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## STRATEGIC RISK MANAGEMENT AND PROFITABILITY OF NIGERIAN BANKS: AN EMPIRICAL ANALYSIS

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### **Abstract**

The aim of this research is to empirically ascertain the influence of strategic risk management on profitability of corporate firms using the banking institutions as a case study. Thus, the study is designed to examine nature of relationship that exists between nature of relationship that exists between selected risk management variables (non-performing loan ratio, liquidity coverage ratio, cost to income ratio and capital adequacy ratio) and profitability of the banking system as measured by the banks' return on assets as well as return on equity. Data were sourced from the banks' annual books of account and also the Central Bank of Nigeria's Statistical Bulletin. The econometric methodology of Ordinary Least Squares (OLS) were employed for data analysis. The results of the analysis indicate that only non-performing loan ratio and capital adequacy ratio are valuable in predicting variations in Nigeria's banking firms' profitability within the context of this study. As indicated from our findings, for Nigerian Deposit Money Banks financial performance is heavily determined by risk management practices. Therefore, it is recommended among others that banks should establish an appropriate credit risk environment. This will entail approving and periodically reviewing the credit risk strategy and significant credit risk policies of the bank. The strategy should reflect the bank's tolerance for risk and the level of profitability the bank expects to achieve for incurring various credit risks.

### **Introduction**

Financial intermediation, the process in which money deposited in banks for safe keeping by individuals or organizations is

loaned out to borrowers may be affected by the risk that depositors demand their money at a rate faster and larger than the reserves

the bank has kept from deposited funds. Asset transformation, the process of creating new assets (loans) from liabilities (deposits) is subject to the risk that a change in market interest rates may dilute the profit a bank makes in its loans since a bank must charge interest on its loans that is higher than the interest it pays on its deposits. Money creation, the process in which additional money is generated in the financial system by the repeated lending of an initial deposit in a bank through the principle of the fractional reserve, can create inflationary or other macroeconomic risks as the amount of money created in a fractional reserve banking system depends on the level of reserves banks are required to maintain from deposits. Thus, risk taking is an integral part of and constitutes a major characteristic of banking business. Risk has a very long history as it can be said to have been in existence as long as human existence. It has defied a universal definition as every author's attempt displays a different orientation.

Gallati (2003) defined risk as a condition in which there exists an exposure to adversity, or a condition in which there exists a possibility of deviation from a desired outcome that is expected or hoped for. Kannan and Thangavel (2008) posit that risk implies exposure to uncertainty or threat. One consensus from the different definitions is that risks can have an adverse impact on profitability. While the types and degree of risks that an organization may be exposed to depends upon a number of factors such as its size, complexity, nature of business and activity volume, it is believed that generally banks face credit, market, liquidity, operational, compliance / legal /regulatory and reputation risks.

There have been several presentations, on the risk management

practices in banks but they are largely theoretical and not empirical. This paper therefore sought to fill this gap by examining risk management practices among commercial banks in Nigeria with a view to relating these practices to their financial performance. In addition to contributing to the limited literature on risk management practices of banks in emerging economies.

Further, banks are usually under serious pressure to develop better credit risk management (CRM) strategies, especially as the lack of powerful CRM is one of the factors that helped trigger the recent financial crisis in Nigeria. And, with supervisory bodies looking for higher capital requirements and liquidity protections, the cost of banking business is increasing globally. As stated by Njanike (2009), the major reason of the banking crisis is a bad CRM system characterized by sophisticated insider loans, speculative loans, and high concentration of credit in certain sectors among others.

Thus, in the recent past, the inability of the financial system to efficiently handle CRM in banking business triggered similar problems in countries such as Mexico, Venezuela, and Zimbabwe. Credit risk has remained one of the topical issues of current financial studies that had enjoyed special attention from both scholars and professionals. In fact, this debate was more pronounced immediately after the recent global economic crisis. A number of scholars concede that one of the key causes of severe banking trouble is motionless credit risk control, and since supply of credit is still the primary business of every bank, credit quality is regarded as a major sign of financial dependability and healthiness of banks. The interests that are charged on loans and advances form substantial component of banks' assets, as such, non-

