Financial Stability and the Performance of the Nigerian Economy: A Variance Decomposition Approach

[1]Torutein, Oki Isiya & [2]Eweke, Oghenemaro Russell
[1&2]*Department of Banking and Finance,*
Federal University Otuoke- Bayelsa

Abstract

The financial sector contributes a sizeable chunk to the economy of Nigeria and its relevance cannot be over emphasized. However, the financial system in Nigeria has over time being fraught by incidences of instability which are believed to have significant effects on the economy. This study investigates the effects of shocks to financial system stability on the Nigerian economy using variance decomposition test and impulse response function. A macro prudential approach was adopted in viewing financial stability and semi-annual data of selected financial soundness indicators were used as proxies for financial system stability. Specifically, the results revealed that GDP was highly responsive to shocks to the ratio of non- performing loans to gross loans both in the short run and long run periods. Innovations to the ratio of regulatory capital and weighted assets had significant impact on GDP in the short run but decreased significantly in the long run. The response of GDP to the ratio of interest margin to gross income was not quite significant. We observed that increase in non-performing loans pose significant risk to the financial system and the economy as a whole. The study recommends amongst other things a closer supervision of non-bank financial institutions involved in credit intermediation and non-traditional lending practices by money deposit banks in order to stem the increasing amount of non-performing loans.

Keywords: *Financial System, Instability, Economy, Performance and Nigeria*

Corresponding Author: Torutein, Oki Isiya

Background to the Study
The Global financial crises of 2007/2008 which according to the World Bank Growth Commission (2010) was a destructive malfunction of the financial sectors of the advanced economies that spread rapidly to the real economy and to the rest of the globe, brought to the fore the systemic implications of risk across the entire Financial System as well as on the real economy (Eze, Ini and Inim, 2018; Egboro, 2016).

Allen and Carletti (2011) opines that the 2007 financial crisis was caused by a huge bubble in real estate in the United States, Spain, Ireland, United Kingdom and several other countries and that the crisis started with the bubble bursting and caused problems in the securitized mortgage market and the real economy.

Its seeds could however be traced to a number of factors including extremely low interest rate policies adopted by the Federal Reserve and other central banks, and the appetite of Asian central banks for (debt) securities contributed to lax credit. These factors helped fuel a dramatic increase in house prices in the United States and several other countries such as Spain, Ireland, and the United Kingdom (Adrian and Shin, 2010; Brunnermeier, 2009; Greenlaw, Hatzius, Kashyap and Shin, 2008; Taylor, 2008; Allen and Carletti, 2011). Also, from August 2007 till September 2008, there was fairly popular consent that poor incentives in the U.S. mortgage industry were a major cause of the problem (Allen and Carletti, 2011).

As Soludo (2009) observed, the countries, which were hitherto not affected by the financial crisis became affected by "second round effects" as the crisis became economic, when by the fourth quarter of 2008, it spilled over from sub-prime loans into consumer and other credits. The Nigerian economy was also affected by the fallout of the crises, as the economy faltered, the banking system experienced a crisis in 2009, the stock market collapsed by 70% in 2008-2009 and many Nigerian banks had to be rescued (Sanusi, 2010).

Prior to the crisis, Soludo (2009) had argued that Nigeria was not very vulnerable, sighting that Merrill Lynch which was one of the leading financial management and advisory companies had ranked Nigeria among ten least vulnerable economies in the world. Also, the Nigerian banking sector experienced dramatic growth post-consolidation and the popular sentiment in the industry was that the banking sector was sound and growth should be encouraged, the IMF endorsed the strength of the banking system to support this growth. Although this sentiment would however prove to be misplaced (Sanusi, 2010). Owing to the 2007 crisis and its resultant effects on several economies, there has been a major focus on the issue of financial stability and a shift by most nations from utilization of only the Micro-prudential approach of bank supervision to introduction of a holistic and systemic approach referred to as Macro-Prudential approach.

Currently, there is no universally accepted definition of the notion of financial stability. However, there are various interpretations of the concept (Elena and Claudiu, 2017). Schinasi (2004), defined financial stability as "a condition in which an economy's

mechanisms for pricing, allocating, and managing financial risks (credit; liquidity; counterparty; market) are functioning well enough to contribute to the performance of the economy. Isărescu (2006), avers that financial stability can be viewed from both a wide and a limited perspective. From a wide perspective (considering the general performance of the financial system), financial stability refers to condition when the financial system is able to efficiently attract and allot monetary assets as well as to absorb "shocks" without damaging the real economy. While from limited perspective (in the sense of avoiding crises), financial stability refers to a situation when banking crises do not occur, and the assets prices and especially the interest rate are highly stable.

