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Determinants of Bank Stability in Nigeria

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ABSTRACT

The paper examines the determinants of bank stability in Nigeria over the 2000 to 2021 period. The analysis was conducted using the ZSCORE as the measure of bank stability in Nigeria alongside the regulatory capital ratio, cost-to-income, non-performing loans, loan-to-deposit, bank concentration, and the share of domestic private credit to GDP as the determinants of bank stability. The model was estimated using the time-series ordinary least square regression method. The results show that the regulatory capital ratio, cost-to-income, non-performing loans, loan-to-deposit, bank concentration, and the share of domestic private credit to GDP are all significant determinants of bank stability in Nigeria. More specifically, regulatory capital ratio, cost-to-income ratio, non-performing loans, and domestic private credit are negative measure of bank stability, while loan-to-deposit ratio and bank concentration are positive determinants of bank stability in Nigeria.

INTRODUCTION

Financial stability is the absence of system-wide episodes in which the financial system fails to function (crises). It is also about the resilience of financial systems to stress (World Bank). Bank stability is very important because the health of the entire financial ecosystem depends on the stability of each individual bank (Elnahass, Trinh, and Li, 2021; Kristóf and Virág, 2022).

When banks are unstable, they are more likely to fail. Bank failure occurs when a bank is unable to meet its financial obligations to creditors and depositors (Carmona, Climent and Momparler, 2019).

Bank failures are costly – they lead to loss of depositors' money, and they impose heavy costs on the economy (Carmona, Climent and Momparler, 2019). This is why bank regulators strive to prevent bank failures by ensuring that banks are stable at all times (Baron, Verner and Xiong, 2021). Many bank regulators around the world, including the Central Bank of Nigeria (CBN), have started to place great emphasis on bank stability. They have begun implementing policies that increase bank stability.

In Nigeria, there have been several bank failures since 2000 to 2021. For example, the failure of Savannah Bank of Nigeria Plc in 2002, Peak Merchant Bank Limited in 2003, and the failure of Eagle Bank Plc, Fortune Bank Plc, Liberty Bank Plc, Societe Generale Bank of Nigeria Plc, Triumph Bank Plc, etc. all in 2006. These bank failures in Nigeria have led policymakers and the CBN to prioritise the stability of banks in Nigeria. This has also led to increased interest in identifying the determinants of bank stability in Nigeria.

In the academic literature, there is little evidence about the determinants of bank stability in Nigeria. A possible reason for this might be because there is too much emphasis on the determinants of bank profitability and neglecting the determinants of bank stability.

This paper focus solely on Nigeria and investigates the determinants of bank stability. This study used several important variables to determine which variables are significant determinants of bank stability in Nigeria. The insight obtained in this paper can aid the Central Bank of Nigeria to be aware of the predictors/determinants they need to monitor in order to avert future bank failures.

The paper adds to banking literature which investigate predictors of bank stability.

The rest of the study is organized in the following way. Part two highlights the literature review while part three introduces methodology. Part four presents the empirical results. The conclusion is captured in part five of the paper.

LITERATURE REVIEW

Theoretical Framework

Theories have shown that lack of bank stability is caused by external shocks or by aberrant behaviour of banks or depositors. In this regard, the first theory of bank stability is 'theory of bank runs' by Diamond and Dybvig (1983). A bank run is when a large number of customers withdraw their deposited money from a bank at the same time, often due to concerns about the bank's financial stability. This can cause a panic in which even more customers withdraw their money, leading to a bank run.

Also, the competition-stability theory argues that less competition leads to high interest rates, and can lead to moral hazard. This can increase the non-performing loan ratio of banks. The competition-fragility theory argues that banks tend to take excessive risks when the competition level increases (Keeley, 1990). The high competition leads to moral hazard because it will pressure banks to give loans to bad borrowers and such loans will deteriorate and lead to non-performing loans which could lead to bank instability (Keeley, 1990).