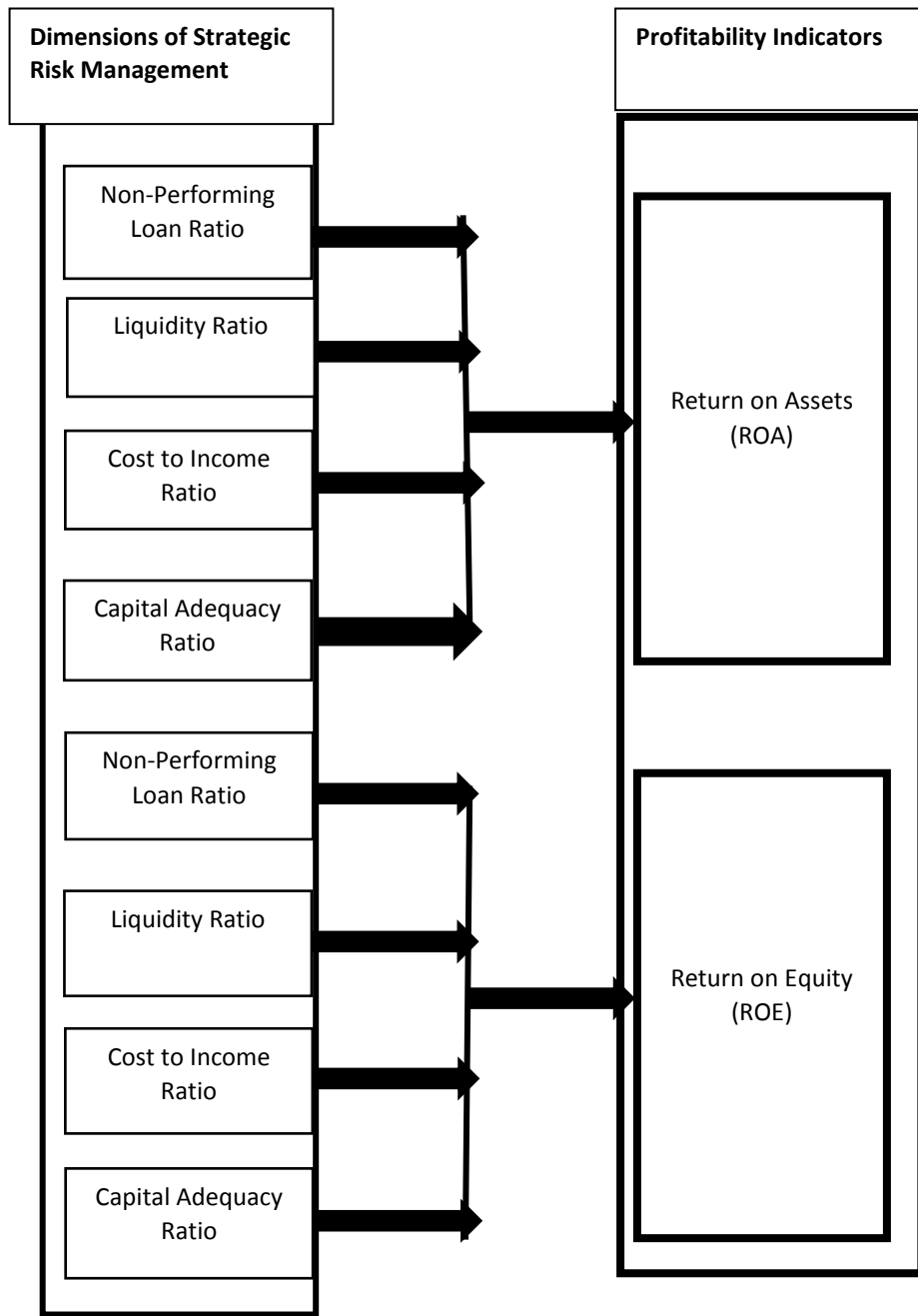
repayment of loans and advances, created serious hindrance not only for borrowers and lenders but also for the whole financial system of a country. Studies of banking tragedies all over the world have exposed that poor loans (asset quality) is the key cause of bank distresses (Boahene, Dasah, & Agyei, 2012). Risk management is the individual effort which incorporates acknowledgment of risk, risk evaluation, developing policies to control it, and lessening of risk by means of managerial resources (Appa, 1996), whereas credit risk is the possibility of loss caused by debtor's default of a loan or other earnings that relate to credit (principal and/or interest). Default rate (DR) is the possibility that a borrower will fail to pay back principal and interest in suitable and agreed terms and conditions. CRM is extremely essential to banks, as it is an integral part of the loan process. It capitalizes on bank risk, adjusted risk rate of return through safeguarding credit risk exposure with a view to defending the bank from the adverse effects of credit defaults. The Nigerian banking sector has been stressed with the dwindling value of its credit assets as a result of the large plunge in stock market indicators, worldwide oil prices, and rapid drop of the value of Naira compared with international currencies (Banc Garanti Limited (BGL) Research, 2010). The weak aspect of the banks' loan assets held up banks to expand other credits to the local economy, in consequence, unfavorably distressing financial performances were recorded in a number of instances.

This pressed the Nigerian government to establish the Asset

Management Corporation of Nigeria (AMCON) in July 2010 to grant a durable resolution to the persistent dilemma of non-performing loans bedeviling Nigerian banks. In line with the position above, the debate on the relationship between CRM and profitability in finance literature represents a topic of great importance to finance scholars and professionals, since the core activity of every bank (key players in the money market) is credit financing. Again, to lend additional support to the argument, the bank theory identifies six main types of risk which are linked with credit policies of banks and these are: credit risk (risk of repayment), interest risk, portfolio risk, operating risk, credit deficiency risk, and trade union risk. However, the most fundamental of these risks is the credit risk and for that reason, it is worthy of special attention in financial management research. The study is encouraged by the current government policy of establishing AMCON as an important element of distress resolution in Nigerian banks.

The policy was expected to help existing banks to turn around non-performing loans or classified assets on their balance sheets into viable or at least recoverable investments. The study would be particularly relevant in the context of the ongoing debate on how banks should minimize the incidence of increasing non-performing loans on their balance sheets. On the basis of the background, the study formulates the following hypothesis for testing: Ho: CRM does not have any effect on the profitability of Nigerian banks.

**Conceptual framework**



Criterion variables

Predictor variables

Figure 1: The relationship between some aspect of strategic risk management and profitability indicators.

The conceptual framework on which this study is built covers two major concepts namely, strategic risk management and corporate profitability. While return on assets and return on equity proxy corporate profitability and serve as the criterion variables, some aspect of strategic risk management which include; non-performing loan ratio, liquidity ratio, cost to income ratio and capital adequacy ratio are the predictor variables.

### **Theoretical Framework and Empirical Literature**

Over the years, different theories have been formulated in ensuring the availability and sufficiency of liquidity at any point in time. The following theories shall be considered in the validation of this study;

#### **Liquidity Asset Theory**

This focuses on the asset side of the balance sheet and argues that banks must hold large amount of liquid assets against possible demand or payment cushion of readily marketable short term liquid assets against unforeseen circumstances (Ngwu, 2006).

#### **Shift ability Theory**

This is based on the proportion that banks liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. Also, these assets could be shifted to the Central Bank for cash without material loss in case of necessity than relying on maturities to solve their liquidity problems (Ngwu, 2006).

#### **Anticipated Income Theory**

This theory is of the view that banks liquidity can be estimated and met if scheduled payments are based on the income of the borrower. It emphasizes that banks should relates loans repayment to income rather than relying heavily on

collaterals. That is, bank liquidity can be influenced by the maturity pattern of loans through customers' installments rather than those secured by real estate (Ngwu, 2006).

#### **Commercial Loan Theory**

Also called the real bills theory states that banks should advance short term self-liquidating productive loans to business firms. In other words, banks should finance the movement of goods through the successive process of production so that once these goods are sold, the loans will liquidate themselves. Such loans are termed inventory or working capital loan (Ngwu, 2006).

#### **Liabilities Management Theory**

This theory advocates that a bank can meet its liquidity requirement by bidding the market for additional funds. In other words, they can borrow money from the money market to meet their liquidity needs instead of granting self-liquidating loans (Jhingan, 2010).

#### **Empirical Review**

Studies on the influence of risk management practices on financial performance have been largely conceptual drawing on the theoretical frameworks provided by institutional regulators (Njogo, 2012; Tandelilin, Kaaro, Mahadwartha & Supriyatna, 2007). These scholars opine that a major objective of bank management is to increase shareholders' return indicating bank performance. They maintained that this objective is often achieved at the cost of increased risk and they detailed bank risks to include interest risk, market risk, credit risk, off-balance risk, technology and operational risk, foreign exchange risk, country risk, liquidity risk, and insolvency risk.

Schroeck (2002) and Nocco and Stulz (2006) as cited in Ariffin and Kassim (2009)

stress the importance of good risks management practices to maximize firms' value. While the former propose ensuring best practices by instituting effective and prudent risk management practices in order to increase earnings, the latter posits that effective Enterprise Risk Management (ERM) will provide long-run competitive advantage to the firm (or banks) compared to those that manage and monitor risks individually. In the light of this a holistic approach is suggested in managing risk.

