

Prudential Regulation and Capital Adequacy Ratio of Banking System in Nigeria: A Comparative Study

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Abstract

This study examined the effects of macro-prudential regulation on banking system capital adequacy in Nigeria. The objective was to ascertain the relationship between macro-prudential regulation and banking system capital adequacy in Nigeria. Time series data were collected from Central Bank of Nigeria statistical bulletin and factbook. In order to achieve the objective, the study specified three models with secondary data covering the period of 1986 - 2018 and utilized ordinary least squares regression analysis, descriptive statistics and granger causality in order to further ascertain the directional relationship among the variables. Capital adequacy was proxy dependent variable while interest rate, inflation rate, cash reserve ratio, lending rate and exchange rate were proxy for independent variables. The result reveals that the independent variables have mixed relationship with capital adequacy. The study concludes that the heterogeneity that exists among the macro-prudential variables as it relates to Nigeria calls for financial re-engineering in order to explore the potential growth virtues embedded in the banking sector. We therefore recommend that in order to achieve banking system soundness, macro-prudential policy has to be precisely determined with clearly defined mandates among responsible institutions. Responsibilities for macro-prudential policy differ among countries. Regardless of the type of institutional model, central banks should have a significant role to play in macro-prudential policy.

Keywords: *Prudential Regulation, Capital Adequacy Ratio, Banking System, Nigeria, Comparative Study*

Introduction

Banking industry is one of the significant sectors of the financial system in most countries (San & Heng, 2013). Banks plays a crucial role of promoting the growth of economy by mobilizing savings and using the mobilized savings in financing the most productive sectors of economic (Alkhazaleh and Almsafir, 2014). Commercial banks are important to the financial segment, particularly in developing economies where capital markets are not well developed and strong. In economies where the capital markets are still developing, banking institutions serve as a vital source of finances for enterprises (Ntow and Laryea, 2012).

Banking institutions regulation and supervision are required for three primary objectives of; promoting soundness and stability of the financial/ banking system, ensuring protection of consumers of financial services and reduce financial crimes (anti-money laundering/counter financing terrorism).Macro prudential regulations cover so many issues such as Risk Management, Corporate governance, Know Your Customer and Anti-money laundering, Project Financing, Object Finance, Real estate and Commercial Real Estate, Small and Medium Enterprises Financing, Financial instrument stability Financing, Microfinance loans, Retail financing and Loan loss provisions.

Critical gaps in prudential regulations, inadequate disclosures and transparency about the financial position of banks, uneven supervision and enforcement, lack of investor and consumer sophistication and major failures in banks' corporate governance were the major factors that led to the creation of an extremely fragile financial system that was tipped into crisis by the global financial meltdown (Aburime and Uche, 2008).

Borio (2011) viewed macro-prudential policy as a calibration of regulatory and supervisory arrangements from a systemic point of view rather than from the efficiency of individual financial institutions. This point of view follows a top-down approach which assesses the soundness of the financial system as a whole and then reviews the health of individual financial institutions, as opposed to the bottom-up approach implicit in traditional micro-prudential policy. A new regulatory framework was envisaged to "marry" micro-prudential supervision with macro-prudential policy. Macro-prudential policy has the aim of dealing with systemic risk on a macro level by reducing pro-cyclicality and common exposure and interlinkages of the financial system.

Capital-related measures include countercyclical capital buffers, leverage ratios and capital add-ons for global systemically important banks (SIBs) as well as dynamic loan provisioning. When regulators choose these macro-prudential tools, it is important that they consider factors such as the stage of economic development of a country and its financial sector, the type of exchange rate regime (that is, fixed or managed) and the type of shocks to which its economic position is vulnerable. There are many studies on prudential regulations; this study examined the effect prudential regulations on capital adequacy of commercial banks in Nigeria.

Literature Review

Theories of Regulation

The standard "public interest" or "helping hand" theory of regulation is based on two assumptions. First, unhindered markets often fail because of the problems of monopoly or externalities. Second, governments are benign and capable of correcting these market failures through regulation. This theory of regulation has been used both as a prescription of what governments should do, and as a description of what they actually do, at least in democratic countries. According to this theory, governments control prices so that natural monopolies do not overcharge, impose safety standards to prevent accidents such as fires or mass poisonings, regulate jobs to counter the employer's monopsony power over the employee, regulate security issuances so investors are not cheated, and so on. The public interest theory of regulation has become the cornerstone of modern public economics, as well as the bible of socialist and other left-leaning politicians. It has been used to justify much of the growth of public ownership and regulation over the twentieth century (Allais, 1947; Meade, 1948; Lewis, 1949).

Theory of Economic Regulation

In 1971, George J. Stigler refined and expanded the ideas first developed in capture theory into a reformulated theory of economic regulation. This theory of economic regulation is derived from public choice theory, which is defined as the economic study of non-market decision making, or simply the application of economics to political science (Mueller 2003). In this context, the theory first takes the view that regulation is a public good whose allocation is governed by the laws of demand and supply (Posner 1974). On the demand side are industry groups that have access to better information than consumers and politicians have access to; thus, this scenario begs for regulation. In other words, a central thesis of Stigler (1971) is that regulation is acquired by the industry and is designed and operated primarily for its benefit. On the supply side, regulation as a public good is supplied by policymakers. In this context, the second view is essentially that the political process defines the rational explanation for regulation (Stigler 1971).

Enforcement Theory of Regulation

Suppose that the society wishes to control business to pursue some socially desirable end: marginal cost pricing, safe food and water, or safety precautions by firms. As Djankov et al. (2003) argue, there are four distinct strategies of such control, involving ever growing powers of the state vis-à-vis private individuals: market discipline, private litigation, public enforcement through regulation, and state ownership. These four strategies for social control of business are not mutually exclusive: competition and regulation often operate in the same market, as do private litigation and public regulation. In addition, there are common intermediate strategies of social control of business, such as private litigation to enforce public rules, which lies between pure regulation and pure litigation. Nonetheless, these four categories provide a useful analytical classification, which also has the advantage of following closely the historical discussions of the proper role of government.

Micro prudential Regulation Theory

According to the theory, traditional micro prudential regulation of banks is based on the logic that banks finance themselves with government-insured deposits (Samuel, Anil and Jeremy, 1981). While deposit insurance has the valuable effect of preventing bank runs, it also creates taxpayer exposure and an accompanying moral hazard problem for bank managers. The goal of capital regulation is to force banks to internalize the losses on their assets, thereby protecting the deposit insurance fund and mitigating moral hazard. Thus if the probability of the deposit insurer bearing losses is reduced to a low enough level, micro prudential regulation is by definition doing its job (Diamond and Dybvig, 1983).

