LIQUIDITY, CASH RATIO, AND NET INTEREST MARGIN NEXUS AND THEIR EFFECTS ON DEPOSIT MONEY BANKS' PERFORMANCE IN NIGERIA

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ABSTRACT:

This study analysed the effects of monetary policy tools - liquidity ratio and cash reserve ratio (CRR) - on the performance of deposit money banks in Nigeria from 2012 to 2021. Using ex-post facto design and secondary data from Central Bank of Nigeria, the research found that while changes in the liquidity ratio did not significantly affect net interest margin (NIM), an increase in the CRR positively impacted net profit margin. These findings support Central Bank's use of CRR to control liquidity. It is recommended that the Central Bank maintain its cash reserve policy and that banks reduce their excess liquidity holdings, as these yield lower returns.

Keywords: *Cash, Liquidity, monetary policy, net interest margin,*

INTRODUCTION

Monetary policy is a key tool for achieving a government's macroeconomic objectives, typically managed by Central Banks. Over time, the role of Central Banks has expanded to include regulating banks due to increased knowledge of policy, financial crisis reforms, and demands from economic agents (Kusi et al., 2019). Central Banks can influence the money supply, credit availability, liquidity, and interest rates through effective use of monetary policy instruments (Ehimare et al., 2015). These instruments will regulate the volume, cost, and direction of money and credit to meet broad economic objectives (Gimba et al., 2020; Okpara, 2010).

In developing economies, including Nigeria, inflation targeting is a key focus for central banks, as noted in the 2022/2023 guidelines (CBN, 2022). The effectiveness of this approach depends on the Central Bank's credibility and how quickly the market adjusts to inflation expectations.

Monetary policy instruments can be categorised into direct control measures (such as reserve requirements and interest rates) and market-based tools (like open market operations and moral suasion). A combination of these instruments is used to manage the money supply in line with government objectives. While ensuring price stability is essential, it's also crucial to consider impact of these policies on banks' profitability to maintain sustainability and achieve financial goals.

How well the deposit money banks grow in any economy will depend on the maturity and independence of the monetary authority, and by extension, the monetary policy measures adopted and implemented in such an economy. While the monetary policy measures aim to manage macroeconomic variables to achieve stability, sometimes, these measures are contrary to the aspirations of market participants, such as deposit money banks. Despite some growth witnessed in before tax of top-tier deposit money banks in Nigeria in the last decade from 2012 to 2021, there appears to be a less than commensurate increase in total loan stock within the same period.

However, macroeconomic headwinds occasioned by rising inflation have affected businesses in recent years and were further exacerbated by the COVID-19 pandemic, which led to loan restructuring for households and businesses (Awojulugbe, 2020). Despite the lower loan stock in the banks, it was curious that the profits declared by the banks are rising within the corresponding period, indicating that there are other sources of revenue to the banks other than from basic financial intermediation.

This research aims to reveal the extent to which specific monetary policy measures explain the fluctuations in the performance of deposit money banks from the Bankers' point of view. This research will use an appropriate internal measure of performance that will directly speak to intermediation activities of banks, such as Net Interest Margin as opposed to Net Profit Margin, Profit before and after tax, or loan stocks, as in previous studies carried out in Nigeria.

The influence of monetary policy instruments deployed by the Central Bank of Nigeria (CBN) on the operational efficiency and financial performance of deposit money banks in the country was examined in this study. Central to this examination is NIM, which effectively captures the intersection point of financial intermediation — representing both income generation and cost of funds management. By evaluating NIM, the study aims to shed light on how monetary strategies shape the sustainability and profitability of banks within Nigeria's evolving financial landscape.

In greater detail, the study examined two key monetary policy variables**:**

- First, it aims to explore the nexus between the liquidity ratio and the net interest margin, assessing how variations in this ratio directly or indirectly influence NIM and, consequently, overall bank performance. Since liquidity management affects a bank's ability to lend and invest profitably, this aspect is critical in understanding the efficiency of policy transmission.
- Second, it seeks to analyse cash reserve ratio (CRR) and bank income relationship as measured by net interest margin. The CRR, being a tool of monetary tightening or easing, plays a pivotal role in the volume of funds banks can deploy for interest-bearing activities, thereby shaping income streams.