Furthermore, Elena and Claudiu (2017) avers that three main risks that affect the components of a financial system namely: a slowdown of the economy dynamics (which could cause losses for banks due to the difficulties in paying back the loans as a result of diminished sales or wages), variations in the price of the financial assets (which could lead to financial losses to investors), decline of an economic sector that previously represented a focal point for banks and investors. And that contagion occurs if these risks are allowed to spread between economic sectors (domestically or internationally), independently from the structural connections or current disturbances' t is expedient however for macro and micro prudential measures to be separately enforced by the central banks on the one hand and financial institutions on the other hand in order to keep the stability of the financial system under control (Brunnermeier and Pedersen, 2009).

Eze, Ini and Inim, (2018) records that Nigeria had for a long time relied on the on-site and off-site supervision of individual Banks and other financial institutions operating in the county, the authorities concerted their efforts on identifying and intervening in individual institutions that were prone to risk. This approach referred to as Micro Prudential Analysis and regulation was anchored on the belief that identifying and mitigating the risks in individual banks would guarantee a stable Financial System. However, the resultant effects of the global financial crises of 2007/2008 have provided the basis for another approach in which regulatory oversight is focused on the system as a whole, and this new approach is referred to as Macro prudential.

It is worth noting that the relevance of the financial sector and its stability to the performance of the economies cannot be overemphasized. Houben, Kakes and Schinasi (2004) noted that the increasing relevance of financial sector stability is related to four major trends in the financial economy. Firstly, financial systems have grown at a significantly faster pace than the real economy. Secondly, the process of financial deepening has been accompanied by a changing composition of the financial system with an increasing share of non-monetary assets and by implication, greater leverage of the monetary base. Thirdly, as a result of increasing cross-industry and cross-border integration, financial systems have become more interwoven, both nationally and internationally. Lastly the financial system has become more complex, in relations to the intricacy of financial instruments, the diversity of activities and the concomitant mobility of risks.

Furthermore, an unstable financial system normally results in financial crisis. Financial crisis has dire implications for economic growth (Lordina, Charles, Joshua, and Simon, 2011). Although several studies have investigated the contributions and impact of the financial sector on the Nigerian economy, quite a few have examined the impact of financial stability or financial soundness on the Nigeria economy.

This study aims at investigating the relationship between financial stability and the Nigerian Economy. More specifically the study examines the effect of the ratio of non-performing loan to gross loans, ratio of regulatory capital to weighted asset and the ratio of interest margin to gross income on the gross domestic product of Nigeria. However, financial stability is a new concept and shows the financial system's efficiency and solidity. This means key financial institutions need to operate without disruptions in order to increase public confidence in the financial system (Lordina, Charles, Joshua, and Simon, 2011). The study adopts a Macro-Prudential approach to investigate the relationship between financial stability and the Nigerian Economy. Eze, Ini and Inim, (2018) noted that the two main tools used in Nigeria for the purpose of Macro Prudential Analysis are Financial Soundness Indicators (FSIs) and Stress Testing, thus our work will utilize Financial Soundness indicators (FSI's) as published by the Central Bank of Nigeria's Financial Stability reports for analysis of stability of the Nigerian Financial System while Gross Domestic Products at constant prices will be used to measure the performance of the Nigerian Economy.

Review of Related Literature
Review of Theoretical Literature
There are two basic paradigms used in classifying financial stability (Borio, 2008; Jérôme, Paul, Fabien, 2014). These Paradigms are:

Micro-Prudential Approach
The Micro-prudential approach adopts a bottom-up approach and ignores spillover effects between institutions. It attempts to limit financial institutions' probability of bankruptcy and idiosyncratic shocks, according to this approach, financial instability is exogenous to the financial system, and risks should be managed on an individual basis (Jérôme, Paul, and Fabien, 2014). This approach hinges on the belief that identifying and mitigating the risks in individual banks would guarantee a stable Financial System.

Macro-Prudential Approach
Macro-prudential approach on the other hand focuses on the economic system as a whole and is aimed at circumscribing shocks that may have a macro impact. Risks are considered to come from the system itself and the spillovers between institutions are important. Financial stability is generated through a top-down perspective, guaranteed by the actions of main financial institutions. Macro-prudential policies try to limit the occurrence of financial crisis in order to limit its impact on welfare (Jérôme, Paul, and Fabien, 2014).

