(REVIEW ARTICLE)

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Capital adequacy and financial stability: A study of Nigerian banks' resilience in a volatile economy

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Abstract

This study investigated the relationship between capital adequacy and financial stability in Nigerian banks within a volatile economic environment. The research stemmed from the challenges of inadequate bank deposits, largely due to Nigeria's large unbanked population and limited access to formal financial services. This situation undermined banks' ability to accumulate capital and lend effectively, hampering economic growth. The study aimed to evaluate how capital adequacy ratio (CAR) influences the financial stability of banks, with a focus on the impact of monetary policy and capital regulation. Using an ex-post facto research design, secondary data from 2005 to 2020 were collected from NDIC reports, CBN bulletins, and financial journals. The Ordinary Least Squares (OLS) method was employed to analyze variables such as return on assets (ROA), return on equity (ROE), non-performing loans (NPL), firm size, CAR, and loans and advances (LA). Findings revealed that CAR and firm size positively influenced bank stability, while NPL and LA negatively impacted it. Monetary policy and capital regulation played significant roles in determining financial stability. The study concluded that improving capital adequacy and firm size enhances bank resilience, while tighter regulation of non-performing loans and effective monetary policies could mitigate financial instability. Recommendations include strengthening risk management frameworks, aligning with Basel III standards, and improving credit monitoring. This study contributes to existing knowledge by identifying new determinants affecting capital adequacy and financial stability, with suggestions for further research on regulatory reforms and their long-term effects on bank profitability.

Keywords: Capital Adequacy; Financial Stability; Nigerian Banks' Resilience; Volatile Economy

1. Introduction

Banks play a pivotal role in the financial system, particularly in facilitating credit accessibility and managing deposits. These institutions are essential for many borrowers, particularly those who cannot access credit markets without bank loans. In various economies, including Nigeria, banks' financial stability is significantly influenced by monetary policy, which directly impacts both bank assets (such as loans) and liabilities (such as deposits). One critical function of monetary policy is its ability to shift the supply of deposits and bank loans (Abiad and Mody, 2015). For example, an expansionary monetary policy that increases bank reserves and deposits (capital) boosts the availability of loans, leading to higher borrowing and investment.

This is particularly relevant in Nigeria, where Small and Medium Enterprises (SMEs), which contribute over 84% of jobs and 48.5% of the GDP (according to the Ministry of Industry, Trade, and Investment), rely heavily on bank loans to finance their operations. Increased loan availability leads to greater investment, which in turn raises aggregate demand (Y) and stimulates economic growth (Razavi, *et al,* 2023a; Obot, 2023; Adah, 2018). Thus, the role of banks in driving productive investment through lending cannot be overemphasized.

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However, the stability of banks' balance sheets is critical to maintaining this lending activity. A deterioration in banks' balance sheets—caused by factors like higher reserve ratios or an increase in interest rates—can severely constrain their capital, reducing their ability to extend loans (Razavi *et al*, 2023b, Razavi *et al*, 2019). This reduction in lending can dampen investment spending, thereby slowing economic activity. If such deterioration becomes severe, it can trigger a wave of bank failures, spreading fear and panic throughout the financial system, which could even lead to the collapse of otherwise healthy banks. Such crises often result in a loss of financial intermediation, where borrowers lose access to crucial credit markets, thereby exacerbating economic contractions.

A key concern in this context is the substantial unbanked population in Nigeria. As of 2020, approximately 56% of Nigerian adults were unbanked, highlighting a significant challenge in accessing formal financial services. Limited financial literacy and inadequate financial infrastructure contribute to this issue, making it difficult for banks to mobilize deposits effectively. In response, the Central Bank of Nigeria (CBN) has launched initiatives such as Payment Service Banks (PSBs) and the Shared Agent Network Expansion Facilities project to improve financial inclusion. These measures according to Olawale and Obinna (2023a) aim to bring millions of unbanked Nigerians into the formal financial system, thereby increasing deposit mobilization and promoting financial stability.

Despite these efforts, bank stability remains a critical regulatory objective, as evidenced by the CBN's capital adequacy guidelines. Banks are required to maintain a minimum regulatory capital adequacy ratio (CAR) of 10% or 15%, depending on their size and license, to ensure that they can withstand risks and continue to lend (Adeyemi, 2018; Olawale and Obinna, 2023b). This requirement reflects the crucial role of banks in maintaining financial stability through effective risk management and ensuring that capital levels align with their risk profiles.

The discussion of banking stability is further linked to the broader economic impact of monetary policy transmission. As argued by scholars like Schumpeter (2004) and Hicks (2019), banks play a dual role in credit allocation and capital accumulation, both of which are essential for economic growth. Efficient financial intermediation by banks encourages investment, enhances productivity, and drives economic development (Razavi *et al*, 2023a). The literature on monetary policy transmission mechanisms, such as Mishkin (2016) and Ramey (2023), highlights the importance of the interest rate and credit channels in influencing real economic activity. The bank lending channel, in particular, underscores the critical role of banks in transmitting monetary policy through loan supply, further emphasizing the need for financial stability.