This research will analyse the period from 2012 to 2021 concerning the impact of selected monetary policy measures on revenue from intermediation, as represented by Net Interests, in five banks: Access, Zenith, United Bank for Africa, First Bank of Nigeria, and Guarantee Trust Bank..The financial dominance of FUGAZ banks - First Bank of Nigeria, UBA, GTCO, Access Bank, and Zenith Bank - is well documented in *The Whistler's* analysis of Nigeria's banking sector. According to The Whistler's April 2024 report, these tier-one banks collectively grew their assets from ₦55.16 trillion in 2022 to ₦94.22 trillion in 2023, marking a 70.7% increase.

LITERATURE REVIEW

Central Banks use monetary policy to manage the money supply, aiming for economic growth, price stability, and balance of payments. In Nigeria, the Central Bank primarily focuses on achieving internal and external balance, with an emphasis that has shifted over time from direct controls before 1986 to market mechanisms thereafter.

As stated in the 2020 Monetary Policy report, the key objectives include supporting output growth while ensuring stable prices, managing inflation, exchange rates, and interest rates. Over the years, promoting price stability, stimulating economic growth, and stabilising the naira have remained consistent.

Ultimately, the success of monetary policy lies in fostering economic development, requiring a balance between government priorities for growth and the needs of deposit banks for wealth maximisation to achieve synergy.

Monetary Policy Implementation and Banking Performance in Nigeria

The Central Bank of Nigeria (CBN) is the main monetary authority, tasked with promoting trade balance, price stability, and developing a reliable financial system to implement effective monetary policies and ensure systemic surveillance. Established under the 1958 CBN Act, its key functions include:

1. Issuing currency notes and coins.

2. Maintaining Nigeria's external reserves.

3. Managing exchange rates to defend the currency's international value.

4. Promoting an efficient financial system as the lender of last resort.

5. Ensuring monetary stability through policy measures.

6. The banker and financial advisor to the Federal Government.

These functions can be divided into developmental and financial stability roles. In 2022/2023, the monetary policy focuses on maintaining price and financial system stability that supports inclusive growth. This policy is used alongside other government economic policies to address issues like excess liquidity and foreign exchange stability, particularly relevant in a developing economy like Nigeria. In contrast, industrialised economies often use monetary policy to combat liquidity shortages and inflationary pressures.

Conceptual Review

Bank Performance

Researchers have explored various parameters to assess banks' performance, with different findings on the impact of independent monetary policy variables. Financial performance is crucial for the health and survival of businesses, as higher performance indicates better resource management, contributing to economic development (Naser & Mokhtar, 2004). Omankhanlen *et al (*2021) used profitability as a performance proxy, defining bank profitability as earnings from services and products when revenue exceeds expenses. Udeh (2015) measured performance using net profit before tax, while Gimba et al. (2020) used net profit margin, and Dheza et al. (2022) focused on net interest income, calculated as interest income minus interest expenses divided by average earning assets, which is favoured as a measure of banking profitability because it reflects the core functions of financial intermediation (Dheza et al., 2022; Kusi et al., 2020).

Liquidity Ratio

The banks must maintain a portion of depositors' funds in liquid assets to accommodate short-term withdrawal requests and uphold confidence in the banking system (Olweny & Chiluwe, 2012).

Liquidity is the ability to convert short-term investments into cash for obligations. Effective liquidity management optimises current assets like Cash, Marketable Securities, and Receivables.

Nigeria’s Central Bank mandates a liquidity ratio of 30% for banks, which is reviewed during monetary policy meetings. Banks operating below this rate risk being unable to meet short-term obligations, potentially leading to panic withdrawals (Omankhanlen et al., 2021).