Hakim and Neamie (2001) as cited in Ariffin and Kassim (2009) also examined credit risk and bank's performance in Egypt and Lebanon banks in the 1990s by using data for banks from the two countries over the period 1993-1999. Their study estimates a fixed effects model of bank return with varying intercepts and coefficients with findings that show that the credit variable is positively related to profitability while the relationship of the liquidity variable is insignificant across all banks and has no impact on profitability. The study also finds a strong link between capital adequacy and commercial banks' return, with a high capitalization ratio noted as being a hindrance to returns. Another dimension is offered by Bruner (2010) on taking excessive risk to boost performance.

Burner (2010) observed that a reduction in real risk-free rates of interest to historically low levels led to credit expansion in a ferocious search for yield among investors. Hence, major financial crisis around the world can also be attributed to the ambition to achieve maximum returns on shareholder's funds thereby leading to a situation where the board and management take excessive risk to boost stock prices. The economic crisis of 2007 and the 2009 financial crisis in the Nigerian banking industry are examples of such instances.

Adeusi, Akeke, Adebisi and Oladunjoye (2013) in their study which focused on the association of risk management practices and bank financial performance in Nigeria used data obtained from the annual reports of 10 banks for four years and reported an inverse relationship between the financial performance of the banks and doubtful loans. The relationship between financial performance and capital asset ratio was found to be positive and significant. Their study suggests that the higher the managed funds by banks, the higher the performance. The study concludes that there is a significant relationship between banks performance and risk management practices hence, the need for banks to practice prudent risks management in order to protect the interests of investors. Credit risk represents a measureable threat to the banks' profitability; as a result, several researchers have examined the impact of CRM on bank performance in different scopes.

Ahmed, Takeda, and Shawn (1998) employed multi-variant regression and found that loan loss provision has an important positive impact on non-performing loans. So, a raise in loan loss provision implies an elevation in credit risk and decomposition in the value of loans subsequently distressing bank performance negatively. In another study, Ahmad and Ariff (2007) used regression analysis in their study to establish the most important determinant of credit risk of commercial banks in emerging economies' banking systems weighted against the developed economies' banking systems. It establishes that a rise in loan loss provision is as well regarded as a major determinant of potential credit risk. They added that credit risk in emerging economies' banks is greater than that in developed economies. In an

effort to study the impact of bank regulations, concentration, financial and institutional development on commercial banks' margin, and profitability in the Middle East and North Africa (MENA) nations from 1989 to 2005, using the unbalanced panel data regression, Ben-Naceur and Omran (2008) found that bank capitalization and credit risk have considerable and positive influence on net interest margin, cost efficiency, and profitability of banks.

Similarly, in an attempt to find the impact of effective CRM on bank survival, Njanike (2009) appraised the degree to which failure to efficiently deal with credit risk leads to banks' failure in Zimbabwe between 2003 and 2004. The study established that the failure to efficiently handle credit risk led to a higher-level banking crisis. It recommended that banks should establish and implement credit scoring and evaluation methodologies, review and revise the insider loans policies, and implement prudential corporate governance practices.

In another study conducted in Kenya, Kithinji (2010) measured the effect of CRM on banks' profitability through the use of regression model. The study uses records on the total credit, level of non-performing loans, and profits for the period of five years. It reveals that the accumulated profits of banks are not influenced by the quantity of credit and non-performing loans. Hence, Kithinji (2010) proposed that other variables other than credit and non-performing loans have greater effects on the profitability of banks. Al-Khouri (2011) further evaluated the effect of bank's specific risk characteristics and the overall banking environment on the performance of 43 commercial banks operating in six of the Gulf Cooperation Council (GCC) countries over the period of 10 years. The study adopt

regression as an analysis tool, and its findings prove that credit risk, liquidity risk, and capital risk are the key aspects that influence bank profitability in the GCC countries.

In Nigeria, Kargi (2011) reviewed the impact of credit risk on the profitability of Nigerian banks, using five years' data for the period of 2004-2008. The study examines the relationship through the use of descriptive, correlation, as well as regression model. He established that CRM has an important role in the profitability of Nigerian banking sector. The study supports the claim that profitability of bank is negatively controlled by loans and advances, non-performing loans, and deposits levels, thus exposing banks to huge risk of illiquidity and distress.

In Costa-Rica, Epure and Lafuente (2012) applied regression analysis to study the presence of credit risk on bank performance. They discovered that performance improvements led to regulatory changes and that credit risk accounts for differences in bank performance, while non-performing loans inversely affect efficiency and return on assets (ROA) and the capital adequacy ratio (CAR) has a positive influence on the net interest margin. In another recent study conducted in Nepal, Poudel (2012) assessed the effect of CRM on the financial performance of Nepalese banks using regression analysis.

The study establishes that all credit risk factors have an inverse influence on the financial performance of banks; conversely, the DR exerts a major impact on bank performance. The study proposes banks to create and develop policies with the aim of not only reducing the exposure of the banks to credit risk but also improving profitability. In another study conducted in Taiwan, Chen

and Pan (2012) assessed the credit risk efficiency of banks for the period of four years (2005-2008). The study employs financial ratio to measure the credit risk and evaluate using Data Envelopment Analysis (DEA). The credit risk measures were credit risk technical efficiency, credit risk allocation efficiency, and credit risk cost efficiency. The findings suggest that only one bank is competent in all forms of efficiencies over the assessment periods.

The Ghanaian study of Boahene et al. (2012) utilized regression analysis in an attempt to reveal the connection between credit risk and profitability of selected banks and established that credit risk components (non-performing loan rate, net charge-off rate, and the pre-provision profit as a percentage of net total loans and advances) have a positive and significant relationship with bank profitability. This shows that banks in Ghana enjoy high profitability regardless of high credit risk, an opposing view to other views expressed in many studies that credit risk indicators are negatively related to profitability.

In contrast to the position of the Ghanaian study, scholars like Kolapo, Ayeni, and Oke (2012) studied CRM and performance of Nigerian banks using panel model regression analysis. They argued that the impact of credit risk on bank performance considered using the ROA of banks as a measure of performance in Nigeria is cross-sectional invariant. A rise in non-performing loans or loan losses provision reduces profitability (ROA), whereas a rise in total loan and advances improves profitability. The study suggests that Nigeria banks have to improve their ability in credit analysis and loan management, whereas the regulatory authorities ought to give extra concentration to banks' conformity to applicable

requirements of the Bank and Other Financial Institutions Act (BOFIA) 1 and prudential guidelines governing banking practices in Nigeria.