1.1. Statement of the Problem

This study addresses the challenges of monetary transmission mechanisms in relation to bank capital and financial stability in Nigeria. A major issue is the inadequacy of bank deposits, which form a significant portion of bank capital. In Nigeria, the deposit base of commercial banks has been limited due to the large unbanked population and a lack of access to formal financial services. This problem is exacerbated by the limited financial inclusion in the country, with over 56% of Nigerian adults unbanked as of 2020. The inability of the banking system to effectively mobilize deposits from the majority of the population undermines the potential for capital accumulation and weakens banks' capacity to lend, which is crucial for economic growth.

To address this problem, the study will examine the impact of capital adequacy on the financial stability of Nigerian banks. It will explore the extent to which monetary policy influences bank capital adequacy and how this, in turn, affects overall financial stability. Additionally, the study will evaluate the effectiveness of capital regulation in safeguarding bank stability, particularly in the context of Nigeria's emerging economy.

1.2. Research Objectives

The main objective of this study is to evaluate the impact of capital adequacy ratio on the financial stability of banks in Nigeria. However, the specific objectives are:

- To investigate the impacts of bank capital adequacy on financial stability in Nigeria.
- To determine the effects of monetary policy on bank capital adequacy in Nigeria.
- To evaluate the effects of monetary policy on banks' financial stability in Nigeria.
- To assess the impact of capital regulation on financial stability in Nigerian banks.

2. Literature Review

This section examines relevant empirical studies on the relationship between capital adequacy ratios and bank financial stability, particularly in Nigeria. The literature covers various subtopics, including bank capital adequacy and financial stability, the role of monetary policy on capital adequacy and financial stability, and the impact of capital regulation on bank stability.

2.1. Bank Capital Adequacy and Financial Stability in Nigeria

Bank capital adequacy is critical to the financial stability of any banking system. Adequate capital acts as a buffer to absorb shocks that may arise from financial crises, reducing the likelihood of systemic collapse. Financial stability refers to a banking system's ability to maintain its operations without experiencing adverse effects due to shocks or economic stress. Capital adequacy, as prescribed by the Basel accords, mandates a certain percentage of banks' assets to be held as capital to mitigate risks, such as credit risk, operational risk, and market risk (BIS, 2022). In Nigeria, the Central Bank of Nigeria (CBN) mandates a minimum capital adequacy ratio (CAR) of 15% for banks with international licenses and 10% for banks operating locally (CBN, 2022).

Akinsola and Ikhide (2017) explored the role of capital adequacy in the South African banking sector and found that stringent capital requirements tend to amplify the business cycle, particularly during periods of economic contraction. Although this study is regionally focused on South Africa, it offers insights into the Nigerian banking context, where stringent capital adequacy requirements have been imposed to mitigate the vulnerabilities experienced during the global financial crisis of 2008. Onaolapo and Olufemi (2012) conducted a study of Nigerian banks and found mixed results regarding capital adequacy's influence on bank performance. While their results indicated that capital adequacy does not significantly affect profitability, it does influence other financial metrics like total assets and earnings per share. This suggests that while capital adequacy might not directly drive profitability, it plays an essential role in safeguarding financial stability by enhancing banks' ability to absorb losses.

Further, Igbinosa and Naimo (2020) highlighted that financial stability depends heavily on capital adequacy. They argue that well-capitalized banks are better positioned to withstand financial stress, thereby contributing to overall financial stability. Financial instability, particularly in developing economies like Nigeria, often stems from weak capital structures. Banks that are undercapitalized tend to be more vulnerable to liquidity risks, solvency issues, and eventual bank failure (Owolabi, 2017a). With Nigeria's banking sector having experienced significant challenges in the past, such as bank failures and a liquidity crunch, maintaining an adequate capital buffer remains imperative for long-term stability.

Furthermore, Ekundayo (2019) argued that capital adequacy is crucial for banks in financing long-term assets and projects, contributing to economic growth. This aligns with the principle that strong capital reserves provide a cushion against unexpected losses, helping banks maintain financial intermediation even during times of economic downturn. Therefore, capital adequacy in the Nigerian banking sector plays a vital role in not only mitigating risks but also promoting economic stability and growth.