The Macro Prudential Analysis relies on indicators that can be used as a basis for monitoring the health, vulnerabilities, and stability of the Financial System. These indicators include aggregated Micro prudential indicators as well as Macro-economic variables that impact on Financial System Stability (Sere-Ejembi, Udom, Salihu, Atoi and Yaaba, 2014).

The macro-prudential approach argues that the safety and soundness of the individual financial institutions does not necessarily guarantee the safety and soundness of the entire financial system and that there are circumstances where individual actions of the financial institutions aimed at keeping such institutions safe and sound may pose dangers to the stability of the entire system.

Review of Empirical Literature
Lordina, Charles, Joshua, and Simon (2011) examined the relationship between financial stability and economic growth in Africa. Using a dynamic fixed-effect model, the results reveal that financial stability impacts positively on economic growth. Specifically, the results indicate that capital adequacy, liquidity and asset quality have significant effects on the GDP growth rate both in the long and the short run. It is recommended that the agencies concerned, majorly the central banks and the governments of African countries, should pursue policies that enhance the stability of their financial systems in order to spur economic growth in their respective countries.

Elena and Claudiu (2017) quantified the index of financial stability linking it with macroeconomic indicators for Romanian economy. The index was intended to analyze the relationships between the main indicators of the banking sector and the most relevant macroeconomic indicators. The Financial Stability Index synthesized the balance state and evolution of a complex of financial variables as well as the impact of the banking system stability upon the real economy. They selected 12 data series including Financial Sector Indicator which reflects the status of the Romanian financial sector as well as international indexes to quantify the influence of the international environment toward the Romanian economy. They concluded that the utility of the FSI is highlighted especially during the economic crises periods when we may find a close correlation between FSI and GDP.

Ubilava (2014) studied financial and economic indices developed by the Federal Reserve Banks of Kansas City and Chicago, respectively, in order to identify the impact of financial uncertainty on the overall economic performance. Using smooth transition and vector smooth transition auto-regressions, they assessed nonlinear dynamics of these indices, and tests the Granger non-causality hypothesis between the financial stress and economic activity in an out-of-sample setting. Their findings confirmed the causal relationship between financial and economic indices.

Enowbi, Kupukile and Simplice (2017), assessed linkages between financial instability, financial liberalization, financial development and economic growth in 41 African countries for the period of 1985-2010. The results revealed that financial development

and financial liberalization have positive effects on financial instability. The findings also reveal that economic growth reduces financial instability and the magnitude of reduction is higher in the pre-liberalization period compared to the post-liberalization period.

Khattab, Mpabe, and Ihadiyan (2015) examined the interactions between the financial development, financial instability and economic growth in the Maghreb countries. The analysis covered the period of 1995-2013 and consisted of a sample of five countries of the region and utilized the World Bank Data and the Heritage Foundation Data, The panel vector autoregressive model estimation revealed that financial development has a negative impact on the financial instability as well as a combined impact on the economic growth, financial instability has a negative impact on the financial development and a combined effect on the economic growth, economic growth promotes the financial development and that financial liberalization in a less corrupt environment promotes the financial development.

In Nigeria, Eze, Ini and Inim (2018) conducted a time series analysis to highlight the strengths and vulnerabilities in the system from1997 and 2016, using indicators of capital adequacy, asset quality and profitability. The indicators show that clear signs of impending crises had started to emerge in the system by the end of 2016. They suggested the moderation of inflation, close monitoring of the risk management framework of the banks and strict enforcement of corporate governance standards.

Also, Olu and Sheriffdeen (2014), investigated the potential trade-off between financial sector regulation and financial stability in Nigeria and implications for financial inclusion and inclusive growth. Quantitative and qualitative analyses of the financial market activities showed that the raison détre for 2004 consolidation and the 2009 post-consolidation reforms were hinged on instability in the banking sector due to critical gaps in regulatory framework and regulations, inadequate supervision and enforcement of regulations, and, instability caused by capital flows.

Methodology
The study utilizes semiannual data spanning from first half of 2010 to first half of 2017, data for Gross Domestic Product was sourced from the CBN statistical Bulletin 2017, while data for Financial Soundness indicators were collected from the CBN's Financial Stability Report.

Financial Soundness Indicators are categorized into three namely
1. Assets-Based Indicators
2. Capital Based Indicators
3. Income and Expense Based Indicators

This study selects one from each category of financial Soundness indicator. The ratio of non-performing loan to gross loans was used as our Asset Based Indicator, ratio of regulatory capital to weighted asset was used as our Capital Based Indicator while the ratio of interest margin to gross income was used as our income and expense based indicator.