The findings of these studies reviewed reveal diverse outcomes. Based on the above studies, the common determinants for CRM are the level of bad loans (non-performing loans), problem loans, or provision for loan losses on the one hand, and on the other hand, the frequently used proxy for profitability is ROA. The regular approach used by the largest part of these studies was to analyze the effect of CRM on any other variable suitable to the debate using regression analysis; the regression analysis measures the actual impact of CRM on profitability of firms. The literature is further evaluated in terms of the number of recent studies, extent of the relationship discovered by scholars, and the methods of analysis employed by the studies reviewed.

### **Materials and Methods**

To achieve the purpose of this study which aims at empirically ascertaining the influence of strategic risk management and banking system's profitability by examining nature of relationship that exists between selected risk management variables (non-performing loan ratio, liquidity coverage ratio, cost to income ratio and capital adequacy ratio) and profitability of the banking system. Thus, we start by ascertaining the stability of the variables of study by carrying out stationary test.

This will ensure that the data are fit for use for analysis. After this, we progress to check for a possible integrating relationship among the variables by carrying out an integration test. If we establish a long run relationship, we proceed to Error



Correction Mechanism to correct any deviation that might have occurred in the short term and also determine the adjustment speed. This test also serves as a means of achieving the first research objective, which is to establish empirically the influence of strategic risk management and banking system's profitability. It is worthy of note that if the variables are not integrated of the same order which is a necessary condition for integration test using Johansen approach, we adopt the econometric model of Auto Regressive Distributed Lag (ARDL), which is utilized when the variables of study that are not integrated at the same order and also show no evidence of integration using Johansen technique.

#### **Population of the Study**

The population of the study comprised of all the deposit money banks in Nigeria financial system licensed and operating in the Nigeria economy. The Nigerian deposit money banks were selected from the banking sector because it has a wider geographical coverage than any other financial institution in the banking sector and also control over 70% of assets and liabilities of the banking sector of the Nigeria financial system.

#### **Measurement, Validity and Reliability**

All variables are measured on a 5-point Likert scale. The original ordinal responses or scale were converted into interval scale using the SPSS variable transformation window. Both validity and reliability of the research instrument were established. Specifically, while the validity of the research instrument is based on expert opinion, its reliability is based on Cronbach Alpha method.

#### **Method of Data Collection/Model Specification**

Data for this study was secondary in nature and was obtained from the annual reports and accounts of the selected quoted commercial banks. Each of the risk management indices (credit risk, liquidity risk, operational risk and capital risk) as practiced by the selected banks was computed using figures contained in the financial statements. Each category of the risk management practices represent areas suggested in Basel II of the Basel Accord. This served as the guide to obtaining data through content analysis as opposed to studies that used the questionnaire to obtain data from respondents on the risk management practices of their firm (Ariffin & Kassim, 2009).

Financial performance in the banks were measured by the widely accepted indices of Return on Asset (ROA) and Return on Equity (ROE). Data obtained was analyzed using descriptive statistics and cross-sectional OLS regression analysis for estimating the coefficients of the independent variables. Pearson's Correlation analysis was also used to test for multicollinearity relationship among the independent variables that measure risk management practices.

#### **Model Specification**

We express total loans and advance as a function of deposit structure of the banking system and interest factor as a moderating variable.

The linear model in a functional form is stated as follows:

$$ROA = f(NPLR, LIQR, CIR, CAR) \quad (1a)$$

$$ROE = f(NPLR, LIQR, CIR, CAR) \quad (1b)$$

#### **Where:**

*ROA = Return on Assets*

*ROE = Return on Equity*

*NPLR= Non-Performing Loan Ratio  
(computed as NPL/TLA)*

*LIQR = Liquidity Ratio (Liquefiable Assets /  
Qualifying Liabilities)*

*CIR = Cost to Income Ratio (Operating  
Expenses / Gross Earnings)*

*CAR = Capital Adequacy Ratio [Capital Base  
(Tier I + Tier II) / Risk-weighted Assets]*

The econometric form for the model is specified as:

$$ROA_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

$$ROE_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

$\alpha$  = the intercept

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$  = the regression coefficients of non-performing loan ratio, liquidity coverage ratio, cost to income ratio and capital adequacy ratio respectively.

$e_t$  = error or stochastic term.

## **A PRIORI EXPECTATION**

### **Return on assets**

Is a profitability ratio that provides how much profit a company is able to generate from its assets. In other words, [return on assets](#) (ROA) measures how efficient a company's management is in generating earnings from their economic resources or assets on their balance sheet.

### **Return on equity**

Is shown as a percentage, and the higher the number, the more efficient a company's management is at managing its balance sheet to generate profits. Ratio on equity is a ratio that provides [investors](#) with insight into how efficiently a company (or more specifically, its management team) is handling the money that [shareholders](#) have contributed to it.

### **The nonperforming loan ratio**

Better known as the NPL ratio, is the ratio of the amount of nonperforming loans in a bank's loan portfolio to the total amount of outstanding loans the bank holds. The NPL ratio measures the effectiveness of a bank in receiving repayments on its loans. Results show a moderately high negative correlation between the non-performing loans ratio and rates of return on equity and return on assets. Therefore, increasing the non-performing loans ratio has influence by reducing bank profitability

### **The liquidity coverage ratio (LCR)**

Refers to the proportion of highly liquid assets held by financial institutions, to ensure their ongoing ability to meet short-term obligations. This ratio is essentially a generic stress test that aims to anticipate market-wide shocks and make sure that financial institutions possess suitable capital preservation, to ride out any short-term liquidity disruptions that may plague the market. We expect a negative relationship between this variable and banks performance.

### **The cost to income ratio**

Is one of the efficiency ratios which is used to gauge the efficiency of an organization. It is used to compare the operating expenses of a bank vis-à-vis its income. The lower the cost to income ratio, the better the company's performance.

### **The capital adequacy ratio (CAR)**

Is a measurement of a bank's available capital expressed as a percentage of a bank's risk-weighted credit exposures? The positive and significant relationship between capital adequacy and bank's profitability suggests that banks with more equity capital are perceived to have more safety and such advantage can be translated

into higher profitability. The higher the capital ratio, the more profitable a bank will be.

Similarly, the a priori expectation is stated thus:

$$B_1 < 0, B_2 < 0, B_3 < 0 \text{ and } B_4 > 0$$

### Methods of Data Analysis

The four (4) methods of data analysis to be attempted are the Unit Root, Co-integration Analysis, Error Correction Model, Granger Causality and Multiple Regression Analysis. The choice of our method of analysis stem from their suitability in dealing with problem relating to the effects on the dependent variable of several independent variables.