Conceptual Framework

Prudential Regulations

Prudential regulation is monitoring of deposit-taking institutions, supervision of the conduct of these institutions and laying down requirements that limit their risk-taking. The aim of prudential regulation is to ensure the safety of depositors' funds and maintain the stability of the financial system (Brownbridge, 2000). Regulations refer to the rules and policies set by a legally authorised body governing the activities of institutions under its supervision. The body has legal powers to take disciplinary action against institutions found to be contravening the regulations set (Brownbridge, 2000). In Nigeria the body mandated to monitor and supervise the operations of commercial banks is the Central Bank of Nigeria.

Relationship with the prudential regulator while some countries have separated their financial regulators along the lines of licensing, prudential regulation and consumer protection, in Nigeria all roles are primarily performed by the CBN. In February 2011, the CBN released its Supervisory Intervention Framework for the Nigerian Banking Sector (Supervisory Framework 2011), which was designed to complement the CBN's Prudential Guidelines for Deposit Money Banks in Nigeria 2010 (DMB Prudential Guidelines). It reflects the fact that CBN has adopted a risk-based supervisory approach.

The risk-based supervisory approach is a continuous process of updating risk assessments through on-site and off-site examinations of financial institutions to create an early warning system so the CBN can anticipate and deal with emerging issues. This approach results in the CBN producing a composite risk rating for financial institutions. Pursuant to Section 13 of the BOFIA, the CBN has the power to establish and enforce capital ratios and prudential standards over all deposit-taking financial institutions operating in Nigeria. The CBN's website sets out all the prudential guidance notes currently in force. The DMB Prudential Guidelines comply significantly with the Basel II framework, but adjust certain sections of the framework to better reflect the distinctive features of the Nigerian economy.

Macro-Prudential Regulation

Macro-prudential policy is often taken to mean the macro-prudential regulation of banks, especially in central banking circles, but it is important to realize that the externalities that justify the use of macro-prudential policies are not at work only in the banking sector. These externalities are also relevant in the real sector. For example, the evidence in Mian and Sufi (2009) suggests that one important reason behind the large and persistent fall in US demand after the banking crisis was excessive leverage in the household sector rather the banking sector.

Regulation refers to various interventions by the government, or its agents, in the private domain, to correct the imperfections and limitations as well as to curtail the excesses of economic agents. For instance, the financial sector is regulated because it exhibits market failures that can have devastating consequences. Therefore, for

public interest, financial systems are regulated to maintain market confidence, ensure consumer protection, reduce financial crime and promote financial stability. Financial system regulation refers to a set of rules, guidelines, and actions of government that defines the behavior of financial institutions and market participants.

These rules are usually enacted by national government regulators e.g. Central Bank of Nigeria (CBN), Securities and Exchange Commission (SEC) or international bodies like the Basel Committee on Banking Supervision, Financial Action Task Force (FATF). Prudential regulation is a part of financial system regulation. It implies establishing specific rules and standards for the behavior of the market participants or institutions, and for the disclosure of information to control risks. It also implies ensuring adequate capital, which is complemented by monitoring and supervision rules to prevent and minimize financial sector risk. Generally speaking, they are preventive rules meant to abort potential problems. Prudential policies comprise macro-and micro-prudential policies components. The origin of the term macro-prudential is traced to the Basel Committee on Banking Supervision since the 1970s and was publicly used in the mid-1980s. The use of the term has become common in the wake of the 2007-09 global financial crises (GFC). The BIS discussed it as a policy aimed at supporting “the safety and soundness of the financial system as a whole, as well as payments mechanism”.

Capital Adequacy

Capital adequacy is the capital expected to maintain balance with the risks exposure of the financial institution such as credit risk, market risk and operational risk, in order to absorb the potential losses and protect the financial institutions debt holder. Meeting statutory minimum capital requirement is the key factor in deciding the capital adequacy, and maintaining an adequate level of capital is a critical element. The United States Uniform Financial Institutions Rating System, (1997).

Capital Adequacy is a measure of the financial strength of a bank, usually express as a ratio of its shareholders’ fund to total assets. The ratio reflects the ability of bank to withstand the unanticipated losses. This ration has a positive relationship with the financial soundness of the bank. To gauge the capital adequacy, bank supervisors currently use the capital-risk asset ratio. The adequacy of capital is examined based upon the two most important measures such as Capital Adequacy Ratio (CAR) or Capital to Risk-weighted Assets ratio, and the ratio of capital to assets.

Capital adequacy has been a focus of many studies and regulators as it is considered to be one of the main drivers of any financial institution’s profitability (Demirguc Kunt et al., 2013). The concept of capital adequacy is a result of the idea of rearranging banks’ existing capital structures in order to restructure the banking industry against widespread distress. Adequate capital creates an opportunity for better standards in any business establishment. It spurs business exertion and a better performance. According to Olalekan and Adeyinka (2013), the minimum ratio of capital to total risk-weighted assets should remain at 10 per cent as prescribed in circular BSD/11/2003 issued on 4 August 2003.

Further, at least 50 per cent of a bank’s capital should comprise of paid-up capital and reserves, while every bank should maintain a ratio of not less than 1:10 between its adjusted capital funds and total credit net of provisions. Consequently, deposit money banks in Nigeria are encouraged to maintain a higher level of capital which is commensurate with their risk profiles. The existing definition of the constituents of capital, deductions from total qualifying capital and restrictions within and between primary (Tier 1) and supplementary (Tier 2) capital are generally consistent with the Basel Accord. Tier 2 capital is limited to 100 per cent of Tier 1 capital. The general provision was part of Tier 2 capital where a bank’s specific provision for bad and doubtful debts was made to CBN’s satisfaction.

The three core indicators of capital adequacy are vital to the robustness of financial sector to withstand shocks to their balance sheets. Deterioration in the ratio signifies increased risk exposure and possible capital adequacy problems while an increase in the ratio means the reverse. Regulatory Capital to Risk-Weighted Assets ratio measures the capital adequacy of the banking sector in Nigeria. The numerator represents the industry position of the regulatory capital of all commercial banks in the country, while the denominator is their Risk Weighted Assets (RWA) within the given period. Regulatory capital is defined in line with the provisions of the Basel Committee on Tier 1 and Tier 2 capitals.