Model Specification
The VAR model is specified as follows:

$$\ln GDP = \alpha_1 + \sum_{j=1}^{n} \beta_1 \ln NPL_{t-1} + \sum_{j=1}^{n} \beta_2 \ln RCAP_{t-1} + \sum_{j=1}^{n} \beta_3 \ln INTMA_{t-1} + \mu$$

Where GDP represents Gross Domestic product, NPL represents the ratio of non-performing loan to gross loans, RCAP represents the ratio of regulatory capital to weighted asset and INTMA represents the ratio of interest margin to gross income.

Method of Data Analysis
Graphical analysis, correlation analysis where used to investigate the relationship between the variables, while the granger causality test was utilized to test for the existence of causal relationships amongst the variables. Furthermore, the variance decomposition test and the impulse response function were used to analyse the effects of shocks or innovations in the explanatory variables on gross domestic product.

Empirical Data Analysis
Figure 1: Selected Financial Soundness Indicators
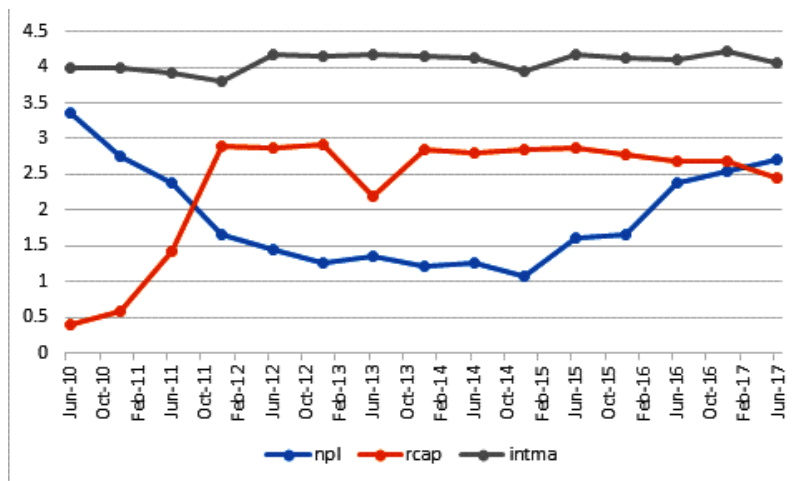
Source: Author's Computation

Figure 1 above shows plots selected financial soundness indicators. From figure 1, we observed that he ratio of non-performing loan to gross loans tends to move in opposite direction with the ratio of regulatory capital to weighted asset. Further correlation analysis in Appendix 3 revealed that the ratio of non-performing loan to gross loans and ratio of regulatory capital to weighted asset were negatively correlated at 74.25% but Granger Causality test in Appendix 4 showed no causal relationships existed between the ratio of non-performing loan to gross loans and ratio of regulatory capital to weighted asset.

We also noticed that ratio of regulatory capital to weighted asset seemed to move in the same direction with interest margin to gross income, although at seemingly varying magnitude. However, further correlation analysis in appendix 3 reveals a slight correlation between the variables at 38.2%. The granger Causality test in Appendix 4 reveals the absence of causal relationship between the variables.

Figure 2: GDP and Selected Financial Soundness Indicators
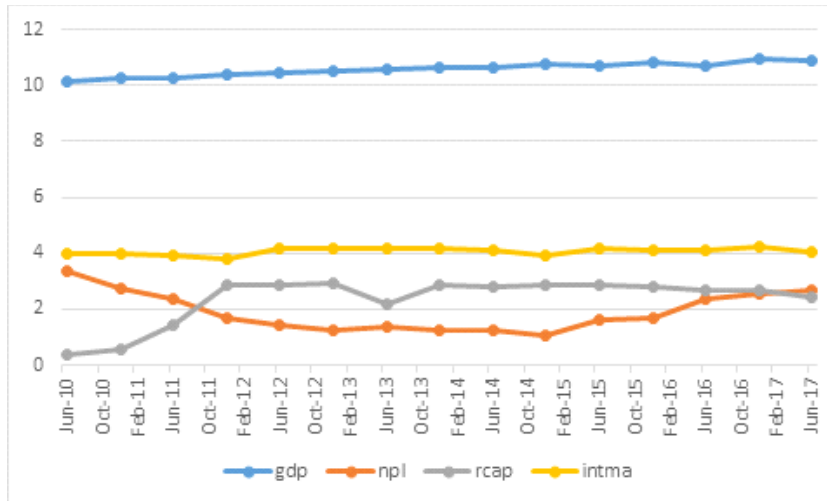
Source: Author's Computation

Figure 2 shows the GDP and selected financial Soundness indicators. We observed that GDP tends to move in the same direction with ratio of regulatory capital to weighted asset and ratio of interest margin to gross income. Correlation analysis (see Appendix 2) revealed that the ratio of regulatory capital to weighted asset was positively correlated with gross domestic product at 71.38%, while ratio of interest margin to gross income was positively correlated with gross domestic product at 48.37%. Conversely, ratio of non-performing loan to gross loans and GDP were negatively correlated at 28.82%.