### Tests for Stationary

Stationary or Unit root tests seek to evaluate the stationary properties of the time series variables employed as both a necessary and pre-condition for estimating the co-integration equations. In this study, the Augmented Dicker-Fuller (ADF) tests are employed to confirm; (a) stationary of the time series data employed, (b) avoid spurious estimates as a consequence of (a) above and (c) confirm the order of integration of the time series variables. The decision rule is that the absolute values of the ADF-statistics should be higher than those of the Test Critical Values at 1%, 5% and 10% levels of significance for all the study variables employed. Thus, the ADF is applied to the model

$$\begin{aligned} \Delta y_t &= \varphi y_{t-1} + \sum_{i=1}^p \alpha_i \Delta y_{t-i} \\ &+ u_t \end{aligned} \quad (3.25)$$

### Where

$\alpha$  Is a constant,  $\varphi$  the coefficient on a time trend and  $P$  the lag order of the

autoregressive process?

### Multiple Regression Analysis:

The multiple regression analysis is used to determine the strength/degree of relationship between the dependent variable and each of the independent variable and each of the independent variables.

### Regression Analysis Output

This is concerned with statistical reliability and significance of the estimated parameters of the models and also testing of the hypotheses.

### R<sup>2</sup> test

This is also known as the coefficient of multiple determination tests. It is the fraction of the dependent variable explained by the independent variable It will be used to determine the goodness of fit of estimated coefficients of the variables in the specified models. To adopt the rejection criteria, for the stated null hypotheses, the R<sup>2</sup> value for the estimated regression equation for each pair of our dependent and independent variable must be 50% and above to be significant. Hence, the critical value will be determined at 5% level of significant.

### Correlation Coefficients (R)

To establish the degree of association between two variables, the correlation coefficient ( $r^2$ ) would be calculated. The correlation coefficient ( $r^2$ ) was chosen because it does not require an assumption of our sample being drawn from normal distribution as is required under the usual correlation coefficient.

### F-Statistic

This was applied to ascertain the overall significance of the model. The acceptance criteria for our null hypotheses of no significant relationship between the

dependent and independent variables shall be based on the statements that “if the calculated is less than the critical F-value, accept otherwise the null hypotheses will be rejected”. It tests the hypothesis that all the slope coefficients excluding the constant in the regression are equal to zero.

The F value provides a test of the null hypotheses that the true slope coefficient is simultaneously zero. If the F value computed exceeds the critical value from the F table at the 5% percent level of significance, the  $H_0$  (null hypotheses) will be rejected. Therefore, the critical value will be based on 2 degree of freedom at 5% level of significance.

### Z-Statistic

Which is also referred as student z-test was used to test for significance, to ascertain the statistical reliability of the coefficient in the specified models. We tested whether the estimated coefficient is significantly different from zero. Z-statistics are applied to measure or judge the statistical reliability of the estimated individual regression coefficients'. It is imperative to deploy the z-statistics where the sample size is thirty (30) and above. The decision rule of the z-statistics is as follows:

1. Where the estimated (calculated) z is greater than the critical z value of the null hypothesis ( $H_0$ ) is rejected and the alternate  $H_1$  is accepted, i.e.  $z_c > z_1$ , and
2. Where the estimated (calculated) z is less than the critical value of table z, accept the null hypothesis  $H_0$ , and reject the alternate hypothesis,  $H_1$  i.e.  $z_c < z_1$ , reject  $H_1$  and accept  $H_0$ .

### Durbin Watson statistics

It is a number that tests for autocorrelation in the residuals from a statistical regression analysis. It is always between 1.5 and 2.5. A value of two means show that there is no autocorrelation in the sample. Values approaching 1.5 indicate positive autocorrelation values toward 2.5 indicate negative autocorrelation. Autocorrelation can be significant in analyzing historical pricing information if one does not know how to look out for it. Hence, it test statistic for serial correlation in residuals.

### Adjusted R-Square statistics

This is also known as coefficient of determination. In statistics, this is used in the context of statistical models whose main purpose is the prediction of future outcomes on the basis of other related information. It is the proportion of variety in a data set that is accounted for by the statistical model. It is a statistic that will give s information about the goodness of fit of a model.

The E-views statistical software will automatically determine the above listed test, and will be used basically for decision making for the Research work.

## Result and Discussions

### Descriptive Statistics

Table 4.1 reports some summary statistics that describe the distributional properties of the study variables. The statistics reported include mean, maximum, minimum, standard deviation, skewness and kurtosis. The table also shows the normality test based on Jarque and Bera (1981).

**Table 4.1: Descriptive Statistics for the study variables**

	ROE	ROA	NPLR	LIQR	CIR	CAR
Mean	22.43000	10.40250	0.955833	0.454167	0.562500	0.309167
Median	23.05000	10.04500	0.910000	0.460000	0.560000	0.310000
Maximum	30.23000	12.87000	1.680000	0.480000	0.590000	0.340000

Minimum	17.22000	7.110000	0.700000	0.400000	0.540000	0.280000
Std. Dev.	4.153045	1.554817	0.258051	0.022747	0.017645	0.018809
Skewness	0.308427	-0.345642	1.932235	-1.073071	0.123136	-0.217797
Kurtosis	1.987328	2.926378	6.333678	3.708120	1.503596	2.157454
Jarque-Bera	10.703006	4.241647	13.02377	2.553679	1.149937	2.449813
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	12	12	12	12	12	12

**Source: Views output**

The descriptive results in table 4.1 show that return on equity (ROE), return on assets (ROA) and Non-Performing Loan Ratio (NPLR) have average values of 22.43, 10.40 and 0.96 reaching maximum levels of 30.23, 12.87 and 1.68 and minimum levels of 17.22, 7.11 and 0.26 respectively over the sample period. For the distribution of the data, the results indicate that Return on Assets has a negatively skewed and leptokurtic distribution, with the values of skewness and kurtosis coefficients being -0.35 and 2.93 respectively. This indicates that the data is not normally distributed, as for a normal distribution, the skewness and kurtosis coefficients should be 0 and 3 respectively.

