating a statistically significant relationship between LCR and ROA.

Meanwhile, changes in firm size (FSZ) have a negative but insignificant impact ($\beta_4 = -0.0358$, $p = 0.350 > 0.1$) on ROA, suggesting that ROA does not respond significantly to FSZ. Consequently, the null hypothesis for FSZ (H_0: $\beta_4 = 0$) is retained, indicating no statistically significant relationship between firm size and return on assets.

1.5.5 Model Adequacy Evaluation

The post-estimation test, specifically the cross-sectional dependence test, was conducted. According to the Friedman test results in Table 2.3 under the Fixed Effect (FE) estimation method, the null hypothesis of "no cross-sectional dependence" cannot be rejected, given the p-value (0.7022) is above the 0.05 significance level. This indicates that the selected deposit money banks are cross-sectionally independent. As a result, the estimated parameters of the ROA model are valid and reliable for making inferences and informing policy decisions.

1.5.6 Discussion of Findings

This study's empirical findings provide valuable insights into the impact of liquidity management on the financial performance of selected deposit money banks in Nigeria. Notably, the research reveals that an increase in debt-to-equity ratio significantly and negatively affects return on assets (ROA). This implies that banks with higher debt levels compared to equity are likely to experience a decline in asset returns, likely due to increased financial risk and the burden of debt servicing. The negative relationship between debt-to-equity ratio and ROA underscores the importance of maintaining an optimal capital structure to support asset performance.

In contrast, the study finds that the loan-to-deposit ratio has a negative but insignificant impact on ROA. This suggests that although banks may face challenges in generating returns from loans, the effect is not statistically significant. Furthermore, the liquidity coverage ratio is found to have a negative and weakly significant effect on ROA. This implies that holding higher liquidity reserves may lead to a slight reduction in asset returns, potentially due to the opportunity cost associated with holding liquid assets. Overall, these findings highlight the complex relationship between liquidity management and financial performance in the banking sector.

1.6 Conclusion

Based on the findings, the study concludes that liquidity management is a critical determinant of financial performance in Nigerian Deposit Money Banks. Banks

that effectively manage their liquidity are more likely to remain solvent, profitable, and resilient against shocks in the financial system. The research also shows that profitability is not just a function of liquidity adequacy but also of how efficiently banks strike a balance between liquidity and investment in productive assets. The study further concludes that while the regulatory guidelines of the CBN are important in safeguarding financial stability, there is a need for flexibility in liquidity regulations to ensure banks can adapt to market realities. Moreover, the dynamic nature of the Nigerian banking environment, characterized by exchange rate volatility, inflationary pressures, and technological disruptions, requires innovative approaches to liquidity management.

Ultimately, effective liquidity management strengthens not only individual banks but also the overall stability of the Nigerian financial system, thus contributing to economic growth.

1.7 Recommendations

Based on the findings and conclusions, the following recommendations are proposed:

1. Maintain Optimal Liquidity Levels: Deposit Money Banks should strike a balance between solvency and profitability by keeping liquidity at levels that are neither too low nor excessively high. Tools such as liquidity gap analysis and maturity mismatch reviews can help achieve this balance.
2. Strengthening Asset-Liability Management: Banks need to empower their asset-liability management committees to closely monitor and align inflows with outflows. This will help reduce mismatches and minimize the risk of liquidity crises.
3. Encourage Regulatory Flexibility: The Central Bank of Nigeria should consider a more flexible regulatory framework that accommodates banks with strong internal controls and risk management systems, giving them room to optimize profitability without endangering financial stability.
4. Diversify Funding Sources: Banks should broaden their funding base beyond traditional deposits by exploring opportunities in capital markets, securitization, interbank arrangements, and collaborations with financial technology providers.
5. Improve Risk Management Practices: Proactive approaches such as stress testing, scenario analysis, and liquidity forecasting should be adopted to anticipate possible liquidity pressures and create effective responses.
6. Leverage Technology: Investing in digital tools and advanced analytics can enhance real-time liquidity monitoring, forecasting, and reporting. This will enable banks to adapt quickly to changes in the financial environment.

7. Enhance Capacity Building: Regular training and professional development programs should be introduced to build staff expertise in liquidity management and align practices with international standards.

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Appendix I
STATA Empirical Outputs
1. Endogeneity Tests
a. ROA Model

```
. ivregress 2sls roa fsz (der ldr lcr = l3.roa l3.der l3.ldr l2.lcr l2.fsz)

Instrumental variables 2SLS regression          Number of obs   =        144
                                                Wald chi2(4)    =      22.16
                                                Prob > chi2     =     0.0002
                                                R-squared       =          .
                                                Root MSE        =     .15601
------------------------------------------------------------------------------
         roa | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
         der |  -.1524602   .1370787    -1.11   0.266    -.4211295    .1162091
         ldr |  -.1445994   .1169508    -1.24   0.216    -.3738187      .08462
         lcr |   .7804137   1.148223     0.68   0.497    -1.470062    3.030889
         fsz |    .072623    .01758     4.13   0.000     .0381668    .1070792
       _cons |  -.2293044   .3106788    -0.74   0.460    -.8382237     .379615
------------------------------------------------------------------------------
Instrumented: der ldr lcr
 Instruments: fsz L3.roa L3.der L3.ldr L2.lcr L2.fsz

. estat endog

  Tests of endogeneity
  H0: Variables are exogenous

  Durbin (score) chi2(3)          =  6.79093  (p = 0.0789)
  Wu-Hausman F(3,136)             =   2.2437  (p = 0.0860)

. estat overid

  Tests of overidentifying restrictions:

  Sargan (score) chi2(2) =  .008573  (p = 0.9957)
  Basmann chi2(2)        =  .008156  (p = 0.9959)
```