Furthermore, the granger Causality (appendix 3) test revealed only one causal relationship amongst variables. Which is that GDP granger caused the ratio of non-performing loans to gross loans? Before estimating Vector Auto-Regressive Model the Johansen Cointegration test was used to estimate the presence of co-integrating equations in the model from the results as shown in Table 1 and Table 2 the trace statistics indicates the presence of 3 cointegrating equations while the Maxx-Eigen Statistic reveals the presence of 1 cointegrating equation

Table 1: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.983068	88.88700	47.85613	0.0000
At most 1 *	0.767484	35.86570	29.79707	0.0088
At most 2 *	0.651159	16.90137	15.49471	0.0305
At most 3	0.218834	3.210582	3.841466	0.0732

Source: Author's Computation

Table 2: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.983068	53.02130	27.58434	0.0000
At most 1	0.767484	18.96433	21.13162	0.0979
At most 2	0.651159	13.69079	14.26460	0.0614
At most 3	0.218834	3.210582	3.841466	0.0732

Source: Author's Computation
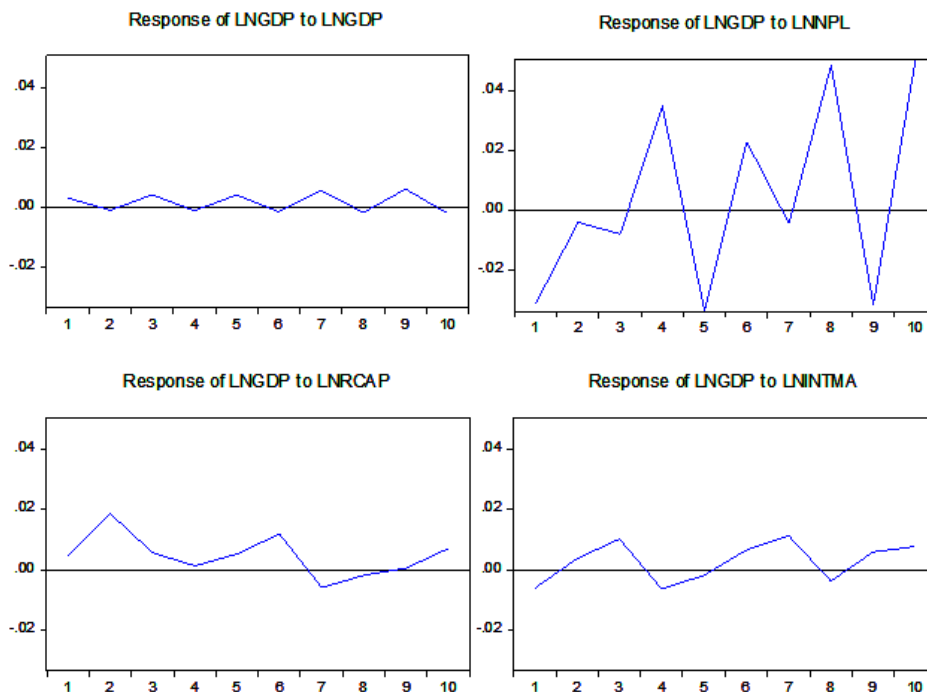
Source: Author's Computation

Before estimating the Vector Autoregressive model has an adjusted R^2 of 0. 9713 indicating 97.13% of the variations in the dependent variable is explained by changes in the explanatory variables. The impulse response graph in Figure 3 shows an initial negative response of GDP to innovations in the ratio of non-performing loans to gross loans. Furthermore, the result of the variance decomposition test indicates that GDP has initial response of 93.4% to innovations in the ratio of non-performing loans to gross loans. In the short-run (third period), innovations in the ratio of non-performing loans to gross loans result in about 63.6% shocks in Gross Domestic products, in the long run this increases to about 88.5%.

Similarly, GDP showed a slightly negative initial response of GDP to shocks in the Ratio of Interest Margin to gross income the variance decomposition test revealed GDP had a 3.54% response to shocks in the ratio of interest margin to gross income. In the short run gross domestic product had a 9.68% response to impulses in the ratio of interest margin to gross income. This however decreased to about 4.36% in the Long-run. The Impulse Response graph further showed a positive response of GDP to the ratio of interest margin to gross income in the long-run.