However, Return on Equity and Non-Performing Loan Ratio has positive skewness with coefficient of 0.31 and 1.93 respectively. Further, the Jarque-Bera statistic is substantially large with zero probability, indicating that the test of

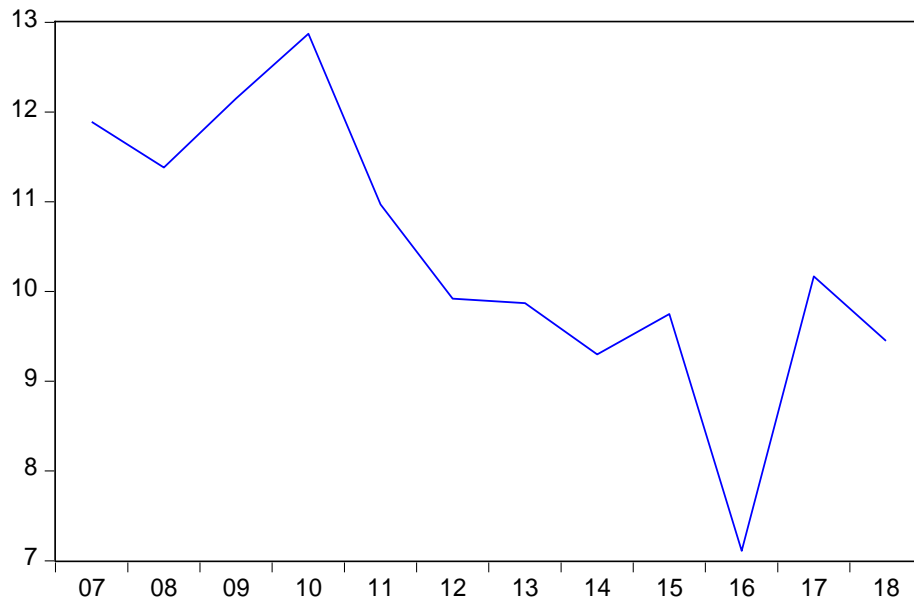
normality is highly significant. The null hypothesis of normal distribution is therefore rejected at 5% level of significance. Thus, we conclude that the data are normally distributed.

Similarly, the data for both Liquidity Ratio (LIQR) and Capital Adequacy Ratio (CAR) have a negatively skewed distribution, with skewness coefficients of -1.07 and -0.21 respectively. On the contrary, the data for Cost to Income Ratio (CIR) has positively skewed distribution, with positive skewness coefficients of 0.12 and 2.86 respectively indicating normally distributed data.

Overall, the reduced difference between the maximum and minimum values for each data series suggests absence of or minimized presence of outliers in the all the data series, which is good for further analysis as presence of outliers are most likely to affect the results.