The international convention is that regulatory capital should not be less than 8.0 per cent of banks' risk weighted assets, while the required minimum ratio in Nigeria is 10 per cent for Regional and National banks and 15 per cent for International banks. Regulatory Tier 1 Capital to Risk-Weighted Assets ratio measures the capital adequacy of the banking sector in Nigeria. The numerator represents the industry position of the Tier 1 capital of all DMBs in the country, while the denominator is their Risk Weighted Assets (RWA) within the given period. Tier1 capital comprises of paid-up capital, common stock and disclosed reserves such as retained earnings, share premiums, general reserves and legal reserves. Nonperforming Loans net of provision to capital indicator is intended to compare the potential impact on capital of nonperforming loans net of provision. The numerator is treated in Nigeria as nonperforming when payments of principal and interest are overdue by three months or more. Specific provisions are deducted from the capital which is measured as capital and reserves reported in the sectoral balance sheet.

Liquidity Ratios

The Basel Committee which advocated the Basel III norms realized the necessity to have an appropriate framework for managing liquidity risk along with prudential norms for capital risk asset ratio (CRAR). The Basel Committee on Banking Supervision published its report on Basel III rules titled 'Liquidity- Basel III International Framework for Liquidity Risk Measurement, Standards and Monitoring in 2010'. This committee suggested two standards viz. liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) to ensure adequate liquidity with banks and to take care of funding risk. The said committee published its report titled 'Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools in January 2013.

The committee expects that along with capital adequacy standards, regulatory authorities in their jurisdiction, mainly central banks of various countries, should introduce standards on LCR and NSFR. The Basel Committee has observed that the liquidity coverage ratio and net stable funding ratio are important components of Basel III Accord. Implementation of these norms will help to make the existing banking system more robust and vibrant. LCR is introduced with a view to ensure that a bank has an adequate stock of unencumbered high-quality liquid assets that consist of cash and near cash assets to meet its liquidity needs in the next 30 calendar days. This will help a bank to survive until the 30th day of the stress scenario. The standard norm of net stable funding ratio is also expected to bring discipline through use of more stable sources of funds to fund long-term assets.

Cash Reserve Requirement

Reserve requirements are probably one of the most complex policy tools at the disposal of central banks. Reserve requirements are sometimes hard to understand due to the fact that they can be used for very different reasons, and that these reasons vary substantially across time and 8countries. Reserve requirements can be used either as a banking regulation, a monetary policy tool, a tax or a financial repression instrument.

Banking regulation: Reserve requirements intend to force banks to keep a minimum amount of liquid assets to withstand bank run (Feinman (1993), and Carlson (2015)). Monetary policy tool: Reserve requirements can be used to constrain credit, and to control interest rates (either to control the demand of banks for central bank money or to stabilize interest rates (Huberto M. Ennis and Todd Keister (2008)). Reserve requirements can be used as a direct tax on banks (Romer (1985)), for pure fiscal reasons. The tax can also be used as a pigouvian tax on issuance of short-term deposits Kashyap and Stein (2012). The tax can also be used on foreign deposits to discourage inflows, or on foreign currency deposit, to discourage financial dollarization and or penalize currency risk.

Interest Rate

Interest rate is an important economic price. This is because whether seen from the point of view of cost of capital or from the perspective of opportunity cost of funds, interest rate has fundamental implications for the economy. By either impacting on the cost of capital or influencing the availability of credit, by increasing savings, it is known to determine the level of investment in an economy.

Interest can be defined as the return or yield on equity or opportunity cost of deferring current consumption into the future (Uchendu, 1993). This definition clearly shows that interest is a concept which can mean different things depending from the perspective it is viewed. Interest rate can therefore be seen as a nebulous concept, a position affirmed by the availability of different types of this rate. Some of which are; savings rate, discount rate, lending rate and Treasury bill rate. Apart from this, interest rate can also be categorized as nominal or real. This categorization credited to Irvin Fisher tries to accommodate the moderating influence of inflation on interest rate. Nominal interest rate is the observed rate of interest incorporating monetary effects while real interest rate is arrived at by considering the implications of inflation on nominal interest rate (Uchendu, 1993; Essia, 2005).

Exchange Rate

Exchange rate is considered the single most important price by some countries because of its role in the determination of international balance of payment (Levich, 2001). Mordi (2006) argues also that exchange rate movements have impact macroeconomic variables like inflation, prices incentives etc. also fiscal viability, balance of payments equilibrium; export competitiveness, resource allocation efficiency and overall international confidence have been seen to be impacted by same. The need to understand what drives exchange rates is now very crucial, an understanding of its determinants particularly in a developing nation like Nigeria would indeed aid in policy decisions of the sovereign monetary authorities.

Lending Rate

Bank Lending is a very important function of the banking system, providing liquidity in the economy, profitability of the banks through the interest charged as well as impacting on the economic growth rate and the business net worth of nations. Okpara (2009) explains that the banking sector helps to make credits available by mobilizing surplus funds from savers who have no immediate needs for such funds and thus, channel such funds in form of credits to the investors who have brilliant ideas on how to create additional wealth in the economy but lack the necessary capital to execute such ideas.

Inflation Rate

Inflation defines a rise in the general level of prices of goods and services in an economy over a period of time. Inflation may also be defined as a sustained rise in general price levels or a period of persistent rise in prices. The implication is that each unit of the currency in question will buy less than it had previously bought.

Inflation could bring about the debasement of the means of exchange. Central Bank of Nigeria in recent times have consistently churned out harsh policies that the bank claims are aimed at cushioning inflation in Nigeria. For instance, on Tuesday, 25th January 2011, the Central Bank increased the Monetary Policy Rate (MPR) by 25 basis points from 6.25 to 6.5 percent to reduce money supply in the economy (Otto and Nnebee, 2011), between January 2011 to January 2013, the MPR has been increased to 12.5 percent. These increases impact on the prime lending rates of banks, thus affect cost of borrowing and ultimately the cost of production of goods or services in the country. This in turn is likely to impact on total investments output, employment and development.