On the other hand, GDP has a positive initial response to impulses in the ratio of regulatory capital to weighted assets. The variance Decomposition test of GDP indicates an initial response of 2.13%, a short-run response of 25.06% and a long-run response of 6.03 % to shocks in regulatory capital to weighted assets.

Table 3: Variance Decomposition of LNGDP

Period	S.E.	LNGDP	LNNPL	LNRCAP	LNINTMA
1	0.032005	0.894101	93.43854	2.127511	3.539848
2	0.037508	0.736087	69.08944	26.58660	3.587876
3	0.040290	1.660569	63.59684	25.06398	9.678617
4	0.053813	0.979067	78.09424	14.11665	6.810042
5	0.063739	1.093819	83.21929	10.75885	4.928040
6	0.069165	0.981060	81.78415	12.13429	5.100498
7	0.070703	1.563058	78.62730	12.30017	7.509475
8	0.085947	1.103849	85.26911	8.364376	5.262666
9	0.091891	1.399237	86.25262	7.321831	5.026309
10	0.105432	1.102623	88.50391	6.028124	4.365346

Source: Author's Computation

Conclusions and Recommendations
This study utilized graphical analysis, correlation analysis, granger causality and VAR model to examine the relationship between Financial Stability and the economy. We also discovered that GDP was highly responsive to shocks in the ratio non-performing loans to gross loans, this is however expected considering the contributions of non-performing

loans to the banking sector crises of 2009 which necessitated the creation of the Asset Management Company of Nigeria (AMCON), also We also observe that this increase in the ratio of Non-performing loans to gross loans tends to coincide with recession experienced in Nigerian Economy.

Furthermore, from Figure 1, a steady decline in the ratio of non-performing loans to gross loans between the second half of 2010 up until the end of 2012 was observed. The ratio was relatively stable up until 2015 when it began to steady climb from 5% as at the end of June 2015 up to 15% as the end of June 2017. This trend is indicative of possible increase in risk of the financial system. According to Central Bank Nigeria (2017), the quality of assets in the banking system deteriorated in the review period (i.e. first half of 2017) compared with the position during the preceding half year. At 3.7 per cent, the ratio of non-performing loans to total loans indicated an increase of 0.2 percentage point above the level at end-December 2012, but a decline of 0.6 percentage point below the level at end-June 2012.

The study also observed that the response of GDP to innovations in ratio of regulatory capital to weighted assets are more significant in the short run, this response tends to drop significantly in the short run. We observed a drop in the ratio of regulatory capital to weighted assets during periods of slumps in economic productivity. The response of GDP to impulses in the ratio of interest margin wasn't quite significant both in the short and long run scenarios.

Summarily, the paper observed that financial stability plays a key role in the determining economic performance as shocks to stability measures portends both short run and long run risks to the economy.

This study recommends that regulatory authorities pay keen attention to the steady rise in the ratio of Non-performing loans to gross loans and the continuous decrease in the ratio of Regulatory capital to weighted assets, tighter measures should be imposed to stem the tide of increasing non-performing loans. Also considering the eroding effects of inflation we recommend an upward review of the current minimum capital base requirement and stricter implementation of this requirement. Finally, the study recommends closer supervision of non-bank financial institutions involved in credit intermediation and non-traditional lending practices by money deposit banks.

References

Allen, D. & Carletti, N. (2011). Monetary policy under financial turbulence, *Annual Conference of the Central Bank of Chile*

Adrian, T. & Shin H. (2010), Liquidity and leverage, *Journal of Financial Intermediation 19 (3)* 418-37.

Brunnermeier, M. (2009). Deciphering the liquidity and credit crunch 2007–08. *Journal of Economic Perspectives 23* (1) 77–100

Brunnermeier, M. K. & Pedersen, L.H., (2009). Market liquidity and funding liquidity, Review *of Financial Studies, 22* (22), 2201-2238.

Borio, C. (2003). *Towards a macro prudential framework for financial supervision and regulation*? *BIS Working Paper*.