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LITERATURE REVIEW

Some studies investigate bank stability in different contexts. Elbadri and Bektaş (2022) examine the link between the prices of oil and gold, and financial stability of Islamic banks operating in the Gulf Cooperation Council from 2005 – 2018. They employ a series of cointegration and causality tests and find that prices of the commodities have good effects on stability of banks in the short run. They also find a unidirectional causality in the short run for prices and long run for bank stability. Ali and Puah (2019), investigate the determinants of bank stability in Pakistan, using a panel data for 24 commercial banks from 2007 – 2015. The authors find that bank size, liquidity risk, funding risk and profitability are determinants, while credit risk has little or no effect on bank stability. Hassan, Khan and Paltrinieri (2019) investigate the causality linking liquidity, credit and bank stability among Islamic banks (IBs) and commercial banks (CBs) from 2007 – 2015. They find that credit risk and liquidity risk have a negative relationship. They also find that Islamic banks are better than conventional banks in managing risks.

Fernández (2020) investigates the determinants of stability of banks in the United States for the period 1990 – 2017. They find that mortgage rate, interest rates and treasury bonds are the main determinants of bank stability i11n the United States. Tran, Nguyen and Nguyen (2022) examine the effects of institutional quality, market concentration and bank competition among 133 emerging and developing countries from 2002 – 2020. They find that bank stability is positively associated with the level of market concentration. They also find that institutional environment is a determinant of bank stability in developing and emerging countries.

Khediri, Abidi and Sayari (2021) investigate the impact of corporate governance on the stability of the Gulf Cooperation Council (GCC) banking sector using panel data for Islamic banks from 2003 to 2018. The authors used the pooled ordinary least square (OLS), the panel generalized least square (GLS) random effect (RE) and the two-step system generalized method of moments (GMM) estimation. They find that CEO power has a negative impact on bank stability, while board independence and shareholders' independence have an insignificant effect on bank stability.

Rinaldi and Prasetyo (2019) investigate the impact of bank competition on bank stability in Sharia and commercial banks in Indonesia from 2011 – 2015. They find that both bank competition and stability have a positive relationship. Also, they conclude that commercial banks have greater stability than the Islamic banks. Shim (2019) investigates the effect of diversification of bank loans and market concentration and conclude that they have a significant positive impact on bank stability. Phan, Tran and Iyke (2022) investigate the effect of geopolitical risk on bank stability. They conclude that high geopolitical risk is associated with lack of bank stability.

Safi and Khlif (2023) examine the impact of financial inclusion on banking stability in Iraq, from 2010 – 2021 and employ the least squares method with the regression model for the hypotheses. The result of the study shows a significant partial effect of financial inclusion on banking stability in Iraq. Furthermore, the results of the financial inclusion indicators were varied and partially accepted. This was an indication that emphasises great contribution of financial inclusion to Iraq's banking stability.

Also, the impact of financial inclusion on bank stability was investigated by Ahamed and Mallick (2019). They analyse 87 countries from 2004 – 2012 and find that higher level of financial inclusion leads to greater bank stability. Saif-Alyousfi, Saha and Md-Rus (2020) investigate the impact of competition on bank stability in the GCC banking market from 1998 to 2016. They find that higher level of bank competition and greater degree of concentration lowers bank stability or increases financial fragility. Abdelsalam, Elnahass, Ahmed and Williams (2022) examine the effect of asset securitizations of stability in a dual banking system (i.e., Islamic and commercial banks) 21 countries. The result of their findings showed that banks with asset securitization are riskier and less stable. Nguyen (2019) investigates the link between the structure of the audit committee and stability of the bank. They examine 37 commercial banks in Vietnam from 2002 – 2018 and conclude that the stability of bank varies with size and audit committee, but negative effect is reduced in banks with good external audit services.

Utonga and Ndoweka (2023) investigate the impact of financial development on inflation in Tanzania from 1980 – 2020 and employ the vector error correction model for the analysis. The results reveal that financial development has a long-run impact on inflation in Tanzania, resulting in a reduction in inflation in the country while in the short run, the impact of financial development on inflation is not significant. Therefore, they recommend that the government should implement regulatory policies that will promote financial sector stability. The study also recommends that adopting and promoting financial inclusion will reduce the need for cash and enhance the efficiency of monetary policy, serving as a preventive measure against inflationary pressures and unnecessary credit that will eventually lead to instability in the financial sector.