Empirical Review

David, Kithinji and Njeru (2018) evaluated the effect of CBK prudential guidelines on financial performance of commercial banks. The study was guided by three independent variables which were: to find out the effect of rate cap law on financial performance of commercial banks in Nairobi CBD, to examine the effect of capital adequacy on financial performance of commercial banks in Nairobi CBD, and to find out the effect of liquidity management on financial performance of commercial banks in Nairobi CBD. The scope of the study was based on commercial banks in Nairobi CBD. Descriptive research design was used in the study. The study population was 43 managers of all licensed commercial banks in Nairobi CBD. Questionnaires were self-administered for data collection. Statistical package for social sciences (SPSS) was used to analyze data. The study found that the Rate Capping Law was not achieving its primary objective of making credit accessible to the low income earners at an affordable price. The study further found that capital adequacy and liquidity management are important regulations that positively affect financial performance of commercial banks. Therefore, the study recommended the review of rate capping law by the relevant authority because it had failed to achieve its main objective to ease the access of credit to low income earners.

Toby (2007) investigated select financial indicators and their prudential implications for banking system soundness in Nigeria, using the spearman's rank correlation coefficient and Freund-Williams significance test at 5 per cent. Significant correlation was found between capital adequacy and bank solvency, while a significant negative correlation between cash reserve ratio and nonperforming loans. Also cash and bank balance ratio correlates positively and significantly with the return on total assets, while the ratio of loans to deposits correlates negatively and significantly with bank solvency, the pre-tax profit margin correlates positively with bank solvency. Incremental capital requirements should be graduated in line with selected bank solvency and profitability projections. An optimal loan to deposit ratio must have the objectives of increasing asset quality, long run corporate growth and facilitation of monetary transmission mechanism.

Asekome and Aihie (2014) attempted to appraise the major banking sector reforms in Nigerian from 1958 to 2011, and the challenges posed to both the banks, the apex authorizes as well as the Nigeria financial system. The paper observes that most of the banking sector reforms in Nigeria were reactive rather being proactive and were also directed towards particular issues that arose from time to time. They were therefore not strategically holistic in approach hence most of the positive impacts of many of the reforms were short lived and unsustainable. The paper recommends the need to strengthen monitoring and supervisory capacity of the apex authorities through effective training and capacity building for CBN and the NDIC to strengthen their effectiveness. The paper also recommends the need to release some of the functions of CBN to other apex agencies such as the NDIC as the CBN appears to be over saddled with too many responsibilities beyond its present capacity.

Iwedi (2017) the series of bank failure in Nigeria have raised doubt in the minds of banking and non-banking public about the efficacy of the prudential regulator and its frameworks. This is due to the fact that a substantial number of these groups are questioning the roles of the prudential regulator saddles with the responsibility of regulating and supervising the activities of banks together with the laws governing the operation and conduct of banking business in Nigeria. The incessant failure witness in the banking sector over these years is captured by the number of failed banks, spate of non performing credits, the debt and extent of required capitalization, loss of depositors funds and the general impact on the economy all of which underscores the importance of the sector. A study of this nature examined bank failure in Nigeria and those responsible for such series of failures. It was discovered that the Nigeria banking sector regulatory authorities are responsible and are to be blamed for these incessant rates of failures in the banking sector of the Nigeria economy. We conclude that the failure experience in the sector in recent times is attributed to

regulatory laxity on the part of the prudential regulators occasioned by their inability and delay to carry out some of its routine, off site, and on site functions as stipulated in the mandate establishing CBN and failures to ensure compliance to the prudential guidelines.

Olu and Tella (2018) investigated the potential trade-off between financial sector regulation and financial stability in Nigeria and implications for financial inclusion and inclusive growth. The effects of the existing regulations on the structure of the banking sector which dominates the Nigerian financial system are regarded as very germane to present and future stability of the financial system which itself is necessary for achieving financial inclusion and inclusive economic growth. Quantitative and qualitative analyses of the financial market activities showed that the *raison d'être* 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.

Gap in Literature

After reviewing past literature on interlinked areas of macro-prudential regulations and banking system soundness in this chapter few observations gap have been noted and are given below; Firstly, pre and post timeframe series studies on macro-prudential regulations and banking system soundness relationship are few (Baudot-Trajtenberg, Frayberg and Tzur-Ilan, 2017; Agénor, 2018; Musabi and Mbithi, 2018) and are using, in most cases, data from developed countries. Therefore this study examined the effect of prudential regulations and capital adequacy of commercial banks in Nigeria.

Methodology

Ex-post facto design was adopted thus utilizing historical data and econometrically evaluating them to forecast trends and make relevant recommendation. Ex- post facto design also can be best defined as quasi –experimental because the relationship available between the various hypotheses cannot be swayed. These data were collected from 1986 to 2009 to cover the period before the prudential guidelines, and further from 2010 to 2018 to cover the period after the macro prudential guideline. Data for this study were sourced mainly from the various issues of Central Bank of Nigeria's Statistical Bulletin. The population of study here is all commercial banks quoted on the Nigerian Stock Exchange as at 31st December 2018. The sample size of the study was fourteen commercial banks quoted due to the availability of data.

Method of Data Analysis

From the literature review on the macro prudential regulations and banking system soundness in Nigeria, suitable methods of analysis were employed for data analysis in this study to determine the significance of the relationship between macro prudential regulations and banking soundness in Nigeria. Bank's Liquidity (BALQ) is the dependent variable while; Interest Rate (INTR) Inflation Rate (INFR), Cash Reserve (CARR) and Lending rate (LNDR) are proxies for regulation implementation.

Descriptive Statistics

Descriptive statistics are very important because if we simply presented our raw data it would be hard to visualize what the data was showing, especially if there was a lot of it. Descriptive statistics therefore enables us to present the data in a more meaningful way, which allows simpler interpretation of the data. The skewness of a symmetric distribution such as a normal distribution is zero, distribution with its tail on the right side is positively skewed distribution and the one with its tail on the left side is negatively skewed distribution.

$$\text{Skewness} = \frac{\sum_i^N (X_i - \bar{X})^3}{(N-1) \cdot \delta^3} \quad 1$$

Where;

N =Number of years/observations

X = Median

X_i = Mean

δ = Standard Deviation

The Kurtosis;

The kurtosis measures the combined sizes of the two tails. It measures the amount of probability in the tails. The value is often compared to the kurtosis of normal distribution of the classification. The kurtosis of the normal distribution is 3, if the kurtosis exceeds 3, the dataset has heavier tails than normal distribution. If the kurtosis is less than 3 then the dataset has lighter tails than a normal distribution.

$$\frac{1}{n} \sum_{i=1}^n \left(\frac{x_i - \mu}{\sigma} \right)^4 \quad 2$$

Where;

n =Number of years/observations

X = Median

X_i = Mean

δ = Standard Deviation

Jarque-Bera test;

The Jarque-Bera test is a goodness-of-fit test of departure from normality, based on the sample skewness and kurtosis. The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. The test statistic is always nonnegative. If it is far from zero, it signals the data do not have a normal distribution.

$$JB = \frac{N}{6} \left(\frac{S^2 + (K-3)^2}{4} \right) \quad 3$$

where;

N =Number of years/observations

S = Skewness

K = Kurtosis

Ordinary Least Square (OLS)

For the multiple descriptive variables extra variables are added to the equation. The formula of the model is the same as in a single response variable (Y), but this time Y is projected by multiple explanatory variables (X1 to X5).