Central Bank of Nigeria, (2013). *Financial stability report, June*

Central Bank of Nigeria, (2017). *Financial stability report, June*

Egboro (2016). The 2008/2009 banking crisis in Nigeria: The Hidden Trigger of the Financial Crash. *British Journal of Economics, Management & Trade, 12* (2), *1-16.*

Elena, M. *&* Claudiu, M. (2017). The financial stability index – An insight into the financial and economic conditions of Romania Theoretical *and Applied Economics, 4* (14), *5-24.*

Enowbi, K. & Simplice, N. (2017). Linkages between financial development, financial instability, financial liberalisation and economic growth in Africa. *Munich Personal RePEc Archive MPRA Paper No. 82641*

Greenlaw, D., J. Hatzius, A. Kashyap, & Shin, H. (2008). *U.S. Monetary Policy Forum Report.*

Houben, A., Kakes, J. & Schinasi, G. (2004). Toward a framework for safeguarding financial stability, *Working Paper, Vol. 2, No. 1, International Monetary Fund, Washington DC, 1–57.*

Ini S. U, Eze, O. R, & Inim V. E. (2018). An evaluation of financial system stability in Nigeria global *Advanced Research Journal of Management and Business Studies*

Isărescu, M., (2006). Stabilitateapreţurilorşistabilitateafinanciară, Piteşti

Jérôme C, Paul H, & Fabien L. (2013). Financial stability and economic performance https://hal-sciencespo.archives-ouvertes.fr/hal-01064263

Lordina P., Charles K., Joshua A., & Simon K. (2011). Financial stability and economic growth: a cross-country study. *International Journal of Financial Services Management. 5* (2), 12-24.

Khattab A., Mpabe B, Mathieu J, & Ihadiyan A. (2015). Financial development, financial instability and economic growth: The Case of Maghreb countries international. *Journal of Economics and Financial Issues, 5 (4),* 1043-1054

Olu A. & Sheriffdeen T. (2014), financial regulation in low income countries: Balancing Inclusive Growth with Financial Stability. The Nigeria Case. *Overseas Development Institute Working paper 409*

Sanusi, L. (2010). The Nigerian banking industry: What went wrong and the way forward, *Convocation Lecture presented at the Bayero University, Kano, Nigeria. February, 26* (4), 22-41

Schinasi, G. (2004). Defining financial stability. *IMF Working Paper* (187).

Sere-Ejembi, A. U. (2014). Developing Banking System Stability Index for Nigeria. *CBN Journal of Applied Statistics*, 5(1), 49-77

Soludo, C. (2009) Global financial and economic crisis: How vulnerable is Nigeria? Central Bank of Nigeria.

Taylor, J. B. (2008). The financial crisis and the policy responses: An empirical analysis of what went Wrong. *Working paper. Stanford University.*

Ubilava D. (2014), On the relationship between financial instability and economic performance: Stressing the business of Nonlinear Modelling. *Agricultural & Applied Economics Association Annual Meeting*

World Bank Growth Commission (2010). Post-Crisis growth in developing countries: A special report of the commission on growth and development on the implications of the 2008 financial crisis, *Washington DC: The World Bank; 2010.*

Appendix
Appendix 1: Data Presentation

	GDP	NPL	RCAP	INTMA	LnGDP	LnNPL	LnRCAP	LnINTMA
Jun-10	25,518.01	28.8	1.5	54	10.14714	3.360375	0.405465	3.988984
Dec-10	29,094.26	15.7	1.8	53.7	10.2783	2.753661	0.587787	3.983413
Jun-11	29,556.41	10.8	4.2	50.8	10.29406	2.379546	1.435085	3.927896
Dec-11	33,424.00	5.3	17.9	45.2	10.41703	1.667707	2.884801	3.811097
Jun-12	34,193.99	4.3	17.7	64.6	10.43981	1.458615	2.873565	4.168214
Dec-12	37,519.94	3.5	18.3	64.3	10.53263	1.252763	2.906901	4.16356
Jun-13	38,226.65	3.9	8.9	65.2	10.55129	1.360977	2.186051	4.177459
Dec-13	41,865.90	3.4	17.1	63.9	10.64223	1.223775	2.839078	4.157319
Jun-14	41,904.61	3.5	16.4	62.7	10.64315	1.252763	2.797281	4.138361
Dec-14	47,139.01	2.9	17.2	51.2	10.76086	1.064711	2.844909	3.93574
Jun-15	43,900.85	5	17.6	65	10.68969	1.609438	2.867899	4.174387
Dec-15	50,244.10	5.3	16.1	62.2	10.82465	1.667707	2.778819	4.130355
Jun-16	45,782.78	10.7	14.7	61.4	10.73166	2.370244	2.687847	4.11741
Dec-16	55,706.70	12.8	14.8	67.6	10.92786	2.549445	2.694627	4.213608
Jun-17	53,058.61	15	11.5	57.8	10.87915	2.70805	2.442347	4.056989