2.2. Monetary Policy and Bank Capital Adequacy in Nigeria

Monetary policy significantly influences the capital adequacy of banks in Nigeria. Through monetary policies such as interest rate adjustments, reserve requirements, and liquidity management, the Central Bank of Nigeria (CBN) directly impacts the level of capital that banks must hold to remain solvent. The Basel III framework emphasizes the importance of capital adequacy ratios (CAR), requiring banks to hold a certain percentage of their assets as capital to mitigate risks (BIS, 2022). In Nigeria, the CBN enforces these capital adequacy standards, setting a 15% minimum CAR for international banks and 10% for domestic ones (CBN, 2022). Monetary policy tools can either enhance or impair a bank's ability to maintain these ratios.

Monetary policy decisions, particularly in terms of liquidity and reserve requirements, play a key role in determining how much capital banks are able to hold. For instance, the introduction of a higher reserve requirement by the CBN in recent years has increased banks' liquidity obligations, compelling them to either raise more capital or reduce their lending capacity (Owolabi, 2017b). This regulatory environment makes it crucial for banks to strike a balance between maintaining adequate capital and ensuring profitability. In their analysis of Bosnian banks, Dreca (2013) found that capital adequacy ratios are influenced by various factors such as loan volume, the return on assets (ROA), and the structure of bank deposits. While these findings are specific to Bosnia, the principles remain relevant to the Nigerian context.

In Nigeria, Buyuksalvarc and Abdioglu (2012) investigated the relationship between monetary policy and capital adequacy, concluding that the loan-to-asset ratio, ROE, and leverage negatively impacted capital adequacy ratios. Their findings underscore the importance of managing lending and leverage in maintaining regulatory capital standards. Additionally, the research revealed that liquidity and profitability were positively correlated with higher CAR levels, emphasizing the need for banks to maintain strong liquidity positions in order to meet capital adequacy requirements.

Furthermore, Alsabbagh (2014) explored how capital adequacy is shaped by ROA and the risky assets ratio in Jordanian banks, offering parallels to the Nigerian banking landscape. He found that banks with higher returns on assets are more likely to meet capital adequacy requirements, as they can absorb risks more effectively. However, banks with high risky assets-to-total assets ratios are more likely to struggle with capital adequacy, as these risks erode capital buffers. Similar dynamics can be observed in Nigeria, where the banking sector's exposure to non-performing loans and volatile foreign exchange rates has affected capital adequacy levels. Overall, monetary policy serves as a critical tool for influencing bank capital adequacy in Nigeria. Regulatory measures such as reserve requirements and interest rate adjustments not only affect liquidity but also compel banks to maintain sufficient capital buffers to ensure financial stability. By shaping the broader economic environment in which banks operate, the CBN's monetary policy decisions have a direct and significant impact on banks' ability to meet capital adequacy requirements.

2.3. Monetary Policy and Bank Financial Stability in Nigeria

Monetary policy plays a crucial role in shaping the financial stability of Nigeria's banking sector. Through various instruments such as interest rates, reserve requirements, and open market operations, the Central Bank of Nigeria (CBN) influences liquidity levels, credit availability, and overall economic stability. Financial stability refers to a banking system's ability to function smoothly without experiencing systemic risks or disruptions. A well-crafted monetary policy can help reduce financial instability by ensuring that banks maintain adequate capital buffers, manage liquidity risks, and limit exposure to volatile financial markets.

Olaoluwa and Shomade (2017) examined the relationship between monetary policy and bank financial stability in Nigeria, finding that interest rates, deposit volume, and reserve requirements are the most significant determinants of financial stability. Their study, which covered Nigerian banks between 1980 and 2014, concluded that lower interest rates generally improve bank lending and profitability, thus contributing to financial stability. However, they also noted that excessive lending during periods of low interest rates could lead to asset bubbles and increased systemic risk, particularly when banks fail to maintain adequate capital reserves.

Ngakosso (2016) conducted a comparative study on monetary policy and financial stability in Central African banks, providing relevant insights into the Nigerian context. He found that while monetary policy plays an essential role in managing liquidity and credit risks, macroprudential policies are equally important in maintaining long-term stability. These findings underscore the need for Nigeria's banking sector to adopt a comprehensive approach that combines both monetary and macroprudential policies to mitigate systemic risks and enhance stability. Similarly, Osinubi (2013) emphasized the importance of macroeconomic stability in ensuring financial stability in Nigeria, arguing that volatile exchange rates and inflation levels have undermined the effectiveness of the CBN's monetary policies.

Liquidity management is another crucial aspect of maintaining financial stability, as it allows banks to meet their obligations and withstand short-term shocks. According to Awojobi and Ayodele (2020), Nigerian banks with higher liquidity ratios are more resilient during periods of financial turbulence, suggesting that the CBN's reserve requirement policies are effective in bolstering financial stability. Their findings align with earlier studies conducted by Faloye and Olabode (2015), who concluded that liquidity management practices, coupled with strict capital adequacy regulations, enhance financial stability in Nigeria's banking sector.