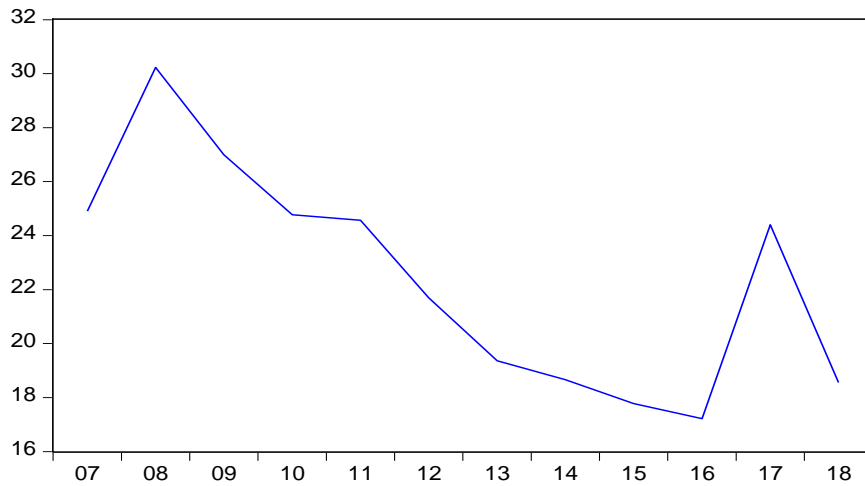
**Graphical Plots of the Data**

ROA

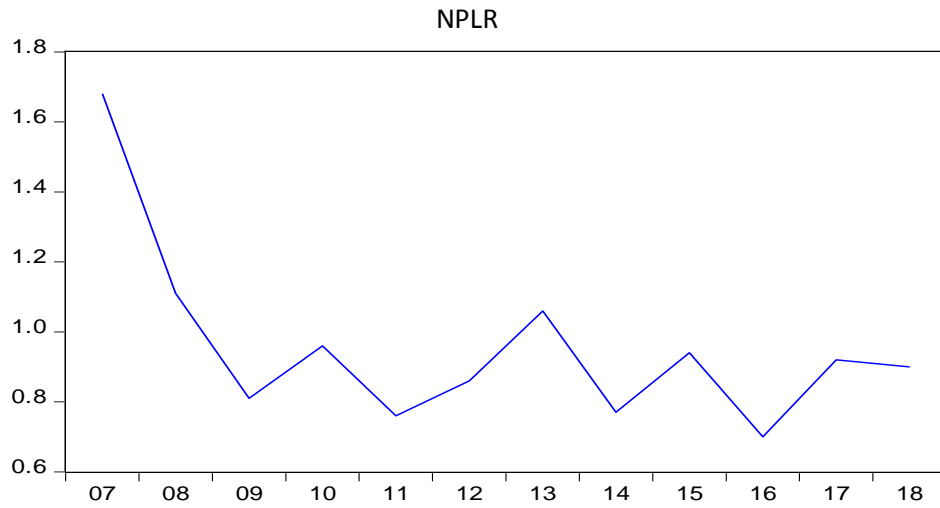


**Graphical plot of Return on Assets**

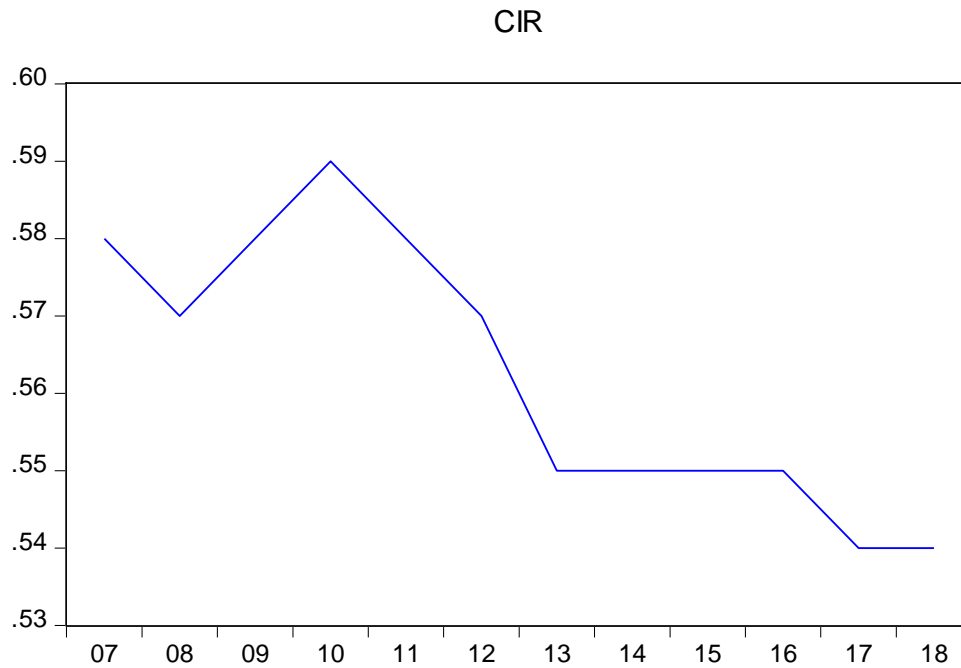
ROE



**Graphical plot of Return on Equity**



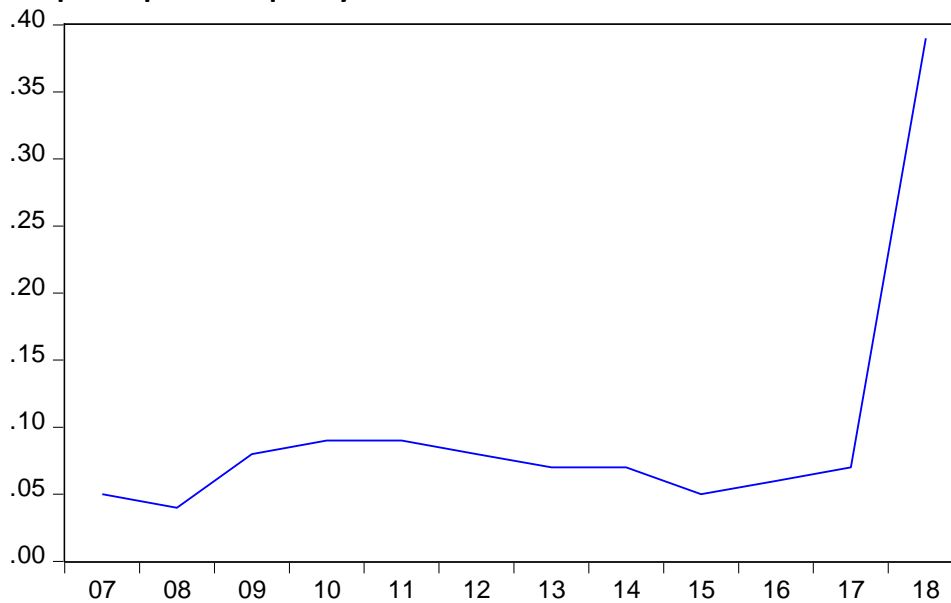
Graphical plot of Non-Performing Loan Q Ratio



Graphical plot of Cost to Income Ratio



**Graphical plot of Liquidity Ratio**



**Graphical plot of Capital Adequacy Ratio**

A cursory look at the data plots above reveals that the data for it appears that LIQR and CAR may be generated by a random walk process as the figure shows an upward trend for each of these data series, although, there are observable fluctuations at some point. For ROE, there is a sharp increase at the beginning of the period, followed by a downward movement that continued till 2016 with another sharp increase that heralded a sharp decline at the

end of the period. ROA and CIR started out with a decline that was followed immediately by a rise, then another decline that somewhat continued and died out at the end of the period. Interestingly NPLR started out with a very sharp decline and then appeared stationary, continuing with a clear observable fluctuation within a particular band till the end of the period.



Unit root/Non stationary Test

Tables 4.2 show the Augmented Dickey-Fuller (ADF) unit root/non stationary test results for the study variables. To determine the data generating process (DGP) for each data series, we perform the ADF test on the three random walk models; (1) pure random walk (2) random walk with

drift and (3), random walk with drift and trend. Further, to determine the order of integration for each data series, we applied the test on both the level series and the first differenced series.

**Table 4.2: ADF unit root test results**

Variables	ADF-statistic	Test Critical Values	Order of Integration	Probability
ROE	-4.607382	1% level = -4.297073 5% level = -3.212696 10% level = -2.747676	I(1)	0.0064
ROA	-4.834154	1% level = -4.297073 5% level = -3.212696 10% level = -2.747676	I(1)	0.0047
NPLR	-5.774816	1% level = -4.200056 5% level = -3.175352 10% level = -2.728985	I(1)	0.0010
LIQR	-6.382734	1% level = -4.297073 5% level = -3.212696 10% level = -2.747676	I(1)	0.0006
CIR	-4.765531	1% level = -4.582648 5% level = -3.320969 10% level = -2.801384	I(1)	0.0081
CAR	-6.592106	1% level = -4.297073 5% level = -3.212696 10% level = -2.747676	I(1)	0.0083

**Source: Views output**

From Table 4.2 above, we observe that all the variables are stationary at first difference I (1) or integrated at order 1. The ADF-statistic for each of the variables is greater than the Test Critical Values and the associated probability estimates are all less

than 0.05 significance level. This now sets us up for the econometric analysis.

**Presentation of Regression Model Estimates**

Table 4.3 below shows estimates of Regression results for the Model 1.

$$ROA_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

**Table 4.5: Estimates of**

$$ROA_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

Dependent Variable: D(ROA)		
Method: Least Squares		
Date: 05/24/21 Time: 16:51		
Sample (adjusted): 2008 2018		
Included observations: 11 after adjustments		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.225192	0.421794	-0.533889	0.6126
D(NPLR)	-2.793846	28.55692	0.097834	0.0053
D(LIQR)	53.93861	42.79305	1.260453	0.2243
D(CIR)	67.89266	26.61184	2.551221	0.5434
D(CAR)	-2.189889	4.460271	-0.490977	0.0409
R-squared	0.648627	Mean dependent var		-0.221818
Adjusted R-squared	0.614378	S.D. dependent var		1.514073
S.E. of regression	1.158659	Akaike info criterion		3.435359
Sum squared resid	8.054943	Schwarz criterion		3.616220
Log likelihood	-13.89447	Hannan-Quinn criter.		3.321351
F-statistic	2.768962	Durbin-Watson stat		1.845481
Prob(F-statistic)	0.000000			

**Source: Authors' computation using E-View**

For our second model, the regression estimates show a coefficient of determination ( $R^2$ ) of 0.614378, which implies that variations in all the explanatory variables account for about 61% of the variations in the dependent variable, return on assets, while the rest 39% of the variations, is attributable to other variables not captured in the study. The results provide evidence that non-performing loan and capital adequacy all are significant in explaining variations in return on assets. On the other hand, liquidity coverage ratio and cost to income show insignificant relationship with the dependent variable return on assets. The probability estimates of the relationship between non-performing loan ratio, capital adequacy ratio and return on assets are 0.0053 and 0.0409 respectively. These figures are less than 0.05 level of significance showing evidence of

significant relationship between each of the predictor variables and the criterion variable. On the other hand, the probability estimate of the relationship between liquidity ratio, cost to income ratio and return on assets are 0.2243 and 0.5434. The probability estimate is greater than our preferred level of significance, (0.05) indicating an insignificant relationship.

