Determinants of Banking Stability in Nigeria

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Abstract

This study investigates the determinants of banking stability in Nigeria. Banking stability is crucial for economic growth and financial development. This study uses aggregate outcomes rather than individual bank performance to analyze the determinants of banking stability in Nigeria. Using aggregate outcomes allows us to focus on the changes occurring in the banking industry as a whole. The findings reveal that bank efficiency, the size of nonperforming loans, regulatory capital ratios, greater financial depth and banking concentration are significant determinants of banking stability in Nigeria. The findings have implications. One implication of this study is that bank supervisors should intensify its effort in addressing the nonperforming loans, capital adequacy problems issues in Nigeria. Also, bank supervisors should ensure that policies designed to improve the workings of the financial system are complied with.

Keywords: Bank Stability, Bank Performance, Bank behavior, financial stability, Nigeria, Bank Regulation

JEL Code: G21, G28

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1. Introduction

This study investigates the determinants of banking stability in Nigeria. Banking stability is crucial for the stability of any financial system in the world. Financial system regulators understand that a loss of confidence in the banking system can have devastating consequences for the entire financial system. For this reason, banking stability has always been a top regulatory and supervisory policy objective for regulators. Nigeria has an emerging banking sector which is ranked 'third' in Africa after South Africa and Egypt. Nigeria has experienced many episodes of financial and economic recession within the last two decades, and this has brought the fragility of Nigerian banking and finance onto the front burner of discourse by academics and policy makers. Many studies have identified some determinants of banking stability such as financial development levels, bank efficiency and systemic interconnectedness, among others. But much of these studies have focused on developed economies. One major issue that is not clearly understood in the literature is the determinants of banking stability in emerging economies, given that their financial structure is less sophisticated than that of developed economies.

So far, the literature on bank stability determinants in Africa is rather scanty, and the studies that examine the Nigerian context are quite few. Therefore, there is need to identify the determinants of banking stability in Nigeria. In theory, bank capital and abnormal credit cuts are the two biggest predictors of bank failure (Diamond and Rajan, 2009; Mendoza and Terrones, 2012). Focusing on bank capital, bank regulators in Nigeria want banks to keep sufficient capital for the risks they take and to mitigate unexpected losses (CBN, 2010). However, some experts believe that capital resources alone are not sufficient to achieve banking stability in emerging economies due to debates about what constitutes bank capital (Farag et al, 2013, Ozili, 2017a). Considering these arguments, it is needful to identify the determinants of banking stability in Nigeria.

This study differs from prior studies in that it is primarily interested in aggregate outcomes rather than in individual bank performance. Using aggregate outcomes allows us to focus on the changes occurring in the Nigerian banking industry. The study uses the z-score as the measure of banking stability. The explanatory variables include bank performance variables, macroeconomic variables and financial structure variables. The findings indicate that nonperforming loans, regulatory capital, bank efficiency, financial depth and banking concentration have a significant effect on banking stability in Nigeria depending on how banking stability is measured. The findings are robust to alternative estimation techniques.

This study contributes to the literature in two ways. Firstly, it aligns with studies that explore bank stability and regulation (e.g. Ozili 2017a; Allen and Gale, 2004; Brunnermeier et al., 2009; Segoviano and Goodhart, 2009; Ozili, 2019). These studies attempt to identify the sources of fragility or potential factors that influence financial stability. This study adds to this literature by examining the case of Nigeria since studies on banking stability determinants in Nigeria are scanty. Secondly, from a policy standpoint, insights gained from this study would help bank supervisors understand the importance of assessing how bank-factors, macroeconomic factors and financial structure could affect the stability of the banking system in the Nigeria.

The remainder of the article is organized as follows. Section 2 reviews the literature on banking stability. Section 3 presents the data and methodology. Section 4 discusses the results. Section 5 concludes and presents some recommendation.

2. Literature Review

Banking stability has many definitions. For instance, it can be viewed as (i) the absence of banking crises when all banks are individually stable (Brunnermeier et al., 2009); (ii) in terms of interdependence, banking stability is the stability of banks linked to each other either directly through the interbank deposits market and participation in syndicated loans, or through lending to common sectors and proprietary trades (Segoviano and Goodhart, 2009); (iii) banking stability can also be viewed as the absence of abnormal disruption in credit supply, payment systems and banking services (Ozili and Thankom, 2018).