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad 4$$

The interpretation of the parameters (α and β) from the above model is principally the same for the simple regression model, however, the relationship cannot be graphed on a single scattered plot. α specifies the value of Y when all variables of the descriptive variables are zero. Each β parameter specifies the normal change in Y that is related to a unit change in X , while regulating for the other descriptive variables in the model.

Coefficient of Determination (R^2)

R-squared is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determinations for multiple regressions. The definition of R-squared is fairly straight-forward; it is the percentage of the response variable variation that is explained by a linear model.

T-Test

A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features. A t-test is applied to measure the significance of the independent variables to the dependent variable and the hypothesis was tested at 5% level of significance and at 95% confidence interval. The hypothesis for this test is as follows;

Null Hypothesis; $H_0: \beta = 0$, (Statistically not significant)

Alternate Hypothesis; $H_1: \beta \neq 0$, (Statistically significant)

And the decision rule states that “ H_0 ” should be rejected when T- stat is greater than the critical value. But when the T- statistics is lower than the critical value; the “ H_0 ” is accepted with its conclusion.

F-Test

An **F-test** is any statistics test in which the test statistic has an F-distribution under the null hypothesis.

Granger Causality

Granger causality is a statistical concept of causality that is based on prediction. According to Granger causality, if a signal X_1 "Granger-causes" (or "G-causes") a signal X_2 , then past values of X_1 should contain information that helps predict X_2 above and beyond the information contained in past values of X_2 alone. More complex extensions to nonlinear cases exist, however these extensions are often more difficult to apply in practice.

$$\begin{aligned} X1(t) &= \sum_{j=1}^p A11_j X1(t-j) + \sum_{j=1}^p A12_j X2(t-j) + E1(t) \\ X2(t) &= \sum_{j=1}^p A21_j X1(t-j) + \sum_{j=1}^p A22_j X2(t-j) + E2(t) \end{aligned} \quad 5$$

where p is the maximum number of lagged observations included in the model (the model order), the matrix A contains the coefficients of the model (i.e., the contributions of each lagged observation to the predicted values of $X1(t)$ and $X2(t)$, and $E1$ and $E2$ are residuals (prediction errors) for each time series. If the variance of $E1$ (or $E2$) is reduced by the inclusion of the $X2$ (or $X1$) terms in the first (or second) equation, then it is said that $X2$ (or $X1$) Granger-(G)-causes $X1$ (or $X2$). In other words, $X2$ G-causes $X1$ if the coefficients in $A12$ are jointly significantly different from zero. This can be tested by performing an F-test of the null hypothesis that $A12 = 0$, given assumptions of covariance stationarity on $X1$ and $X2$.

Operational Measures of Variables

The study was carried out for the Nigerian economy using time series data. In order to assess the relationship between macro prudential regulation and banking system soundness, seven indicators were constructed that consist of: Banking system soundness proxied Bank's Liquidity (BALQ) while macro prudential regulation was proxied by interest rate (INTR) inflation rate (INFR), cash reserve (CARR), lending rate (LNDR) and exchange rate (EXCR).

Dependent variable

The dependent variable is banking system soundness, measured by Capital Adequacy (CPAQ). This is captured by the actual capital base of banks as a ratio to liability to the form of risk weighted assets over the study period.

$$CPAQ = \frac{(\text{Tier 1 Capital} + \text{Tier 2 Capital})}{\text{Risk Weighted Assets}} \quad 6$$

Tier 1 Capital = consists of banks' capital accounts, reserves and common loan stocks.

Tier 2 Capital = Hybrid capital instruments, financial derivatives and subordinated term debt.

Risk Weighted Assets = Set of Banks' assets showing risk exposures weighted according to risk used to determine capital adequacy.

Independent Variable: Independent variables are the variables that the researcher changes to test their dependent variable.

Interest Rate (INTR): It is defined as the proportion of an amount loaned which a lender charges as interest to the borrower, normally expressed as an annual percentage.

Inflation Rate (INFR): The inflation rate is the percentage increase or decrease in prices during a specified period, usually a month or a year. The percentage tells you how quickly prices rose during the period.

Cash Reserve Ratio (CARR): refers to a certain percentage of total deposits the commercial banks are required to maintain in the form of cash reserve with the central bank.

Lending Rate (LNDR): Lending rate is the other depository corporation rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing.

Exchange Rate (EXCR): An exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency.

Model Specification

Our model for the study is anchored on previous studies with modifications, first, the study by Toby (2007) on CAMEL analysis, prudential regulation and banking system soundness in Nigeria.

$$CPAQ = f(\text{INTR}, \text{INFR}, \text{CARR}, \text{LNDR}, \text{EXCR}) \quad 7$$

Expressing the functional notation in equation (1.0) in econometric form;

$$\text{CPAQ} = \beta_0 + \beta_1 \text{INTR} + \beta_2 \text{INFR} + \beta_3 \text{CARR} + \beta_4 \text{LNDR} + \beta_5 \text{EXCR} + \epsilon_i \quad 8$$

By Log linearization the equation is thus:

$$\text{LogCPAQ} = \beta_0 + \beta_1 \text{LogINTR} + \beta_2 \text{LogCARR} + \beta_3 \text{LogINFL} + \beta_4 \text{LogLNDR} + \beta_5 \text{LogEXCR} + \epsilon_i \dots (3.2)$$

A priori expectation $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$

The coefficient of elasticity $\beta_0, \beta_1, \beta_2, \beta_3 - \beta_n$ explains how a unit change in the independent variables affects the dependent variable. The error term ϵ_i was incorporated in the model in order to cater for other factors that influence the dependent variable.

where;

CPAQ = Capital Adequacy

INTR = Interest Rate

INFL = Inflation Rate

CARR = Cash Reserve Ratio

LNDR = Lending Rate

EXCR = Exchange Rate

β_0 , = Constant

$\beta_1, \beta_2, \beta_3 - \beta_n$ = Coefficients

ϵ_i = Error term.