2. Estimation Outputs for ROA model

Common Effect (CE) Model Estimation Output

. reg roa der ldr lcr fsz

```
      Source |       SS           df       MS      Number of obs   =       180
-------------+----------------------------------   F(4, 175)       =      3.51
       Model |  .397148705         4  .099287176   Prob > F        =    0.0088
    Residual |  4.95306924       175  .028303253   R-squared       =    0.0742
-------------+----------------------------------   Adj R-squared   =    0.0531
       Total |  5.35021794       179  .029889486   Root MSE        =    .16824

------------------------------------------------------------------------------
         roa | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         der |  -.0012494   .001828    -0.68   0.495    -.0048572    .0023583
         ldr |  -.0938969   .0593993   -1.58   0.116    -.2111282    .0233343
         lcr |  -.4064546   .2086562   -1.95   0.053    -.8182612    .0053519
         fsz |   .0336576   .0143374    2.35   0.020     .0053611    .0619541
       _cons |   .2754787   .1368904    2.01   0.046     .0053101    .5456474
------------------------------------------------------------------------------
```

. estat ovtest

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of ROA

H0: Model has no omitted variables

F(3, 155) = 0.209
Prob > F = 0.7442

Fixed Effect (FE) Model Estimation Output

```
. xtreg roa der ldr lcr fsz, fe

Fixed-effects (within) regression               Number of obs      =       180
Group variable: bank_id                         Number of groups   =        12

R-squared:                                      Obs per group:
     Within  = 0.0552                                         min =        15
     Between = 0.2033                                         avg =      15.0
     Overall = 0.0001                                         max =        15

                                                F(4,164)           =      2.39
corr(u_i, Xb) = -0.4342                         Prob > F           =    0.0526

------------------------------------------------------------------------------
         roa | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
         der |  -.0036962    .001766    -2.09   0.038    -.0071832   -.0002092
         ldr |    -.03583   .0875938    -0.41   0.683     -.208787    .1371271
         lcr |  -.3461984    .204679    -1.69   0.093    -.7503441    .0579473
         fsz |  -.0358391   .0382142    -0.94   0.350    -.1112943    .0396162
       _cons |   .8606645   .3338895     2.58   0.011     .2013881    1.519941
-------------+----------------------------------------------------------------
     sigma_u |  .10760918
     sigma_e |  .15220809
         rho |  .33325821   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(11, 164) = 4.53                     Prob > F = 0.0000

. est store fe

. xtcsd, friedman


Friedman's test of cross sectional independence =    6.104, Pr = 0.8051
```

Random Effect (RE) Model Estimation Output

```
. xtreg roa der ldr lcr fsz, re

Random-effects GLS regression                   Number of obs     =       180
Group variable: bank_id                         Number of groups  =        12

R-squared:                                      Obs per group:
     Within  = 0.0420                                         min =        15
     Between = 0.1250                                         avg =      15.0
     Overall = 0.0615                                         max =        15

                                                Wald chi2(4)      =      8.93
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0628

------------------------------------------------------------------------------
         roa | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
         der |  -.0030742   .0017556    -1.75   0.080    -.0065152    .0003668
         ldr |  -.0664511   .0734448    -0.90   0.366    -.2104003    .0774982
         lcr |  -.3872333    .201972    -1.92   0.055    -.7830912    .0086245
         fsz |   .0179247   .0217672     0.82   0.410    -.0247383    .0605877
       _cons |   .4046716   .1968169     2.06   0.040     .0189176    .7904256
-------------+----------------------------------------------------------------
     sigma_u |  .06286946
     sigma_e |  .15220809
         rho |  .14574438   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Cross-Sectional Dependence Tests

```
. est store re

. xtcsd, friedman
Friedman's test of cross sectional independence =    5.052, Pr = 0.7022
```

Breusch-Pagan Test

```
. xttest0
Breusch and Pagan Lagrangian multiplier test for random effects

        roa[bank_id,t] = Xb + u[bank_id] + e[bank_id,t]
```

Estimated results:

	Var	SD = sqrt(Var)
roa	.0298895	.1728858
e	.0231673	.1522081
u	.0039526	.0628695

Test: Var(u) = 0

chibar2(01) = 27.58

Prob > chibar2 = 0.0000

Hausman Test

. hausman fe re

Test of H0: Difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 329.72

Prob > chi2 = 0.0000