In contrast, Afolabi (2018) argued that while monetary policy does influence financial stability, its effects are often undermined by external factors such as political instability and global economic downturns. He suggested that the Nigerian banking sector's over-reliance on foreign exchange inflows exposes it to external shocks, making financial stability difficult to achieve through domestic monetary policy alone. Nevertheless, the CBN's efforts to maintain price stability and moderate inflation through interest rate adjustments have proven somewhat effective in reducing the impact of external shocks. Nevertheless, while monetary policy remains a critical factor in promoting financial stability in Nigeria's banking sector, it must be supplemented with macroprudential regulations, effective liquidity management, and external shock mitigation strategies to achieve long-term stability.

2.4. Capital Regulation and Bank Financial Stability in Nigeria

Capital regulation is a key factor in ensuring the financial stability of Nigerian banks. Through the establishment of minimum capital adequacy ratios (CAR), the Central Bank of Nigeria (CBN) aims to shield banks from insolvency, enhance risk management practices, and mitigate systemic risks. The introduction of the Basel III framework reinforces the role of capital regulation in promoting financial stability, demanding that banks maintain high-quality capital and create buffers for periods of economic downturns (BIS, 2022). This regulatory framework is especially crucial in Nigeria, where the banking sector has historically grappled with issues of undercapitalization and ineffective risk management.

Capital regulation in Nigeria became particularly important following the 2005 banking sector consolidation, which sought to address the problem of undercapitalized banks (Adeyemi, 2016). This reform raised the minimum capital requirement for banks, leading to a wave of mergers and acquisitions. While these efforts initially improved the resilience and stability of the banking sector, the long-term impact remains a subject of debate. Onaolapo and Olufemi (2012) suggest that the Nigerian banking system still faces challenges related to capital inadequacy, particularly during periods of economic strain. Although capital regulation has bolstered financial stability, external shocks and governance issues continue to pose significant risks.

Research by Ibe (2013) highlights the importance of capital regulation in maintaining financial stability, arguing that banks with higher CARs are better equipped to withstand financial crises. His findings indicate that well-capitalized banks are more resilient during economic downturns due to their ability to absorb losses. Igbinosa and Naimo (2020) also emphasize that robust capital regulation helps to minimize credit risks and prevent financial distress, particularly in the face of non-performing loans.

However, the effectiveness of capital regulation in Nigeria has been questioned due to systemic issues within the sector. Adegbite (2016) argues that weak enforcement and a lack of transparency undermine the effectiveness of capital regulations. Despite stricter capital requirements, several Nigerian banks continue to struggle with liquidity crises and solvency issues, largely due to poor governance and risk management practices.

Aderinokun (2019) posits that capital regulation alone is not sufficient to ensure long-term financial stability in Nigeria. He argues that a combination of macroprudential policies, effective risk management, and enhanced corporate governance is necessary to complement capital regulations. Nigerian banks' exposure to volatile financial markets, particularly foreign exchange risks, further heightens their vulnerability to external shocks. As such, capital regulation must be reinforced by other measures to address the complex challenges faced by Nigeria's banking sector.

Nevertheless, while capital regulation plays a vital role in safeguarding the financial stability of Nigerian banks by ensuring adequate capital buffers, its success depends on robust enforcement, transparency, and complementary regulatory measures. The ongoing vulnerabilities in the sector, such as external shocks and governance challenges, indicate that capital regulation alone is not a panacea for financial stability in Nigeria.

2.5. Theoretical Review: Modigliani and miller (mm) theory

Over the decades, various macroeconomic theories have been developed to address key economic challenges such as unemployment, inflation, and stagnant economic growth. These theories aim to provide solutions to these pressing issues, with many focusing on improving financial systems and institutions. The objective of this study is to explore the impact of bank capital adequacy on financial stability in Nigerian banks. Capital adequacy has been defined by numerous scholars, each contributing nuanced perspectives, yet maintaining a core definition. Capital adequacy ratio (CAR) is often defined as the ratio of a bank's capital to its risk-weighted assets. It serves as a critical indicator of a bank's financial health, representing the ability of a bank to absorb potential losses while continuing its operations without falling into insolvency (Ezike & Oke, 2013).

The theories on capital adequacy largely stem from Modigliani and Miller's (MM) irrelevance theorem, which revolutionized modern financial theory. According to the MM theory, in perfect markets (with no taxes, bankruptcy costs, or informational asymmetry), a firm's capital structure is irrelevant to its value. This implies that a bank's value depends solely on its assets and income, regardless of how the assets are financed (Modigliani & Miller, 1958). However, this model has limitations, especially in "imperfect economies" like Nigeria, where market conditions are far from ideal. Factors such as taxes, market inefficiencies, and costs associated with financial distress, such as legal fees and asset depreciation during liquidation, make the MM model less applicable in developing economies (Sanusi, 2011).