Delis and Staikouras (2011) and Bhattacharya et al. (2002) show that strict banking supervision can limit the ability of banks to take excessive risks and possibly improve the timing of supervisory intervention during stressed times. Barth et al. (2013) points out that banking instability may be caused by incomplete regulation or ineffective supervision although both are related and cannot be examined in isolation. Although strict supervision is desirable, Barth et al. (2006, 2008) in their empirical study show that strict banking supervision did not lead to greater banking stability; and Čihàk and Tieman (2007) suggest that these conflicting results are due to differences in supervision quality across countries.

The macro-prudential literature identifies some bank stability determinants, e.g., Ozili (2018) investigates the determinants of banking stability in Africa and find that banking efficiency, foreign bank presence, banking concentration, size of banking sector, government effectiveness, political stability, regulatory quality, investor protection, corruption control and unemployment levels are significant determinants of banking stability. Ozili (2018) also notes that the significance of each determinant depends on how banking stability is measured and depends on the period examined. Jokipii and Monnin (2013) investigate the effect of real output growth and inflation on banking sector stability for 18 OECD countries from 1980 to 2008 and find a significant and positive relationship between banking stability and real output growth. They did not find a clear link between banking stability and inflation. Ijtsma et al. (2017) investigate the effect of banking concentration on banking stability for European countries during the 1998 to 2014 period and they find that banking concentration has no effect on bank stability. Tan and Anchor (2016) investigate the interrelationship between profitability and banking stability in China and find that low bank stability (higher insolvency risk) leads to higher profitability when return on assets (ROA) is the profitability measure used, implying that higher profitability leads to higher bank fragility for Chinese commercial banks. Bank efficiency is also a determinant of banking stability. Berger and DeYoung (1997) argue that efficient banks are better at managing their credit risks because they can improve their stability by mitigating high non-performing loans. In their study, they investigate the interrelationship between bank efficiency and problem loans, a proxy for bank stability. They employ granger-causality techniques to test the relationships among loan quality, cost efficiency and bank capital. They find that higher non-performing loans precede reductions in

banks' cost-income ratios. In Nigeria, Sere-Ejembi et al (2014) in their study suggest the use of a banking stability index in Nigeria which they developed by a combination of financial soundness indicators and macro-fundamentals to complement existing regulatory policy tools for banking stability. So far, there are very few studies investigating banking stability in Nigeria in the literature. The current study contributes to the banking literature by re-visiting the banking stability debate for the case of Nigeria.

3. Data and Method

3.1. Data

All data employed in this study were obtained from the World Bank. Banking sector data and macroeconomic data was obtained from the 'global financial development' database and the 'global economic prospect' database, respectively, from the World Bank's databank. The data cover the 2003 to 2016 period. The choice of sample period ensures that the time period covers a full economic cycle which is usually at least 10 years or more.

3.2. Method

The model specification adopted for this study is similar to the models of Uhde and Heimeshoff (2009), Fernández et al. (2016) and Ozili (2018). The functional form of the model is linear, and is expressed below:

Banking stability = f (macroeconomic factors, bank-specific factors, financial structure)

$SB = c + \Delta GDP + CAR + INF + ROA + DP + BN + NPL + EFF + e.$. equation (1)

Where:

ΔGDP = business cycle fluctuation or state of the economy measured as change in real gross domestic product; CAR = regulatory capital ratio; INF = inflation rate; ROA = bank profitability measured as return on assets; DP = depth of the financial system; BN = banking concentration; NPL = ratio of nonperforming loan to gross loan; EFF= bank efficiency measured as cost to income ratio; SB = banking stability measured as the z-score. The z-score is a measure of bank stability and is calculated at bank level as the return on assets plus the capital-asset ratio divided by the standard deviation of asset returns. Z-score = (ROA+CAR)/SDROA, where ROA is return on assets, CAR is the capital to asset ratio and SDROA is the standard deviation of return on assets. A high Z-score indicate that the banks are more stable because it is inversely related to the probability of bank insolvency (Ozili, 2018).

The OLS estimator is used to analyse the time series data. The dependent variable (SB) is the z-score which measures the likelihood of bank insolvency. A higher z-score implies a lower probability of insolvency, hence, greater banking stability. Uhde and Heimeshoff (2009), Fernández et al. (2016) and Ozili (2018) also use the z-score to measure banking stability.