Presentation of Results and Discussion of Findings

Table 1: Summary of Unit Root Tests Result

Variables	Levels					1 st Differences					Order of Integration
	ADF t-stat	Critical Values			p-value	ADF t-stat	Critical Values			p-value	
		@ 1%	@ 5%	@ 10%			@ 1%	@ 5%	@ 10%		
CPAQ	-4.58	-4.27	-3.55	-	0.004	-	-4.28	-3.56	-	0.000	I(1)
				3.21	7	8.69				0	
INTR	-4.13	-4.27	-3.55	-	0.013	-	-4.39	-3.61	-	0.021	I(1)
				3.21	9	4.04				1	
INFR	-3.19	-4.30	-3.57	-	0.104	-	-4.39	-3.61	-	0.000	I(1)
				3.22	7	6.23				2	
CARR	-3.24	-4.27	-3.55	-	0.093	-	-4.33	-3.58	-	0.001	I(1)
				3.21	6	5.24				2	
LNDR	-3.07	-4.27	-3.55	-	0.129	-	-4.28	-3.56	-	0.000	I(1)
				3.21	4	6.20				1	
EXCR	-1.64	-4.27	-3.55	-	0.751	-	-4.28	-3.56	-	0.001	I(1)
				3.21	1	5.06				5	

Source: E-views 9.0

Table 1 shows a summary of the Unit Root test for macro prudential variables. The test is carried out to ensure that the time series data maintain stationarity. From the summary table, all the variables were not stationary at Levels, hence a further unit root test at first difference to establish stationarity. The table reveals that the variables became stationary at first difference.

Table 2: Test of Two-Means

	CPAQ	INTR	INFR	CARR	LNDR	EXCR
Mean-Pre	1.3842		14.1148	23.4822	45.6459	13.1456
Mean-Post	2.5578		7.5237	11.6523	37.1826	15.3866
Difference	1.1735		-6.5910	-11.830	-8.4633	2.2409
Std. Dev. – Pre	0.9057		5.1647	21.3029	8.9628	5.0819
Std. Dev. – Post	0.5629		1.3534	3.44699	18.5824	2.4383
Difference	-0.3428		-3.8113	-17.856	9.61952	-2.6435

Source: E-views 9.0

This study assesses macro-prudential regulations and banking system soundness in Nigeria. As part of the analysis, the study examined the pre and post macro-prudential regulations. Here, we adopted the test of two means to analyze the two periods under study. The pre and post macro-prudential periods is seen at this point as two independent groups with respect to the mean of the variable under view.

Table 3: Descriptive Statistic – Pre Macro-Prudential Regulations Data

	CPAQ	INTR	INFR	CARR	LNDR	EXCR
Mean	1.384272	14.11483	23.48229	45.645	13.14569	64.8791
Median	1.283462	13.08792	14.12192	45.750	12.50000	21.8861
Maximum	4.473706	28.02000	76.75887	64.100	26.90000	149.692
Minimum	0.386853	7.427500	0.223606	29.100	4.500000	3.18280
Std. Dev.	0.905731	5.164774	21.30296	8.6928	5.081924	56.9504
Skewness	1.742135	1.027863	1.203034	0.0447	0.627025	0.21900
Kurtosis	6.733435	3.485221	3.112704	2.7796	3.634289	1.19455
Jarque-Bera	26.07868	4.461446	5.801862	0.0565	1.974963	3.45148
Probability	0.000002	0.107451	0.054972	0.9721	0.372514	0.17804
Sum	33.22252	338.7558	563.5749	1095.5	315.4967	1557.10
Sum Sq. Dev.	18.86803	613.5224	10437.77	1738.0	593.9968	74597.0
Observations	24	24	24	24	24	24

Source: E-Views 9.0

Table 3 shows the descriptive statistics of Pre Macro-Prudential Regulations Data. Capital Adequacy (CPAQ) has a mean of 1.384 and a standard deviation of 0.905. The minimum and maximum value obtained was 0.386 and 4.473 respectively. Also, Interest Rate (INTR) has a mean value of 14.114 and standard deviation of 5.164. The maximum and minimum value obtained for the period was 28.020 and 7.427 respectively. Inflation Rate (INFR) has a mean of 23.482, and a standard deviation of 21.302. The minimum and maximum value obtained was 0.223 and 76.758 respectively. Cash Reserve Ratio (CARR) for the period has a mean 45.645 and a standard deviation of 8.692. The minimum and maximum values obtained were 29.100 and 64.100 respectively.

For Lending Rate (LNDR), the mean value and standard deviation were 13.145 and 5.081 respectively. While the minimum and maximum value for the period was 4.500 and 26.900 respectively. Also, for Exchange Rate (EXCR), the mean value and standard deviation were 64.879 and 56.950 respectively. While the minimum and maximum value for the period was 3.182 and 149.692 respectively.

Table 4: Pre Macro-Prudential Regulations Data

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.099109	2.148853	1.907580	0.0725
LOG(INTR)	-0.127013	0.342732	-0.370591	0.7153
LOG(INFR)	-0.002338	0.074903	-0.031211	0.9754
LOG(CARR)	-1.145618	0.512786	-2.234107	0.0384
LOG(LNDR)	-0.261440	0.267824	-0.976162	0.3419
LOG(EXCR)	0.391452	0.072561	5.394790	0.0000
R-squared	0.713935	Mean dependent var		0.143915
Adjusted R-squared	0.634473	S.D. dependent var		0.621047
S.E. of regression	0.375478	Akaike info criterion		1.091083
Sum squared resid	2.537705	Schwarz criterion		1.385597
Log likelihood	-7.093000	Hannan-Quinn criter.		1.169218
F-statistic	8.984563	Durbin-Watson stat		1.951372
Prob(F-statistic)	0.000203			

Source: E-views 9.0

Table 4 shows the log linearized regression result of Ordinary Least Squares for Pre Macro-Prudential Regulations data in Nigeria. From the result, it is observed that the adjusted R² has a value of 0.634. This means that the independent variables can account for about 63.4% variations in the dependent variable using the model. The other 36.6% variation in the dependent variable is attributed to other indices not included in the model but captured by the error term. The log linearized regression estimate as presented in table 4.3 reveals that the coefficient of determination R² is 0.713, while adjusted R² is 0.634. This implies that up to 63.4% variation in CPAQ is accounted by the independent variables – Interest Rate (INTR), Inflation Rate (INFR), Cash Reserve Ratio (CARR), Lending Rate (LNDR), and Exchange Rate (EXCR). Specifically on individual variables, Interest Rate (INTR) has a negative coefficient of -0.127, with p-values of 0.7153. This relationship is observed to be insignificant at 5% level of significance. Inflation Rate (INFR) shows a negative but insignificant relationship with Capital Adequacy (CPAQ), with a coefficient value of -0.002 and a p-value of 0.975.