For banks, capital adequacy is essential due to their role in financial intermediation, receiving deposits, and issuing loans. As Widyastuti, Komara, and Layyinaturrobaniyah (2019) noted, capital structure theories are relevant to banks

as they face unique risks, including liquidity and credit risks, which make capital adequacy a vital aspect of their operations. Modigliani and Miller's initial theory also assumes no taxes, but later adjustments introduced the idea that taxes affect capital structure through tax shields. Interest payments on debt reduce taxable income, lowering the overall cost of capital and increasing firm value (Barrios & Blanco, 2003). This modification led to the understanding that firms, including banks, can benefit from taking on debt due to the tax shield it creates, ultimately enhancing their performance (Akinsulire, 2008).

Despite its shortcomings, the MM theory laid the groundwork for subsequent research in capital structure, particularly in the banking sector. New theories have emerged, incorporating the realities of market imperfections and financial distress costs, while continuing to emphasize the importance of capital adequacy in ensuring the stability and resilience of financial institutions (Adah, 2018).

3. Methodology

This study adopts an ex-post facto research design, as it relies on historical data that cannot be manipulated. The research design guides the process of data collection, analysis, and interpretation, allowing for an investigation of the relationship between bank performance variables—return on assets (ROA) and return on equity (ROE)—and independent variables like non-performing loans (NPL), firm size, capital adequacy ratio (CAR), and loans and advances (LA). Secondary data spanning from 2005 to 2020 were sourced from NDIC annual reports, CBN statistical bulletins, and financial journals, making the study reliant on reliable and publicly accessible information. The multiple regression analysis, using the Ordinary Least Square (OLS) method, was employed to explore these relationships, with model specifications based on previous literature.

The econometric model is developed to evaluate the impact of bank fraud and other variables on commercial bank performance in Nigeria. Key variables, including non-performing loans, capital adequacy ratio, and firm size, are incorporated into the regression equation to express the relationship between independent and dependent variables. Descriptive statistics are used to summarize data characteristics, while inferential statistics, specifically multiple linear regression, assess the simultaneous effects of the independent variables on bank performance. The study evaluates the significance of the findings using statistical techniques such as t-tests, F-tests, and correlation analysis, ensuring that the model's estimates are both theoretically sound and statistically reliable.

3.1. Data Analysis

The data obtained from the Annual Central Bank of Nigeria Statistical Bulletin (CBN 2021) from 2005-2020 on Return on Assets (ROA), Return on Equity (ROE), Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Loans and Advances and Firms Size (FS) in Nigeria are presented in table 4.1 below

Table 1 Return on Assets (ROA), Return on Equity (ROE), Capital Adequacy Ratio(CAR), Non-Performing Loans (NPL), loans and advances (LAA)and Firms Size (FS) in Nigeria from 2005-2020

S/N	YEARS	ROA (₦'B)	ROE (₦'B)	NPL (₦'B)	LAA(₦'B)	CAR (₦'B)	FS (₦'B)
1	2005	19,305.03	190.67	138.02	3.6	4,699.01	3.6
2	2006	19,199.06	192.83	139.00	23	4,790.20	23.0
3	2007	19,620.19	197.90	141.73	48.8	4,819.17	48.8
4	2008	19,927.99	201.56	142.84	61.3	4,989.92	61.3
5	2009	19,979.12	206.05	144.72	78.8	5,133.46	78.8
6	2010	20,353.20	825.67	578.49	51.6	5,217.59	51.6
7	2011	21,177.92	1,128.25	449.69	14.3	5,306.34	14.3
8	2012	21,789.10	1,091.13	681.72	10.3	5,372.15	10.3
9	2013	22,332.87	689.07	707.52	11.9	6,371.93	11.9
10	2014	22,449.41	1,188.97	793.00	0.2	6,529.37	0.2
11	2015	23,688.23	1,945.72	886.52	14.5	7,341.39	14.50

12	2016	25,267.54	2001.23	1,234.27	16.5	7,529.53	16.50
13	2017	28,957.71	1,744.18	1,361.43	12.5	7,775.93	12.50
14	2018	31,709.45	3,089.89	1,872.21	23.8	7,829.57	23.80
15	2019	35,020.55	4,602.78	1,987.05	10	7,917.14	10.00
16	2020	37,474.95	5,514.47	2,516.25	11.6	7,987.16	11.60

Source: Annual Central Bank of Nigeria Statistical Bulletin (2021)

In Table 2, the descriptive statistics such as: minimum and maximum value, mean and standard deviation for the variables in the study are presented. The minimum and maximum values for return on asset (ROA) are 1.7830 and 4.7133 respectively with mean and standard deviation of 3.9013 and 0.8219 respectively. The standard deviation of 3.9219 implies that the data employed for this study deviate from the mean value from both sides by 3.9219. This means that there is a wide dispersion of the data from the mean because standard deviation is higher than the mean value. Also, Table 4.2 shows that the minimum and maximum values for return on equity (ROE) are 2.1000 and 3.4400 respectively with mean and standard deviation of 2.3292 and 2.8239 respectively. The standard deviation of 2.8239 implies that the data employed for this study deviate from the mean value from both sides by 2.8239. This means that there is a wide dispersion of the data from the mean because standard deviation is higher than the mean value.