Source: Central Bank of Nigeria's Financial Stability Report and Statistical Bulletin

Appendix 2: Correlation Matrix

	LNGDP	LNNPL	LNRCAP	LNINTMA
LNGDP	1.000000	-0.288274	0.713835	0.483712
LNNPL	-0.288274	1.000000	-0.742504	-0.248109
LNRCAP	0.713835	-0.742504	1.000000	0.382404
LNINTMA	0.483712	-0.248109	0.382404	1.000000

Source: Author's Computation

Appendix 3: Granger Causality

Pairwise Granger Causality Tests
Sample: 2010S1 2017S2
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNNPL does not Granger Cause LNGDP	13	1.59058	0.2621
LNGDP does not Granger Cause LNNPL		7.00111	0.0175
LNRCAP does not Granger Cause LNGDP	13	0.16911	0.8474
LNGDP does not Granger Cause LNRCAP		1.12204	0.3719
LNINTMA does not Granger Cause LNGDP	13	0.17963	0.8389
LNGDP does not Granger Cause LNINTMA		0.77176	0.4938
LNRCAP does not Granger Cause LNNPL	13	1.34473	0.3137
LNNPL does not Granger Cause LNRCAP		1.06690	0.3884
LNINTMA does not Granger Cause LNNPL	13	0.83697	0.4677
LNNPL does not Granger Cause LNINTMA		1.80159	0.2260
LNINTMA does not Granger Cause LNRCAP	13	0.31268	0.7400
LNRCAP does not Granger Cause LNINTMA		4.37516	0.0520

Source: Author's Computation

Appendix 4: Vector Autoregression Estimates

Sample (adjusted): 2011S1 2017S1
Included observations: 13 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNGDP	LNNPL	LNRCAP	LNINTMA
LNGDP(-1)	-0.361519	4.173585	-2.773334	1.754320
	(0.34416)	(2.85183)	(4.63796)	(1.06841)
	[-1.05044]	[1.46348]	[-0.59796]	[1.64199]
LNGDP(-2)	1.335665	-4.564840	5.061233	-3.503123
	(0.58320)	(4.83260)	(7.85932)	(1.81049)
	[2.29024]	[-0.94459]	[0.64398]	[-1.93490]
LNNPL(-1)	-0.070570	1.996984	-1.146743	1.014025
	(0.16715)	(1.38511)	(2.25262)	(0.51892)
	[-0.42218]	[1.44175]	[-0.50907]	[1.95411]
LNNPL(-2)	0.158137	-1.257322	0.980927	-1.119523
	(0.19367)	(1.60482)	(2.60994)	(0.60123)
	[0.81653]	[-0.78347]	[0.37584]	[-1.86205]
LNRCAP(-1)	0.033781	-0.086030	0.220145	0.136186
	(0.03267)	(0.27069)	(0.44023)	(0.10141)
	[1.03411]	[-0.31782]	[0.50007]	[1.34290]
LNRCAP(-2)	0.013182	0.193846	-0.153356	0.081434
	(0.03587)	(0.29723)	(0.48338)	(0.11135)
	[0.36751]	[0.65219]	[-0.31726]	[0.73132]
LNINTMA(-1)	0.152858	-1.849869	-0.054922	-0.969762
	(0.16483)	(1.36582)	(2.22125)	(0.51169)
	[0.92738]	[-1.35440]	[-0.02473]	[-1.89521]
LNINTMA(-2)	0.106609	-0.065056	-0.532638	-0.042106
	(0.11363)	(0.94158)	(1.53130)	(0.35275)
	[0.93821]	[-0.06909]	[-0.34783]	[-0.11936]
C	-0.934451	11.98488	-18.87770	26.26595
	(3.42120)	(28.3493)	(46.1049)	(10.6208)
	[-0.27314]	[0.42276]	[-0.40945]	[2.47306]
R-squared	0.990438	0.926849	0.639659	0.780356
Adj. R-squared	0.971314	0.780546	-0.081022	0.341067
Sum sq. resids	0.004097	0.281337	0.744108	0.039487
S.E. equation	0.032005	0.265206	0.431308	0.099357
F-statistic	51.79003	6.335139	0.887576	1.776406
Log likelihood	33.95924	6.469272	0.147172	19.23251
Akaike AIC	-3.839882	0.389343	1.361973	-1.574233
Schwarz SC	-3.448764	0.780461	1.753092	-1.183114
Mean dependent	10.64108	1.735826	2.633785	4.090184
S.D. dependent	0.188966	0.566124	0.414830	0.122399