The explanatory variables are bank-specific and macroeconomic variables. For the ΔGDP variable, a positive relationship between ΔGDP and the z-score is expected because banks are more stable during periods of economic prosperity. For the inflation (INF) variable, a negative

relationship between inflation and z-score is expected because low inflation will increase the purchasing power of money and bank customers will increase spending which would generate additional cash flow for banks and improve banks' liquidity and its ability to absorb future losses; thus, banks should be more stable during periods of low inflation. For the capital regulation variable (CAR), a positive relationship between CAR and stability is expected because regulatory capital serves as a buffer which absorbs unexpected losses in banks. For this reason, well-capitalized banks should be more stable in stressed times compared to less-capitalized banks. For the profitability variable (ROA), a positive relationship between ROA and stability is expected. Although banks generate profits for business continuity purposes, profitable banks can set-aside some profit as 'emergency funds' for the rainy day which improves their stability, compared to less-profitable banks.

DP measures the depth of the financial system. It captures the size of the financial sector relative to the economy. A positive relationship between DP and stability is expected because a large financial system should have embedded within it some mechanisms that allow for risk-sharing and loss-sharing among all participants in the financial system in order to improve its resilience to abnormal shocks; therefore, a financial system with greater depth should be more stable. For the bank concentration variable (BN), a positive relationship between BN and stability is expected because a concentrated banking sector is easier to monitor, regulate and supervise by the regulator, which also allows for quicker regulatory intervention into banks during stressed times. For the NPL variable, a negative relationship between NPL and stability is expected because large problem loans are usually written off against bank profit and may erode bank capital, making banks unstable. For the EFF variable, a negative relationship between EFF and stability is expected because banks that have a low cost-income ratio are more efficient, and therefore, more stable compared to banks with higher cost-income ratios.

4. Empirical Results

4.1. Descriptive statistics

Table 1 reports the descriptive statistics for the variables during 2003 to 2016. The mean and median of most variables are approximately the same such as inflation (INF), return on asset (ROA), bank efficiency (EFF) and stability (SB) variables indicating that there is less deviation between the sample means and medians. Also, the standard deviation for most variables is considerably low except for bank concentration (BN) and non-performing loans (NPL).

Table 1: Descriptive statistics									
	∆GDP	CAR	INF	ROA	DP	BN	NPL	EFF	SB
Mean	5.86	15.55	11.55	2.44	14.75	47.29	12.16	66.93	15.99
Median	6.51	17.47	11.55	2.47	17.08	42.42	9.30	66.69	15.59
Maximum	9.25	23.40	17.86	3.69	19.40	71.08	37.30	81.37	19.95
Minimum	-1.62	1.75	5.38	0.09	8.57	23.40	2.95	57.68	12.53
Std. Dev.	2.70	6.41	3.48	0.93	4.17	13.48	10.13	6.22	2.47
Observations	14	12	14	13	14	14	13	12	14
The Variable description: ∆GDP = business cycle fluctuation or state of the economy; CAR = regulatory capital ratio; INF = inflation rate; ROA = Bank profitability; DP = depth of financial sector; BN = banking concentration; NPL = nonperforming loan to gross loan ratio; EFF= bank efficiency; SB = banking stability. Std Dev = Standard deviation.									

4.2. Correlation

Table 2 reports the Pearson correlation matrix for the variables during 2003 to 2016. The correlation results show that ROA and BN coefficients are significant and positively correlated with banking stability, implying that higher bank profitability and higher banking concentration is associated with greater banking stability in Nigeria. On the other hand, the correlation results also show that the CAR, INF and EFF coefficients are positively correlated with banking stability in Nigeria but the correlations are not significant. Finally, the correlation coefficients are sufficiently low to be concerned about multi-collinearity in this study. See appendix for Granger causality test in Table 4.

Table 2: Pearson correlation matrix

Variables	∆GDP	CAR	INF	ROA	DP	BN	NPL	EFF	SB
∆GDP	1.000								
CAR	-0.419 (0.26)	1.000							
INF	0.400 (0.28)	-0.514 (0.15)	1.000						
ROA	0.187 (0.62)	-0.048 (0.90)	-0.072 (0.85)	1.000					
DP	-0.587* (0.09)	-0.169 (0.66)	-0.325 (0.39)	-0.086 (0.82)	1.000				
BN	-0.078 (0.84)	0.203 (0.59)	-0.593* (0.09)	0.407 (0.27)	0.219 (0.57)	1.000			
NPL	0.795*** (0.01)	-0.524 (0.14)	0.672** (0.04)	0.170 (0.66)	-0.719** (0.02)	-0.257 (0.50)	1.000		
EFF	0.484 (0.18)	-0.706** (0.03)	0.564 (0.11)	-0.419 (0.26)	-0.335 (0.37)	-0.436 (0.23)	0.708** (0.03)	1.000	
SB	0.048 (0.90)	-0.307 (0.42)	-0.311 (0.41)	0.716** (0.03)	0.300 (0.43)	0.767*** (0.01)	0.017 (0.96)	-0.208 (0.59)	1.000

The p-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significant levels. Variable description: ∆GDP = business cycle fluctuation or state of the economy; CAR = regulatory capital ratio; INF = inflation rate; ROA = Bank profitability; DP = depth of financial sector; BN = banking concentration; NPL = nonperforming loan to gross loan ratio; EFF= bank efficiency; SB = banking stability.