Cash Reserve Ratio

The Cash Reserve Ratio is the proportion of total deposit liabilities which the deposit money banks are expected to keep as cash with the Central Bank of Nigeria (Udeh, 2015). This is one of the most powerful instruments of monetary control, as a change in the required ratio directly impacts the extent to which the banking system will expand loans and advances. An increasein the reserve ratio will likely reduce the liquidity position of the banking system, and the interest rate will likewise rise.

Theoretical Review

Monetary policy and economic growth have been the focus of numerous studies, especially since the 1960s. James Tobin demonstrated that future consumption derives from current income saved, influencing portfolio shifts from money to real capital as inflation rises, which boosts capital stock and output over time. Tobin contested the notion of money's super-neutrality by highlighting its dual role as an asset and a store of wealth. However, in the past fifty years, newer theories have challenged his findings.

In the 1960s, Milton Friedman and his colleagues emphasised the significant impact of money on economic activity, prompting researchers to better understand how monetary policy affects aggregate demand (Mishkin, 2018).

Theoretically, monetary policy is a critical factor that shapes banking profitability (Campmas, 2020) and is concerned with the measures that impact the money supply, thereby influencing the movement in economic growth and price stability. Therefore, financial intermediation theory (or dealership theory) recognises banks as profit-maximising economic agents who seek to profit from the financial intermediation process. Some other theories of money are stated below:

- Quantity Theory of Money
- The Keynesian Theory:
- The Liquidity Preference Theory
- Anticipated Income Theory
- Liability Management Theory
- Shiftability Theory

Empirical Review

Awdeh (2019) studied how monetary policy impacts economic growth in Lebanon. The study noted that the central bank of Lebanon adopted exchange rate targeting in 1994 and exploited other variables, such as interest rate, to stimulate foreign financial inflows. Using cointegration analysis and the Vector Error Correction (VEC) model to analyse monthly data covering January 2002-June 2017, showed that economic growth was depressed by such measures in the long run. The study concluded that, regardless of the importance of the balance, financial inflows may moderate economic growth in both the short and long run Chima et al. (2020) assessed unconventional monetary policies in Nigeria (2007–2017). Using panel regression, they found these unorthodox measures negatively affected deposit money banks' performance, especially regarding deposit insurance coverage.

Omankhanlen et al. (2020) analysed how interest rate, liquidity ratio, and money supply - used as monetary policy indicators - related to bank profitability in Nigeria. Their results showed a positive long-run impact from liquidity ratio and money supply, and a negative one from interest rates.

Guler (2021) found that when monetary policy measures are credible and there is integrity in the posturing of the monetary authority issuing the measures and regulations, inflation targeting objectives can be better managed. This presupposes that when the market participants have faith in the ability of the monetary authorities to pursue measures described in their monetary policy documents, they tend to take action that will result in the eventual actualisation of such objectives. The study was on six emerging inflation-targeting economies of Turkey, Brazil, the Czech Republic, Chile, Poland, and South Africa to analyse how inflation expectation in emerging economies impacts the behaviour of participants.

Dheza et al. (2022) used data from 29 Ghanaian banks (2006–2016) to study policy impacts. Results showed short-term rate hikes reduced profitability through tighter lending, while lower basis points and average rates improved long-term bank performance by encouraging loan growth.

Eke et. al (2024) carried out a study on the effect of net interest margin on the financial performance of deposit money banks in Nigeria. Their study employed an estimated technique that involved the use of descriptive statistics and Ordinary Least Squares (OLS) regression. The study established that net interest margin is statistically significant and has a positive effect on operating income (OI). The researchers suggested that Banks should monitor and manage the duration gap between assets and liabilities, considering potential interest rate changes and the bank's risk appetite.

METHODS

Data from the Central Bank of Nigeria's annual statistical bulletin informed the analysis of this study, while the Net Interest Margin, the dependent variable, was derived from the annual reports of five sampled banks.