Table 2 Descriptive Statistics of Variables

Descriptive Values	Variables					
	ROA	ROE	NPL	CAR	FS	LAA
Mean	3.9013	2.3292	1.2516	2.0157	0.1231	0.1231
Median	3.0091	2.3600	1.2312	2.0121	0.1062	0.1062
Maximum	4.7133	3.4400	1.5721	2.0330	0.1279	0.1279
Minimum	1.7830	2.1000	1.1291	2.0110	0.0912	0.0912
Std. Dev.	3.9219	2.8239	2.0173	2.1019	0.1728	0.1728
Skewness	-0.7389	-1.0066	-1.1093	-0.8910	-0.2911	-0.2911
Kurtosis	3.9102	3.4671	3.1973	2.1115	2.2190	2.2190
Jarque-Bera	8.7927	35.5945	12.8192	18.9012	6.7191	6.7191
Probability	0.1457	0.3221	0.8102	0.4923	0.2719	0.2719
Obs	16	16	16	16	16	16

Source: Researcher's Computation (2022)

The minimum and maximum values for non-performing loans (NPL) are 1.1291 and 1.5721 respectively with mean and standard deviation of 1.2516 and 2.0713 respectively. The standard deviation of 2.0173 implies that the data employed for this study deviate from the mean value from both sides by 2.0173. This means that there is a wide dispersion of the data from the mean because standard deviation is higher than the mean value. Also, capital adequacy ratio (CPR) has maximum and minimum values of 2.0110 and 2.0330 respectively with the mean value of 2.0157. The standard deviation for CPR is 2.1019. This shows that the data deviate from the mean value from both sides by 2.1019. This means that there is a wide dispersion of the data from the mean because standard deviation is higher than the mean value. Likewise, the minimum and maximum values for firm size (FS) are 0.0912 and 0.1279 respectively with mean and standard deviation of 0.1231 and 0.1728 respectively. The standard deviation of 0.1728 implies that the data employed for this study deviate from the mean value from both sides by 0.1728. This means that there is a wide dispersion of the data from the mean because standard deviation is higher than the mean value.

Furthermore, the skewness values for return on assets (ROA), return on equity (ROE), non-performing loans and advances (NPL), capital adequacy ratio (CAR) and firm size (FS) are negative and this implies that the distribution is negatively skewed. More so assets (ROA), return on equity (ROE), and non-performing loans and advances (NPL) are leptokurtic because their kurtosis values were greater than three (3), while capital adequacy ratio (CAR) and firm size (FS) are platykurtic since their value are less than three (3), which implies that the variables produce fewer and less

extreme outliers than those of the normal distribution. The Jarque-Bera values indicate the normality test for the variable which tests if the residuals are normally distributed. The Jarque-Bera values for all variables suggest that the residuals are normally distributed given the probability values. This descriptive statistics enables the researcher to establish the characteristics of the variables included in the study for better understanding.

3.2. Stationarity (Unit Root) Test Results

Table 3 Results of Stationarity (Unit Root) Tests

Variable	ADF Test statistic	Mackinnon's Critical Value at 1%, 5% & 10%			Order of Integration	Prob.
		1%	5%	10%		
D(ROA)	-4.82901	-3.27192	-2.76897	-2.61182	I(1)	0.0012
D(ROE)	-5.78384	-3.89201	-2.37291	-2.89243	I(1)	0.0039
D(NPL)	-3.72749	-3.18973	-2.58290	-2.49202	I(1)	0.0005
D(CAR)	-5.119842	-4.532598	-3.673616	-3.27736	I(1)	0.0110
D (LAA)	-5.286956	-4.616209	-3.710482	-3.29779	I(1)	0.0005
D(FS)	-5.459758	-4.532598	-3.673616	-3.27736	I(1)	0.0001

Source: Researcher's Computation (2022)

Augmented Dickey Fuller test was employed to carry out pre-test on the study's variables. In Table 4.3, the result of the stationary test of time series data was presented. Through the table, it was revealed that the absolute values of the ADF test statistics for all the study variables are higher than their corresponding Mackinnon's critical values at 1%, 5% and 10% respectively. All the study variables are integrated of order I (1) and as such, the result was good to be used for further econometrics estimations.