4.3. Estimation results

The OLS estimation result is reported in Column 1 of Table 3. The two macroeconomic indicators, business cycle (ΔGDP) and inflation rate (INF) coefficients, are negative and significant, and imply that there is an inverse relationship between the macroeconomy and banking stability in Nigeria. Four explanatory variables have a positive impact on banking stability namely: return on assets (ROA), financial system depth (DP), concentration (BN) and cost-to-income ratio (EFF). The t-statistics and p-values for the four variables are significant at the 5% and 10% levels, and imply that higher bank profitability, greater depth of financial system, higher banking concentration and higher bank efficiency are positive drivers of banking stability in Nigeria. CAR coefficient is significant but report a negative sign after adjusting for robust standard errors and heteroscedasticity in columns 2 and 3 of Table 3. The negative sign on the CAR coefficient is contrary to the apriori expectation. An explanation for this may be due to the z-score (the dependent variable) since the capital ratio is already included in computation of the z-score. Similarly, NPL coefficient is significant but report a positive sign after adjusting for robust standard errors and heteroscedasticity in columns 2 and 3 of Table 3. The positive sign on the NPL coefficient is contrary to the apriori expectation. An explanation for this may be due to choice of estimation technique.

Notice that the results are re-estimated in columns 2 and 3 to perform some robustness tests. The HAC Newey West standard error estimator is used to correct for both heteroscedasticity and autocorrelation in column 2 of Table 3. The Newey-West results are reported in Column 2 of Table 3. The result does not change significantly from the regression result in Column 1 of Table 3. The White robust standard errors estimator is used to correct for heteroscedasticity in the data. The results are reported in Column 3 of Table 3. As can be observed, the result does not change significantly from the main result.

Table 3: Regression Estimation Results			
	(1)	(2)	(3)
	OLS	HAC (Newey-West)	White's Robust Standard Errors
EFF	0.113* (9.16)	0.113** (35.76)	0.113** (32.29)
NPL	0.129 (4.23)	0.129* (10.91)	0.129* (10.21)
BN	0.113** (21.63)	0.113** (34.68)	0.113** (21.12)
DP	0.257* (6.38)	0.257** (18.59)	0.257** (21.76)
ROA	1.384** (24.94)	1.384*** (126.7)	1.384*** (75.89)
INF	-0.185* (-6.96)	-0.185** (-14.14)	-0.185* (-9.53)
CAR	-0.072 (-4.69)	-0.072** (-14.29)	-0.072** (-16.66)
∆GDP	-0.347* (-7.41)	-0.347* (-11.87)	-0.347* (-7.27)
Adjusted R^2	99.81	99.81	99.81
Durbin Watson	3.17	3.17	3.17
S.E.	0.115	0.115	0.013

Table 3 reports the regression estimation results. Column 1 reports the OLS estimation. Column 2 reports the re-estimated regression results using the Newey-west robust standard error adjustment. Column 3 reports the re-estimated regression results using the White robust standard error adjustment. The t-statistic values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significant levels. Variable description: ∆GDP = business cycle fluctuation or state of the economy; CAR = regulatory capital ratio; INF = inflation rate; ROA = Bank profitability; DP = credit supply; BN = banking concentration; NPL = nonperforming loan to gross loan ratio; EFF= bank efficiency; SB = banking stability.

5. Conclusion and Recommendation

5.1. Conclusion

The study investigates the determinants of banking stability in Nigeria and concludes that bank profitability, depth of financial system, the size of nonperforming loans, regulatory capital ratio, banking concentration and bank efficiency are significant determinant of banking stability in Nigeria during the period examined. The findings are consistent with the current policies adopted by the Nigerian banking regulator, the Central Bank of Nigeria (CBN), particularly in the areas of regulatory capital management to ensure that banks allocate sufficient risk capital that is commensurate with their risk-taking activities.