Research Design

This research used an ex-post facto design, utilising secondary data from the Central Bank of Nigeria Statistical Bulletin and annual accounts of selected banks from 2012 to 2021. The nature of the data allows for a panel data strategy, which provides more valid results than traditional cross-sectional time series techniques (Baltagi, 2015). Panel methods can control for omitted variables and address both long and short-run effects, overcoming the main weaknesses that cross-sectional and time series have (Imbens & Wooldridge, 2019).

Methods of Data Analysis

The data analysis for this research utilised a panel unit root test to determine if a time series variable is non-stationary and has a unit root. A unit root can introduce bias due to the stochastic nature of the data. The panel Autoregressive Distributed Lag Models (ARDL) will be employed to examine the long and short-run effects of one variable on others, effectively addressing collinearity issues. The Panel ARDL method, which is the theoretically driven approach, is useful for estimating both short-term and long-term effects of a time series on another. The Vector Error Correction Method (ECM) will also be used because it directly estimates the speed at which a dependent variable returns to equilibrium after a change in other variables.

Model Specifications

Below is the multiple regression model formulated to analyse the variables and draw inferences from the dataset

$NIM = \beta 0it + \beta 1\ (LQR)it + \beta 2\ (CRR)it + \mu it$ Where:

NIM (dependent variable), = is the difference between the interest paid and interest received divided by average assets.

$\beta 0$ = Constant term, which represents when all explanatory variables are held constant $\beta 1$ = Coefficient of the parameter estimates

LQR = Liquidity ratio measured as the proportion of total deposits to be kept in specified liquid assets.

CRR = Proportion of total deposit liabilities which the bank is expected to keep as cash with the Central Bank of Nigeria.

μ = Error term

From the above model, Net Interest (NI) is the dependent variable, while the monetary or independent variable includes Liquidity Ratio and Cash Reserve Requirements (CRR).

Sources of Data/Variables

This research used Central Bank of Nigeria Statistical Bulletin data for monetary policy measures (Liquidity ratio and Cash Reserve Requirement) and annual reports from five banks (Access, Zenith, UBA, First Bank, and GTBank) for the Net Interest Margin.

Estimation Technique

The dependent variable and independent variables nexus in this study were analysed using multiple regression. This method assesses the strength of relationships and models future interactions. Given the accuracy of secondary data collation across the banking industry, the research focuses on estimating their relationships using the Panel Unit Root Test, Panel Co-Integration with the Pedroni test, and the Generalised Method of Moments (GMM) estimation.

DISCUSSION OF RESULTS

Data Presentation and Analysis

The research utilised the panel unit root test to assess the non-stationarity of time series data. Multiple regression analysis evaluated the relationships between Net Interest Margin (dependent variable) and two independent variables: Liquidity Ratio and Cash Reserve Requirement. This approach aimed to model future interactions using secondary data from the banking industry, ensuring significant accuracy. Key methods included the Unit Root Test, Panel Co-Integration with the Pedroni test, and the Generalised Method of Moments (GMM).

Discussion of Results

This study summarises the statistics, conducts Unit Root testing and Co-integration, and employs the Generalised Moment Method for estimation. We analyse the results of each test, comparing theoretical expectations with empirical outcomes.

Table of Summary Statistics

	NIM	LQR	CRR
Mean	10.65000	57.53500	20.90000
Median	10.50000	52.25500	22.50000
Maximum	18.00000	104.2000	27.50000
Minimum	3.000000	38.27000	12.00000
Std. Dev.	3.445919	18.34438	5.138093
Skewness	0.178945	1.496873	-0.627931
Kurtosis	2.657777	4.630395	2.470905
Probability	0.815189	0.000062	0.212756
Sum	426.0000	2301.400	836.0000
Sum Sq. Dev.	463.1000	13124.13	1029.600
Observations	40	40	40

Source: *Researcher's computation with E-view, 2023.*

The Table of Summary Statistics above presents summary statistics for deposit money banks' liquidity and cash reserve ratios, with means of 57.54% and 20.0%, respectively. The liquidity ratio showed a

maximum growth of 104.2% and a minimum of 38.27%, with a standard deviation of 18.34, indicating substantial variation. Most variables were positively skewed, while the liquidity and cash reserve ratios were exceptions. Generally, macroeconomic monetary policies clustered around their means, with significant distributions except for the liquidity ratio, which had a kurtosis slightly above 3.0.