Other studies examine the determinants of bank (or financial) stability in several micro and macro contexts. For instance, Chinoda and Kapingura (2023) explore the effect of digital financial inclusion and bank competition on bank stability in Sub-Saharan Africa during the 2014 to 2020 period. The authors used the two-step System Generalised Method of Moments regression method. Their results show that digital financial inclusion has a significant positive relationship with bank stability (z-score) and a negative relationship with non-performing loans. They conclude that policymakers should increase digital financial inclusion because it can improve bank stability by reducing the size of nonperforming loans. Yitayaw, Mogess, Feyisa, Mamo and Abdulahi (2023)

investigate the effect of bank-specific and external factors on bank stability in Ethiopia. They examine bank stability determinants from 2014 to 2020. The authors find that bank lending rate, tangibility, GDP growth rate, control of corruption, and rule of law effectiveness are important determinants of bank stability. They also observe that the effect is more pronounced for banks with higher capital.

Šeho, Shaiban, and Ghafoor (2023) examine the link between loan and financial diversification and dual-banking systems in determining stability of banks. Conventional banks (46) and Islamic banks (22) were examined in the Gulf Cooperation Council (GCC) from 2008 – 2021. Their results reveal that bank diversification are non-linear for the two types of banks. González (2023) investigates the effect of creditor rights on bank competition and stability.

Hou (2023) investigates the effect of bank competition in determining bank stability in China. The author finds that there is an optimal competition level. Also, the stock market disaster in 2015 did not have a significant influence on financial stability in China. Borio, Shim and Shin (2023) present an overview of monetary, macroprudential, and exchange rate policies in developed economies and emerging market economies. The authors also assess the extent to which the use of these policies constitutes a holistic macro-financial stability framework. They conclude that emerging market economies have benefited from the joint use of the various policies to mitigate the risks of domestic stability arising from external influences. Cecchetti (2023) argues that the new Basel III standards help to improve global financial system because it makes financial systems substantially safer than it was in 2008, but the costs of increasing capital requirements have been much smaller.

Alkabbani (2023) revisits the controversy over whether FinTech causes financial institutions to become fragile. The study exploits the introduction of FinTech regulatory sandboxes as an exogenous shock and investigate the heterogeneous effects of FinTech on the fragility of financial institutions. The author used a panel sample of listed banks from GCC countries and find that promoting FinTech in emerging financial markets increases the stability of financial institutions through high profitability while promoting FinTech in developed financial markets undermines the stability of financial institutions through low profitability.

Zainuddin, Yasin, Mahi and Akter (2023) examine the financial sustainability of microfinance institutions. They examine 1,232 microfinance firms from 43 countries and find a trade-off between microfinance outreach and stability. Aramonte, Schrimpf & Shin (2022) examine the structural shifts in intermediation and how non-bank financial intermediaries and financial stability (NBFIs) have shaped the demand and supply of liquidity in financial markets. They show that the deleveraging and 'dash for cash' scenarios (as during the Covid-19 crisis) emerged as two sides of the same coin, rather than being two distinct stress propagation channels.

Khan, Khan, Sayal and Khan (2022) examine the impact of financial inclusion on financial stability using panel data of 54 African countries. They conclude that financial inclusion improves financial stability. Also, Jungo, Madaleno & Botelho (2022) assess the effect of financial inclusion and competitiveness on bank stability and conclude that inclusion enhances bank stability in SSA and LAC countries. Malik, bin Md Isa, bin Jais, Rehman and Khan (2022) investigate the role of governance on financial stability in Asian countries. The authors use the stakeholder theory and show that governance bank stability. Nguyen and Du (2022) examine the effect of financial inclusion on bank stability. They examine 102 banks in six countries of ASEAN over the period 2008-2019. They find that financial inclusion contributes to greater bank stability.

Bektas, Elbadri and Molyneux (2022) investigate the relationship among institutional quality, religion, economic cycles and bank stability. They examine 254 banks in nine countries that have dual banking systems. They show the influence of institutional quality on bank stability as proxied by Z-score.

Defung and Yudaruddin (2022) examine the effect of economic freedom on financial stability in Indonesia from 2004 – 2018. The results indicate that economic freedom is positive on bank stability. Li, Trinh and Elnahass (2022) investigate the banking stability during COVID-19 pandemic with 244 banks in 52 countries from 2002 – 2020. Their result show that banks with higher environmental and social activities are more stable during the global health crisis. Hakimi, Boussaada and Karmani (2022) investigate the financial inclusion on bank stability in the Middle East and North Africa (MENA) region from 2004 – 2017 and show that banks increased bank stability.