5.2. Recommendations

The CBN should review the role of regulatory capital ratio in promoting stability in the banking system since the impact of capital adequacy on bank stability also depends on the quality of capital. The CBN should pressure banks to increase the quality of capital they keep and reduce their holdings of hybrid capital in their capital structure since hybrid capital is of low quality, and this is consistent with Basel 3 standards which advocates for high capital quality in banks. Finally, the bank regulator in Nigeria should closely monitor the level of non-performing loans and banking sector concentration, for early interventions before NPLs reach unbearable levels.

Going forward, future research should investigate the impact of bank provisioning in promoting bank stability and to determine the optimal level of bank provisioning that promotes stability in the Nigerian banking system. Also, the observation that NPL and CAR report signs that are contrary to apriori expectation, calls for further research to re-visit this topic to determine whether (i) NPL and CAR are insignificant because they are closely linked to bank profit or capital, as opposed to being linked to bank solvency – the z-score; (ii) or whether they are insignificant due to choice of estimation techniques.

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Appendix

Table 4: Pairwise Granger Causality Tests

Sample: 2003 2016
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
NPL does not Granger Cause EFF	9	3.59318	0.1068
EFF does not Granger Cause NPL		5.12213	0.0643
BN does not Granger Cause EFF	11	0.09256	0.7687
EFF does not Granger Cause BN		0.42005	0.5351
DP does not Granger Cause EFF	11	0.46086	0.5164
EFF does not Granger Cause DP		5.52929	0.0466
ROA does not Granger Cause EFF	9	0.93107	0.3719

EFF does not Granger Cause ROA		3.49165	0.1109
INF does not Granger Cause EFF	11	2.36550	0.1626
EFF does not Granger Cause INF		0.95193	0.3578
CAR does not Granger Cause EFF	8	0.60155	0.4731
EFF does not Granger Cause CAR		0.13732	0.7261
∆GDP does not Granger Cause EFF	11	1.13153	0.3185
EFF does not Granger Cause ∆GDP		0.28231	0.6096
BN does not Granger Cause NPL	11	0.00387	0.9519
NPL does not Granger Cause BN		0.61833	0.4543
DP does not Granger Cause NPL	11	0.06452	0.8059
NPL does not Granger Cause DP		2.73291	0.1369
ROA does not Granger Cause NPL	9	0.35759	0.5717
NPL does not Granger Cause ROA		0.51480	0.5000
INF does not Granger Cause NPL	11	0.50296	0.4983
NPL does not Granger Cause INF		0.86245	0.3802
CAR does not Granger Cause NPL	10	2.28177	0.1747
NPL does not Granger Cause CAR		2.39986	0.1653
∆GDP does not Granger Cause NPL	11	0.03062	0.8654
NPL does not Granger Cause ∆GDP		0.00234	0.9626
DP does not Granger Cause BN	13	12.0754	0.0060
BN does not Granger Cause DP		5.48050	0.0413
ROA does not Granger Cause BN	11	0.00106	0.9748
BN does not Granger Cause ROA		2.78642	0.1336
INF does not Granger Cause BN	13	6.11181	0.0330
BN does not Granger Cause INF		2.18743	0.1699
CAR does not Granger Cause BN	10	2.28581	0.1743
BN does not Granger Cause CAR		0.38301	0.5556
∆GDP does not Granger Cause BN	13	0.72301	0.4151
BN does not Granger Cause ∆GDP		0.27386	0.6122
ROA does not Granger Cause DP	11	0.65409	0.4420
DP does not Granger Cause ROA		3.87401	0.0846
INF does not Granger Cause DP	13	9.99647	0.0101
DP does not Granger Cause INF		0.02208	0.8848
CAR does not Granger Cause DP	10	4.28045	0.0773
DP does not Granger Cause CAR		0.41233	0.5412
∆GDP does not Granger Cause LIQ2	13	0.62238	0.4485
LIQ2 does not Granger Cause ∆GDP		0.39911	0.5417

INF does not Granger Cause ROA	11	0.87974	0.3757
ROA does not Granger Cause INF		0.38930	0.5500
CAR does not Granger Cause ROA	8	22.7193	0.0050
ROA does not Granger Cause CAR		0.68157	0.4466
∆GDP does not Granger Cause ROA	11	0.03295	0.8605
ROA does not Granger Cause ∆GDP		0.77096	0.4055
CAR does not Granger Cause INF	10	0.00461	0.9478
INF does not Granger Cause CAR		0.57105	0.4745
∆GDP does not Granger Cause INF	13	0.21721	0.6512
INF does not Granger Cause ∆GDP		0.06924	0.7978
∆GDP does not Granger Cause CAR	10	0.22100	0.6526
CAR does not Granger Cause ∆GDP		1.88803	0.2118