Cash reserve Ratio (CARR) as observed has a negative relationship with CPAQ with a coefficient of -1.145. This relationship is however found to be significant at 0.05. For Lending Rate (LNDR), there exist a negative but insignificant relationship with Capital Adequacy (CPAQ). Furthermore, Exchange Rate (EXCR) shows a positive but significant relationship with Capital Adequacy (CPAQ), with a coefficient value of 0.391 and a p-value of 0.0000. The result reveals that the independent variables have mixed relationship with CPAQ in the pre-macro-prudential regulations period.

Considering the joint statistically significance effect of the independent variables on the dependent variable, the regression result shows that F-statistic 8.984563 is higher than the Prob(F-stat) 0.000203, this shows a significant effect. In line with Sasraku(2018) and Butzbach (2017) at macro level, banking system can be improved by prescribing a new regulatory framework, promoting regulatory neutrality, eliminating information asymmetry, reinforcing good corporate governance practice in the financial system and finally providing a guideline in regaining the public's trust at a micro level.

Data Analysis – Post Macro-Prudential Regulations

Table 5: Descriptive Statistic – Post Macro-Prudential Regulations Data

	CPAQ	INTR	INFR	CARR	LNDR	EXCR
Mean	2.557856	7.523752	11.652	37.182	15.386	212.046
Median	2.365494	7.343223	11.400	30.425	15.990	169.680
Maximum	3.635368	9.890000	18.550	75.000	18.500	306.921
Minimum	1.964472	5.460000	7.9568	20.000	10.250	150.479
Std. Dev.	0.562922	1.353477	3.4469	18.582	2.4383	71.8286
Skewness	0.810911	0.278145	0.8666	0.8966	-	0.60949
Kurtosis	2.511869	2.357608	2.8356	2.7435	3.2759	1.47593
Jarque-Bera	1.075716	0.270797	1.1368	1.2306	1.4192	1.42826
Probability	0.583998	0.873368	0.5664	0.5404	0.4918	0.48961
Sum	23.02071	67.71376	104.87	334.64	138.48	1908.41
Sum Sq. Dev.	2.535052	14.65521	95.054	2762.4	47.564	41274.7
Observations	9	9	9	9	9	9

Source: Eviews 9.0

Table 5 shows the descriptive statistics of Post Macro-Prudential Regulations Data. Capital Adequacy (CPAQ) has a mean value of 2.557 for the period of 2010 – 2018, and standard deviation of 0.562. The minimum and maximum value of CPAQ for the period was 1.964 and 3.635 respectively. Also, Interest Rate (INTR) has a mean value of 7.523 and standard deviation of 1.35. The maximum and minimum value obtained for the period was 9.890 and 5.460 respectively. Inflation Rate (INFR) has a mean of 11.652, and a standard deviation of 3.446. The minimum and maximum value obtained was 7.956 and 18.550 respectively. Cash Reserve Ratio (CARR) for the period has a mean 37.182 and a standard deviation of 18.582. The minimum and maximum values obtained were 20.000 and 75.000 respectively.

Table 6: Post Macro-Prudential Regulations Data

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.992993	2.583476	0.384363	0.7263
LOG(INTR)	0.121175	0.577489	0.209831	0.8472
LOG(INFR)	-0.163128	0.500156	-0.326155	0.7657
LOG(CARR)	0.368342	0.260386	1.414600	0.2521
LOG(LNDR)	0.650399	0.506813	1.283313	0.2895
LOG(EXCR)	-0.074820	0.456187	-0.164013	0.8801
R-squared	0.603672	Mean dependent var		0.919100
Adjusted R-squared	0.506875	S.D. dependent var		0.209048
S.E. of regression	0.214910	Akaike info criterion		0.002471
Sum squared resid	0.138559	Schwarz criterion		0.129012
Log likelihood	6.011121	Hannan-Quinn criter.		0.286211
F-statistic	0.913897	Durbin-Watson stat		1.224845
Prob(F-statistic)	0.567623			

Source: E-views 9.0

The table 6 shows the log linearized regression result of Ordinary Least Squares for Post Macro-Prudential Regulations data in Nigeria. The log linearized regression estimate as presented in the table reveals the relationship between Capital Adequacy (CPAQ) and the independent variables – Interest Rate (INTR), Inflation Rate (INFL), Cash Reserve Ratio (CARR), Lending Rate (LNDR), and Exchange Rate (EXCR).

Specifically on individual variables, Interest Rate (INTR) has a positive coefficient of 0.121, with p-values of 0.8472. This relationship is observed to be insignificant at 5% level of significance. Inflation Rate (INFR) shows a negative and insignificant relationship with Capital Adequacy (CPAQ), with a coefficient value of -0.163 and a p-value of 0.7657. Cash Reserve Ratio (CARR) as observed has a positive relationship with CPAQ with a coefficient of 0.368. This relationship is however found to be insignificant at 0.05. For Lending Rate (LNDR), there exists a positive but insignificant relationship with Capital Adequacy (CPAQ).

Furthermore, Exchange Rate (EXCR) shows a negative and insignificant relationship with Capital Adequacy (CPAQ), with a coefficient value of -0.074 and a p-value of 0.8801. The result also reveals that the independent variables have mixed relationship with CPAQ in the post-macro-prudential regulations period. This is a pointer to the fact that post macro prudential regulation in Nigeria is an economic concern sequel to and heterogeneity exists among the variables.