Kharabsheh and Gharaibeh (2022) examine the determinants of financial stability in Jordanian commercial banks from 2011 to 2018. They find that Small and Medium Enterprise loans and capital adequacy have a positive effect on the stability of Jordanian commercial banks, while financial inclusion, liquidity risk and credit risk have a negative effect on the stability of Jordanian commercial banks.

The above studies have examined bank stability in several contexts. The studies have not examined bank stability in Nigeria using recent data. Secondly, existing studies have not considered the effect of the CBN loan-to-deposit ratio (LDR) on bank stability. In this study, I address this issue by introducing the LDR as a potential determinant of bank stability in Nigeria.

METHODOLOGY

Source of Data

The data for the study covers the period 2000 – 2021 and were obtained from the Central Bank of Nigeria (CBN) statistical bulletin and the World Bank database.

Model Estimation

The model used to estimate the determinants of bank stability in Nigeria is a multivariate regression model. The model is specified below.

$STAB_t = \beta 0 + \beta 1CARR_t + \beta 2EFF_t + \beta 3NPL_t + \beta 4LDR_t + \beta 5BC_t + \beta 6CDD_t + et$

Where t = year. STAB = bank ZSCORE, CARR = regulatory capital ratio, EFF = cost-to-income ratio, NPL = nonperforming loans ratio, LDR = loan-to-deposit ratio, BC = bank concentration, CDD = the share of domestic private credit to GDP, e = error term, Bo = constant term

Estimation Method

The econometric method used to estimate the determinants of bank stability is the ordinary least squares regression method. The model is estimated using the eViews 12 statistical software.

Variable Justification

The variables in this paper were employed by past studies in the banking and finance literature. Six (6) independent variables and one dependent variable were used in this paper. The reason for using these variables are explained and justified in the table below.

Table 1: Justification of Variables

Variable	Expected/ predicted sign	Remark on the expected/predicted sign	Previous studies that used the variable and support the prediction
STAB		The dependent variable representing bank stability	-
CARR	+	Regulatory capital ratio is used as a determinant of bank stability. A high regulatory capital ratio is expected to increase bank safety and increase bank stability	Anginer, Bertay, Cull, Demirgüç-Kunt, and Mare (2021).
EFF	-	Cost-to-income ratio is used as a determinant of bank stability. A low cost-to-income ratio is expected to increase bank profit and increase bank stability	Partovi and Matousek (2019).
NPL	-	Nonperforming loans ratio (NPL) is used as a determinant of bank stability. Higher nonperforming loans is expected to reduce bank profitability and make banks potentially unstable	Khan, Siddique and Sarwar (2020)
LDR	+	Loan-to-deposit ratio (LDR) is used as a determinant of bank stability. Higher loan-to-deposit ratio is expected to increase bank profitability and lead to greater bank stability	Anggari and Dana (2020).
BC	+	Bank concentration (BC). Higher bank concentration is expected to increase the performance of the banking sector and improve their profitability	Karadima and Louri (2021)
CDD	+	Domestic private credit as a ratio of GDP (CDD) is used as a determinant of bank stability. Higher domestic private credit is expected to increase bank profitability and increase their stability	Bui (2020)

Empirical Results

In the section, the descriptive statistics results, the Pearson Correlation results and the ordinary least squares regression estimation results are presented.

Descriptive Statistics

The mean of STAB variable is 15.87 and is higher than the median value of 15.83 and much higher than the standard deviation (SD) of 2.54. The mean of CARR is 15.53 which is lower than the median value of 17.11 and much higher than the SD of 5.25. The mean of EFF is 73.67 and higher than the median value of 61.72 and is much higher than the SD of 39.08. The mean of the NPL variable is 13.02, higher than the median value of 10.59 and much higher than the SD of 9.03. Mean of the LDR variable is 77.01, lower than the median value of 77.73 and much higher than the SD of 15.06. The mean of the BC variable is 47.85, which is higher than the median value of 40.83 and much higher than the SD of 19.05. The mean of the CDD variable, which stood at 11.73 and higher than the median value of 11.16, is much higher than the SD of 3.22.