Table of Panel: Unit Root Results

Variable	LLC	IPS	ADF-Fisher	PP-Fisher	Remark
NIM	-3.45899***	-1.32527	13.4172	13.5401	Stationary
LQR	-1.46505*	-0.03667	6.01709	6.01709	Stationary
CRR	-1.74630	0.29710	4.61661	4.82369	Non-Stationary

Source: *Researcher's computation with E-view, 2023.* "***, **, * Denotes stationarity at 1%, 5% and 10% respectively

It could be noted that although the liquidity ratio was stationary at 10 per cent, these variables were further subjected to the first differential test to attain a stationary level at 5 per cent, as shown in the Table of Panel: stationarity test at first difference

Table of Panel: stationarity test at first difference

Variable	LLC	IPS	ADF-Fisher	PP-Fisher	Remark
Stationarity @ First Difference					
LQR	-5.86382***	-2.34538***	21.1374***	24.4223***	Stationary
CRR	-7.41126***	-3.84102***	31.3284***	31.3284***	Stationary

Source: *Researcher's computation with E-view, 2023.* "**,**. * Denotes stationarity at 1%, 5% and 10% respectively

The unit root tests applied included Levin Lin & Chu t* (LLC), Im, Pesaran and Shin W- stat (IPS), ADF - Fisher Chi-square, and PP - Fisher Chi-square. While the LLC test assumes a common unit root, the others consider individual processes. Results showed that all variables were non-stationary at level, except for net interest margin and cash reserve ratio. First differencing was used to achieve stationarity for all variables before proceeding with co-integration and generalised moment estimation.

Table of Panel Cointegration Test

Pedroni Residual Cointegration Test Series: NIM LQR PLR LDR CRR
Alternative hypothesis: common AR coefs. (Within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.979556	0.8363	-0.866644	0.8069
Panel rho-Statistic	1.057663	0.8549	1.003988	0.8423
Panel PP-Statistic	-4.478192	0.0000	-4.728294	0.0000
Panel ADF-Statistic	-3.811326	0.0001	-4.006351	0.0000

Alternative hypothesis: individual AR coefs. (Between dimension)

Statistic	**Prob.**
Group rho-Statistic	1.967877 0.9755
Group PP-Statistic	-5.310583 0.0000
Group ADF-Statistic	-3.998341 0.0000

Source: *Researcher's computation with E-view, 2023*

The Pedroni residual panel co-integration test results above indicated a significant long-run nexus between net interest margin and monetary policy measures, with the panel PP-statistic showing a weighted statistic of -4.728 (p-value < 0.05) and the panel ADF-statistic at -4006 (p-value < 0.05). The co-integration test

considered both a common autoregressive coefficient among banks and individual coefficients to address the group's heterogeneity.

Table of Panel Generalised Moment Result

Dependent Variable: NIM
Method: Panel GMM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LQR	0.017327	0.014698	1.178856	0.2500
CRR	0.391151	0.118580	3.298615	0.0030
C	-19.65787	11.09417	-1.771910	0.0891

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.641054	Mean dependent var	6.677582
Adjusted R-squared	0.536361	S.D. dependent var	3.841088
S.E. of regression	1.402439	Sum squared resid	47.20406
Durbin-Watson stat	2.017753	J-statistic	1.601374
Instrument rank	9	Prob (J-statistic)	0.205709

Source: *Researcher's computation with E-view, 2023.*

The GMM method for panel data estimation was used to address endogeneity issues arising from heterogeneous group-specific effects. The results indicate that the liquidity ratio led to a 0.017 percentage increase in the net interest margin (NIM) of deposit money banks, although this was not significant. In contrast, cash reserve ratio (CRR) showed a significant positive relationship with NIM (CRR=0.392; P-value<0.05), with a 1% increase in CRR resulting in a 0.391% rise in NIM, challenging the notion that higher CRR limits banks' cash for intermediation.