3.3. OLS Multiple Regression Results

To capture the short run relationships and the percentage of variation accounted for by the variations in the predictor variables in the short run, the Ordinary Least Squares test was implemented, the results of which are shown in Table 4.

Table 4 OLS Multiple Regression Result of the Variables

Dependent Variable: ROA and ROE				
Method: Least Squares				
Date: 05/28/22 Time: 14:35				
Sample: 1 16				
Included observations: 16				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	18870.79	3083.661	6.119606	0.0001
NPL	8.513804	81.02488	-1.245914	0.0000
CAR	0.370199	0.597122	8.619971	0.5469
FS	10.08039	7.603923	7.964266	0.3539
LAA	-0.9567	0.3896	-2.4556	0.0195
R-squared	0.965269	Mean dependent var		24265.77
Adjusted R-squared	0.556587	S.D. dependent var		5865.000
S.E. of regression	1222.026	Akaike info criterion		17.26673
Sum squared resid	17920163	Schwarz criterion		17.45987

Log likelihood	-134.1338	Hannan-Quinn criter.	17.27662
F-statistic	111.1716	Durbin-Watson stat	4.266314
Prob(F-statistic)	0.000000		

Source: Researcher's Computation (2022)

From the result in Table 4 above, below are the analysis of generated from the OLS Multi Regression of the Variables;

The interpretation of the model is based on the selected economic variables as shown in the above which shows that the coefficient of Adjusted R^2 = 0.5587 indicate that 55% of total variation in the dependent variables can be explain be the explanatory variable, others variables not included in the model explains the remaining 45% and were capable and significant enough in explaining changes in capital adequacy ratio and bank's financial stability in Nigeria as denoted by Return on assets(ROA) and return on equity(ROE). The results also indicated that, the value of the standard error for the entire variables in the model shows that the parameter estimate of capital adequacy ratio (CAR) and Firm size(FS) are statistically significant because their values were less than half of the value of the coefficient of the variables while, non-performing loans and advances(NPL) is statistically insignificance because the value is greater than half of the values of the coefficient of the variables.

4. Discussion of Findings

This study investigated the effect of impact of capital adequacy ratio and bank's financial stability in Nigeria using the time series 2005 to 2020. The empirical findings thus made are discussed, thus: The descriptive statistics indicated by skewedness found that the parameter estimate of all the variables of the skewness values that is for return on assets (ROA), return on equity (ROE), non-performing loans and advances (NPL), capital adequacy ratio (CAR) and firm size (FS) are negative and this implies that the distribution they are negatively skewed to the left. Also, the measure of convexity of the curve (kurtosis) shows that assets (ROA), return on equity (ROE), and non-performing loans and advances (NPL) are leptokurtic because their kurtosis values were greater than three (3), while capital adequacy ratio (CAR) and firm size (FS) are platykurtic since their value are less than three (3), which implies that the variables produce fewer and less extreme outliers than those of the normal distribution. The Descriptive Statistics also found that the Jarque-Bera values indicate the normality test for the variable which tests if the residuals are normally distributed. The Jarque-Bera values for all variables suggest that the residuals are normally distributed given the probability values. This descriptive statistic enables the researcher to establish the characteristics of the variables included in the study for better understanding.

The result of the stationary test of time series revealed that the absolute values of the ADF test statistics for all the study variables are higher than their corresponding Mackinnon's critical values at 1%, 5% and 10% respectively. All the study variables are integrated of order I (1) and as such, the result was good to be used for further econometrics estimations. In the quantitative techniques, the result found that the parameters estimate of capital adequacy ratio had significant positive effect on bank's financial stability in Nigeria from 2005-2020. As expected, this result indicated that capital adequacy ratio was potent determinant of bank performance in Nigeria. By implication, capital adequacy ratio is expected to have a positive relationship with bank performance because reducing capital adequacy ratio means increasing the level of financial risk of banks and applying more on foreign financial resources. It could lead to increased company's cash costs and thus reduce the performance of banks

Also, this study found that Firm size (FS) is individually statistically significant @5% level of significance. The result implies that Firm size (FS) will positively influence the return of capital adequacy ratio and bank's financial stability in Nigeria, monetary policy on bank capital adequacy in Nigeria, monetary policy on bank's financial stability in Nigeria and capital regulation on bank's financial stability in Nigeria.

Furthermore, the result shows that parameters estimate of non-performing loans (NPL) and loans and advances are than the t-tabulated that is -1.245914 and 0.3896 < 3.20 This indicates that parameters estimate of non-performing loans (NPL) and loans and advances (LAA)are individually statistically insignificant @5% level of significance. The finding also indicated that parameters estimate of non-performing loans (NPL) and loans and advances (LAA) had a negative influenced on the return capital of adequacy ratio and bank's financial stability in Nigeria, monetary policy on bank capital adequacy in Nigeria, monetary policy on bank's financial stability in Nigeria and capital regulation on bank's financial stability in Nigeria from 2005 – 2020.