Table 2: Descriptive Statistics Result

	STAB	CARR	EFF	NPL	LDR	BC	CDD
Mean	15.87	15.53	73.67	13.02	77.01	47.85	11.73
Median	15.83	17.11	61.72	10.59	77.73	40.83	11.16
Maximum	22.05	23.40	202.04	37.30	103.35	84.71	19.63
Minimum	12.19	1.75	51.15	2.95	53.88	23.32	8.08

Std. Dev.	2.54	5.25	39.08	9.03	15.06	19.05	3.22
Skewness	0.67	-1.33	2.79	0.93	0.031	0.60	0.97
Kurtosis	3.18	4.58	9.04	3.45	1.86	2.18	3.47
Jarque-Bera	1.53	7.61	62.11	3.08	1.18	1.94	3.46
Probability	0.46	0.022	0.00	0.21	0.55	0.37	0.18
Sum	317.48	295.12	1620.87	260.41	1694.18	1052.60	246.24
Sum Sq. Dev.	122.22	496.64	32078.61	1550.0	4763.89	7624.29	206.99
Observations	20	19	22	20	22	22	21

Correlation Result

The correlation between the dependent variable (STAB) and independent variables is reported in table below. The Pearson correlation result shows that CARR, LDR, BC and CDD are positively correlated with the STAB variable. This suggests that greater levels of regulatory capital ratio (CARR), loan-to-deposit ratio (LDR), bank concentration (BC) and private credit (CDD) are correlated with greater bank stability (STAB) in Nigeria. Also, the Pearson correlation result shows that the EFF and NPL variables are inversely correlated with the STAB variable. This suggests that high cost-to-income ratio (EFF) and high NPL is correlated with greater bank stability (STAB) in Nigeria. Overall, the correlation coefficient in table 3 are all below 0.70 which suggest that there is no perfect collinearity in the correlation.

Table 3: Pearson Correlation

The Variables	STAB	CARR	EFF	NPL	LDR	BC	CDD
STAB	1.000						
CARR	0.331	1.000					
EFF	-0.176	0.320	1.000				
NPL	-0.468	-0.231	-0.004	1.000			
LDR	0.236	0.406	0.007	0.472	1.000		
BC	0.687	0.517	-0.031	-0.526	0.326	1.000	
CDD	0.567	0.306	-0.364	-0.596	0.281	0.797	1.000

Determinants of Bank Stability: Full Sample Analysis

The CARR variable is significant at the 10% level and impacts negatively on STAB in table 4. This shows that high capital ratio has negative effect on the stability of banks in Nigeria. This means that too much regulatory capital is undesirable because it will not improve bank stability; rather, it will hurt banks and increase their fragility. Therefore, the bank regulator in Nigeria should determine the minimum regulatory capital ratio threshold that will improve bank stability in Nigeria.

The EFF is significant at 1% level and has negative relationship to STAB in table 4. It means that low cost-to-income improves bank stability. The result shows that efficient banks are more likely to be stable because of their low cost-to-income ratio compared to inefficient banks that have high cost-to-income ratio. Therefore, the CBN, should ensure that banks are efficient by reducing cost while maximizing income.

The NPL variable is significant at 1% level and negatively relates to STAB. Banks that have low non-performing loans are likely to be stable compared to those that have high non-performing loan ratio. In this case, CBN must continue to monitor the banks and ensure the non-performing loan ratio is below the CBN regulatory threshold of 5% in order to improve bank stability in Nigeria.

LDR variable is significant at 1% level and is positively related to the STAB. This indicates that a high loan-to-deposit ratio has positive effect on bank stability. The implication of the result is that banks that have high loan-to-deposit ratio will (i) increase lending (ii) generate more income from interest through lending, and (iii) income generated will increase bank profitability and contribute to the stability of the bank. Therefore, the CBN should ensure that banks have a high loan-to-deposit ratio, in order to lend out money from the deposits they receive from depositors.