To address endogeneity bias, the study applied GMM using lagged differenced endogenous and exogenous variables. The J-statistic (1.601; $p > 0.05$) confirmed the instruments were effective in correcting this bias in estimating net interest margins for deposit money banks. The R-square value (0.641) indicated that 64.1% of variations in net interest margin were explained by the model, with an adjusted R-square of 53.6% showing good model fit. A Durbin-Watson statistic of 2.02 pointed to no serial autocorrelation, and the Jarque-Bera test (0.211; $p > 0.05$) confirmed normality in residuals.

Implications of Findings

The Liability Management Theory, discussed in chapter two, emphasises maintaining a balanced position of assets and liabilities to enhance profits and minimise the risk of loss from delayed payments.

It suggests that banks can meet liquidity needs and short-term profit opportunities by issuing money market instruments like certificates of deposit (CDs) instead of needing to hold liquid assets or rely solely on self-liquidating loans, as they can borrow reserve money from the market. By holding minimal liability, the usually huge AMCON charges are minimised and, in turn, improve profitability.

The research found that the liquidity ratio had an insignificant effect on the Net Interest Margin, indicating that building liquidity by deposit money banks—despite AMCON charges and insurance—yields minimal returns (0.017 per cent). This may clarify why FinTech companies that facilitate fund transfers are highly profitable.

The study suggests that deposit money banks should explore alternative funding strategies and manage liquidity more effectively without maintaining large, low-return cash reserves.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study analysed the impact of monetary policy variables-liquidity, cash ratio and net interest margin nexus on the performance of deposit money banks from 2012 to 2021. Stationarity was confirmed using four statistical tests, indicating that the panel data series were stationary at 5 per cent for net interest margin (NIM) and cash reserve ratio (CRR). The Pedroni cointegration test rejected the null hypothesis of no cointegration, suggesting a significant long-run relationship between NIM and monetary policy measures. The generalised method of moments revealed that the cash reserve ratio is the most influential factor affecting the profitability of deposit money banks through NIM.

Findings indicate a significant positive relationship between deposit money banks' cash reserve ratio and profitability through net interest margin, contrary to expectations. This suggests that banks seek alternative avenues for profit maximisation rather than solely relying on their intermediary roles. While the liquidity ratio also shows a positive relationship with profitability, it lacks significance, highlighting the need for Nigerian banks to enhance their liquidity management and innovate to improve their net interest margins and overall profitability.

CONCLUSION

This study supports previous findings that increases in the Liquidity ratio and loan-to-deposit ratio can positively influence the Net Interest Margin (NIM) of banks, though this relationship was not significant. The conclusions for the tested hypotheses are as follows:

Ho_1: The liquidity ratio has no significant relationship with NIM in Nigerian deposit money banks, validating the null hypothesis. This suggests banks should avoid excessive liquidity.

Ho_2: The cash reserve ratio (CRR) has a positive effect on NIM in these banks.

RECOMMENDATIONS

The coefficient for the cash reserve ratio (CRR = 0.392; $p < 0.05$) shows a significant positive effect on net interest margin (NIM), indicating that a 1% increase in CRR raises NIM by 0.391%. This supports the CBN's policy of using increased CRR and special non-tradeable bills to boost bank liquidity without direct funding. A 1% rise in liquidity ratio increases NIM by 0.017%, though the effect is not statistically significant. Banks should consider alternative funding to minimise high liquidity costs, like AMCON and insurance. The CBN is advised to adopt flexible liquidity ratios based on individual bank risk profiles.

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