However, The Johansen's co-integration results also confirm the prevalence of two (2) co-integrating equations, thus indicating the prevalence of a significant long run relationship among the time series variables under study, in which case we proceed to correct for errors between the long and short run variables. Thus, the Error Correction Estimates which evaluate and correct for the errors existent between the long and short run dynamics in the study found that the ECM coefficient stands at 0.611201 with the expected negative sign, which implies that approximately 61.12% disequilibrium in Nigeria' of capital adequacy ratio and bank's financial stability in Nigeria represented by return on assets (ROA) and return on equity (ROE) is offset within the year. On the other hand, the coefficient of determination (R^2) of 0.855749 indicates that about 85.58% of the variations of capital adequacy ratio and bank's financial stability in Nigeria represented by return on assets (ROA) and return on equity (ROE) in the long run is accounted for by variations in the study's explanatory variables. Further, the results showed that capital adequacy ratio (CAR), and firm size (FS), were discovered to be significant to return on assets (ROA) and return on equity (ROE) in the long run. capital adequacy ratio (CAR), and firm size (FS) had positive impact on of capital adequacy ratio and bank's financial stability in Nigeria while non-performing loans (NPL) and loans and advance (LAA) had negative effect on of capital adequacy ratio and bank's financial stability in Nigeria. The profitability of ECM f-statistics of 0.000003 confirms its goodness of fit and its Durbin-Watson value of 1.873394 is within acceptable range also.

5. Conclusions

This study investigated the effect of impact of capital adequacy ratio and bank's financial stability in Nigeria using non performing loan, (NPL), loans and advances (LAA), capital adequacy ratio (CAR) and firm size and return on assets (ROA) and return on equity (ROE) as profitability of the firms. This study was guided by four objectives which were to: investigate the impacts of bank capital adequacy on bank's financial stability in Nigeria determine the effects of monetary policy on bank capital adequacy in Nigeria.; evaluate the effects of monetary policy on bank's financial stability in Nigeria and the evaluate the effect of capital regulation on bank's financial stability in Nigeria. On the basis of the findings of this study, it was concluded that the results found that capital adequacy ratio (CAR) and Firm size (FS) would positively influence the return of capital adequacy ratio and bank's financial stability in Nigeria, monetary policy on bank capital adequacy in Nigeria, monetary policy on bank's financial stability in Nigeria and capital regulation on bank's financial stability in Nigeria. Also, this study concludes therefore, that parameters estimate of parameters estimate of non-performing loans (NPL) and loans and advances (LAA) has a negative influence on the return capital of adequacy ratio and bank's financial stability in Nigeria, monetary policy on bank capital adequacy in Nigeria, monetary policy on bank's financial stability in Nigeria and capital regulation on bank's financial stability in Nigeria in the long run.

Recommendations

Based on the findings and recommendations of this study; the following recommendations were made:

- The regulatory authority should ensure that the gains of the banking reforms processes are sustained
- the CBN should take more decisive measures aimed at tightening the risk management framework of the Nigerian banking sector as this will have a positive effect on their profitability.
- Internal loans and credit monitoring strategies should be implemented in full to ensure that loans and credit granted to customers are collected in full plus interest thereon and deposit money bank should not maintain excess liquidity simply because they want to effectively manage their liquidity position.
- Establishing a sound credit-granting process or criteria that will clearly indicate the bank's target market. This should indicate appropriate credit administration, measurement and monitoring process.
- It is also important that banking supervision in Nigeria should align with the Basel III in order to strengthen the regulation, supervision and capital adequacy of a bank.

Contribution to knowledge

The study has built upon previously well-established theories such as the Modigliani and miller (mm) theory. Several macroeconomic theories have been developed over the decades. They are often aimed at addressing pressing economic problems of the day. The pressing economic problems tend to be unemployment, inflation, or stagnant economic growth; most macroeconomic theories make a concentrated effort to shed light on these issues. It has also identified new determinants which impact upon capital adequacy ratio, the influencing factors which underpin a significant positive effect on bank's financial stability, firm size had significant positive effect on bank's financial stability, non-performing loans had significant negative effect on bank's financial stability.

Suggestions for Further Studies

The definite objective of this study is to evaluate the impact of capital adequacy ratio and bank's financial stability in Nigeria. However, based on the findings and recommendations identified in this study, it is hereby suggested that future researchers should focus on the area of regulatory authority should ensure that the gains of the banking reforms processes are sustained and also the CBN should take more decisive measures aimed at tightening the risk management framework of the Nigerian banking sector as this will have a positive effect on their profitability. Further research can also investigate if the loan loss provision has specifically affected profitability of big banks in Nigeria recently.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares that there is no conflict of interest.

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