Discussion of Findings

The study tested the effect of interest rate on capital adequacy. The result of the regression estimate from table 4 indicates that there is a negative effect of Interest Rate (INTR) on Capital Adequacy (CPAQ). This is evidenced by coefficient value of -0.091. Statistically, the Sig. value of 0.6760 is higher than the acceptable significance value of 0.05. Following the empirical result, Interest Rate (INTR) is found to have insignificant effect on Capital Adequacy (CPAQ). The findings support the study of Udede (2014) which found that interest rate although critical for policy makers in making decisions to improve the banks service quality shows insignificant effect on the economy. In the words of Sylvanus and Abayomi (2019) financial sector reforms has far-reaching policy measures including the chartering of new banks, reform of the capital market and a move from direct to indirect monetary controls. The results from the implementation of the reforms have been disappointing, however, high inflation and excessively high interest rates have become common phenomena in the economy.

The effect of inflation rate on capital adequacy on banks in Nigeria was tested. The result of the regression estimates from table 4 indicates that there is a positive effect of Inflation Rate (INFR) on Capital Adequacy (CPAQ). This is evidenced by coefficient value of 0.029. Statistically, the Sig. value of 0.6674 is higher than the acceptable significance value of 0.05. Following the empirical result, Inflation Rate (INFR) is found to have positive but insignificant effect on Capital Adequacy (CPAQ). The positive effect is not in accord with the study Harley (2017) which establishes that there is a negative relationship between inflation and banks capital base as inflation erode banks capital in most developing economy. The study suggested that Nigerian government should regulate investment policy why banks regulators should strive to keep inflation rate at a minimum level, if possible below 5% for them to be more efficient so as to be globally competitive. The finding reveals that Nigeria banking regulators need to give adequate attention to interest rate constant changes.

The study tested the effect of cash reserve ratio on capital adequacy of banks in Nigeria. The result of the regression estimate from table 4 indicates that there is a positive effect of Cash Reserve Ratio (CARR) on Capital Adequacy (CPAQ). This is evidenced by coefficient value of 0.3984. Statistically, the Sig. value of 0.0045 is lower than the acceptable significance value of 0.05. Following the empirical result, Cash Reserve Ratio (CARR) is found to have positive but significant effect on Capital Adequacy (CPAQ). Our finding of significant effect is in line Toby (2007) on financial indicators and their prudential implications for banking system soundness in Nigeria, Using the spearman's rank correlation co-efficient and Freund-Williams significance test at 5percent, found significant correlation between capital adequacy and Reserve ratio. Klingelhöfer and Rongrong (2017) shows that macro-prudential policy can be used either alone to retain financial stability, without harming the real economy; or as a complement to monetary policy to offset the buildup of financial vulnerabilities resulted from a monetary easing. Our analysis suggests that it is the multi-instrument framework that enables a central bank to achieve both macroeconomic and financial stability objectives.

The study further tested the impact of lending rate on capital adequacy of banks in Nigeria. The result of the regression estimate from table 4 indicates that there is a positive impact of Lending Rate (LNDR) on Capital Adequacy (CPAQ). This is evidenced by coefficient value of 2.2765. Statistically, the Sig. value of 0.0298 is lower than the acceptable significance value of 0.05. Following the empirical result, Lending Rate (LNDR) is found to have a positive but significant impact on Capital Adequacy (CPAQ). In the word of Rubioy (2017) macro prudential authorities should take into account both costs and benefits of shadow banking when considering their regulatory perimeter such as lending rates as unregulated banking sector can lead to unintended effects of macro prudential policy. Stricter regulation in the traditional banking sector may result in an increase in credit flows to those banks with lower regulatory levels, especially when this regulation comes from borrower-based instruments. This finding is not in accord with an earlier study Edoumiekumo, Karimo and Amaegberi (2013) which posits that although monetary policy rate and interest rate had no instantaneous and direct impact on real sector development they indirectly do so through the credit and investment channels. To this end monetary policy rate and bank lending rates are the most important monetary policy tools that can make or mar the Nigerian real sector.

The study also tested effect of exchange rate on capital adequacy of banks in Nigeria. The result of the regression estimate from table 4 indicates that there is a positive effect of Exchange Rate (EXCR) on Capital Adequacy (CPAQ). This is evidenced by coefficient value of 0.3577. Statistically, the Sig. value of 0.0000 is lower than the acceptable significance value of 0.05. Following the empirical result, Exchange Rate (EXCR) is found to have significant effect on Capital Adequacy. This implies that favorable exchange rate in the country promote the overall well-being of banks through financial stability. This finding is not in accord with Chipote (2014) which explored the role played by monetary policy in developing economy and found that exchange rate are insignificant monetary policy instruments that drive growth in developing nations. To Udede (2014) exchange rate is a strategic tool to improve and entire system in a country, the study using vector error correction mechanism (VECM) test indicates that only exchange rate exerted significant impact on financial system growth in Nigeria.

Conclusion

This study shows that the empirical analysis of banking system soundness in Nigeria reveals that macro prudential factors are important regulations that positively affect banking system soundness of commercial banks. This interdependency and diversity points to the need for a consolidated cooperation between the authorities responsible for financial regulation and the governmental authorities in charge of economic and fiscal policies towards efficient, coordinated measures that can lead to reduced systemic risk and financial system soundness. Regarding the macroeconomic factors, inflation rate (INFR), lending rate (LNDR), and exchange rate (EXCR) and their impact on banking system soundness in Nigeria, the result of the study concludes that they have negative relationship with the three banking soundness indicators but their effect on the soundness of commercial banks is insignificant.

Recommendations

Sequel to the findings of the research study, the following recommendations have been made;

- 1) In order to achieve banking system soundness, macro-prudential policy has to be precisely determined with clearly defined mandates among responsible institutions. Responsibilities for macro-prudential policy defer among countries. Regardless of the type of institutional model, central banks should have a significant role in macro-prudential policy.
- 2) There is a need to improve and further develop the banking soundness in Nigeria. When indirect effect and crowding out are considered, it can further be argued that the private sector needs to get more involved in the banking sector and that the private sector should be duly considered, supported and encouraged during prudential regulations.
- 3) Even though macro-prudential policy is very important for strengthening the banking system resilience to shocks, it cannot do it solely. Therefore, effective coordination with other policies is necessary. There are situations when the implementation of monetary, fiscal or other economic policies is more relevant and crucial for solving the problem, and the macro-prudential policy is not individually sufficient to mitigate risks or prevent specific situation.

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