The BC variable is significant at 5% level and is positively related to the STAB variable. This indicates that high bank concentration in has positive effect on bank stability in Nigeria. This means that the concentrated banking sector is likely to be more stable. This is possible because the bank regulator will increase its supervision and monitoring of large banks to mitigate systemic risks that arise from high bank concentration.

The CDD is significant at 1% and negative relationship with to the STAB variable. This indicates that a high supply of private credit will have a significant negative effect on bank stability. The implication of this result is that banks that supply large volume of private credit may be exposed to credit risk that could result into losses and threaten the stability of banks. The regulator should

regulate the private credit issued by banks to ensure that banks are not issuing too many loans to risky borrowers or risky sectors of the Nigerian economy.

Table 4: Ordinary Least Squares Regression estimation for the determinants of bank stability (Full sample estimation: 2000-2021)

	(1)
	Dependent variable: STAB
	Coefficient
	(T-statistic)
c	-44.993***
	(5.13)
CARR	-0.333*
	(-1.97)
EFF	-0.350***
	(-3.44)
NPL	-0.700***
	(-4.13)
LDR	0.273***
	(3.91)
BC	0.105**
	(2.58)
CDD	-1.667***
	(-3.77)
R-square	**81.55**
Adjusted R-square	70.49
F-statistic	7.37
P(F-Statistic)	0.003

T-statistic is reported in parenthesis.
****, **, * represent statistical significance at the 1%, 5% and 10% levels.*

Further Analysis: Post-Global Financial Crisis Analysis

In this section, I estimate the determinants of bank stability for the period after 2008 global financial crisis. The reason for performing this analysis is because the Central Bank of Nigeria increased its supervision of banks after the crisis by introducing Basel 2 and Basel 3 regulatory frameworks. Therefore, it is important to determine whether these changes have a significant effect on the determinants of bank stability in Nigeria in after the financial crisis.

To undertake this analysis, I divided the full sample into the pre-crisis subsample (i.e. 2000 to 2006) and the post-crisis subsample (i.e. 2009 to 2021). I re-estimate the results only for the post-crisis. The result is reported in table 5.

The CARR variable is not statistically significant in column 1 of table 4. This means that the capital ratio is not a significant determinant of bank stability in post-2008 global financial crisis. The insignificant coefficient for the CARR suggests no verifiable conclusion can be drawn from the result.

Also, the EFF, NPL, LDR, BC and CDD are not statistically significant in column 1 of table 4. It means that they are not important determinant for stability in banks after the 2008 crisis.

Table 5: Ordinary Least Squares Regression estimation for the determinants of bank stability (Post-crisis estimation: 2009-2021)

	(1)
	Dependent variable: STAB
	Coefficient
	(T-statistic)
c	-35.343
	(2.00)
CARR	-0.166
	(-0.38)
EFF	-0.215
	(-0.61)
NPL	-0.326
	(-1.08)
LDR	0.145
	(1.21)
BC	-0.029
	(-0.11)
CDD	-0.812
	(-0.95)
R-square	77.76
Adjusted R-square	44.41
F-statistic	2.33
P(F-Statistic)	0.22

T-statistic is reported in parenthesis.

CONCLUSION

The reason for this study was to examine the determinants of the stability of banks in Nigeria from 2000 – 2021. The analysis was conducted using the ZSCORE (dependent variable) as the measure of bank stability in Nigeria. Independent variables are the regulatory capital ratio, cost-to-income ratio, nonperforming loans ratio, loan-to-deposit ratio, bank concentration and the share of domestic private credit to GDP. The model was estimated using the time-series ordinary least square regression method.

It was found that the regulatory capital ratio, cost-to-income ratio, non-performing loans ratio, loan-to-deposit ratio, bank concentration and the share of domestic private credit to GDP are all significant determinants of bank stability in Nigeria. More specifically, the regulatory capital ratio, cost-to-income ratio, non-performing loans ratio and domestic private credit are negative determinants while loan-to-deposit and bank concentration are positive determinants of stability of banks in Nigeria. One major implication of the study is that too much regulatory

capital is undesirable because it does not improve bank stability in Nigeria. The study recommends among others that the bank regulator should determine the minimum regulatory capital ratio threshold that will improve the stability of banks and increase its supervision and monitoring of large banks in the concentrated banking sector to mitigate systemic risk arising from high bank concentration in Nigeria.

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