Also, the F-statistic is significant at 0.05 levels, which implies a good line of fit while the Durbin-Watson statistic value of 1.845481 is within acceptable range and serves as an evidence of absence of significant autocorrelation.

Table 4.5 below shows estimates of regression results for the Model 2.

$$ROE_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

**Table 4.3: Estimates of**

$$ROE_t = \beta_0 + \beta_1 NPLR_{t1} + \beta_2 LIQR_{t2} + \beta_3 CIR_{t3} + \beta_4 CAR_{t4} + e_t$$

Dependent Variable: D(ROE)				
Method: Least Squares				
Date: 05/24/21 Time: 16:55				
Sample (adjusted): 2008 2018				
Included observations: 11 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-0.646812	1.453579	-0.444979	0.6719
D(NPLR)	40.41040	98.41226	0.410624	0.0069
D(LIQR)	-106.6057	147.4725	-0.722885	0.5045
D(CIR)	-3.681750	91.70916	-0.040146	0.2093
D(CAR)	19.36722	15.37089	-1.259993	0.6956
R-squared	0.721697	Mean dependent var		-0.577273
Adjusted R-squared	0.710505	S.D. dependent var		3.755410
S.E. of regression	3.992946	Akaike info criterion		5.909891
Sum squared resid	95.66172	Schwarz criterion		6.090752
Log likelihood	-27.50440	Hannan-Quinn criter.		5.795883
F-statistic	7.711402	Durbin-Watson stat		1.553914
Prob(F-statistic)	0.000000			

**Source: Authors' computation using E-View**

The regression estimation results show a coefficient of determination ( $R^2$ ) of 0.710505, which implies that variations in all the explanatory variables account for about 71% of the variations in Return on Equity (ROE), while the rest 29% of the variations is attributable to other variables not captured in the study. From the results, only non-performing loan ratio is significant in explaining variations in return on equity. Other variables included failed the significance test.

The probability estimates of the relationship between non-performing loan ratio and return on equity are 0.0069 which is less than 0.05, our preferred level of significance, establishing a significant relationship. On the other hand, the probability estimate of the relationship between liquidity ratio, cost to income ratio, capital adequacy ratio and return on equity are 0.5054, 0.2093 and 0.6956 respectively. The probability estimates are greater than our preferred level of significance, (0.05) indicating an insignificant relationship.

On the whole, the F-statistic is significant at 0.05 levels, which implies a good line of fit while the Durbin-Watson statistic value of 1.553914 is within acceptable range and serves as an evidence of absence of significant autocorrelation.

### Summary, Conclusions and Recommendations

The aim of this research is to empirically ascertain influence of strategic risk management on profitability of corporate firms using the banking institutions as a case study. Thus, the study is designed to examine nature of relationship that exists between management of risk and performance of Nigerian banks. In part one, the researcher attempts the philosophical presentation of the phenomenon of strategic risk management and firm performance as well as the general motivation behind the study. Also, a few past studies on the subject matter are presented and these serve as spring board for us to take up from the articulated gap that is yet to be filled. Other areas covered in chapter one include, research questions, research hypotheses, significance of the study, limitations and scope of the study and definition of some relevant terminologies.

The part two is literature review where the researcher discusses the theoretical underpinning and also takes a more cursory look at the positions of various scholars whose studies provide the necessary guide to identify the gap in literature awaiting fresh contribution is

taken. In part three, we present the methodology for our study which is line with theory and reviewed past studies.

Lastly, in part 4, we carry econometric analyses and present results for discussion. The econometric analyses start with the unit root test of the study variables which show that all the variables are stationary at order (1). Other analyses carried out included separate multiple regression Estimates.

On the whole, it is concluded that only non-performing loan ratio and capital adequacy ratio are valuable in predicting variations in Nigeria's banking firms' profitability within the context of this study. The findings from this study support the claim by other studies that risk management practices in the banking sector have a significant impact on financial performance (Schroeck, 2002; Nocco & Stulz, 2006; Noraini & Salina, 2010; Adeusi, et. al., 2013). Tandelilin, et. al., (2007) posits that risk management practices not only affects financial performance, but also affects overall economic growth in a nation. This assertion is consistent with the fundamental risk return theory.

This research work examined the risk management practices among deposit money banks in Nigeria with a view to relating these practices to their financial performance. Apart from the obvious policy implications, this practice is in compliance with the second pillar of the Basel II, which empowers banks to review, monitor, manage and report on their risk management systems in other to achieve the desired objectives. Risk management in banking represents the entire set of risk management processes and models which allows banks to implement risk-based policies and practices. They cover all techniques and management tools required

for measuring, monitoring and controlling risks.

As indicated from our findings, for Nigerian Deposit Money Banks financial performance is heavily determined by risk management practices. Therefore, it our suggestion that the CBN and other regulators should endeavor to enforce risk identification, assessment, measurement and control mechanism in line with best global practices in order to improve on commercial banks' performance and so as to avoid financial crisis.

This study also recommends that the regulatory authority should ensure that the gains of the banking reforms processes are sustained, the CBN should take more decisive measures aimed at tightening the risk management framework of the Nigerian banking sector as this will have a positive effect on their profitability, Banks need adequate and accurate information from both internal and external sources in order to access the multiplicity of credit risks they face when presented with a loan proposal.

Banks are also advised to patronize credit bureaus. Credit information bureaus would bridge the information gap that exists whenever there's loan request, in commercial and consumer finance, by tracking the financial behavior of individuals over a period of time. Bank staff that is involved in credit administration should be rewarded and appraised based on performance.

Performance measures should include the ratio of Non-performing assets to total risk asset or ratio of Loan Loss Provisions to Non-performing assets. The result of the study clearly shows that capital adequacy is a great predictor of banks profitability. This becomes necessary where banking regulation specifies that a bank should not lend above a specified amount of

its shareholders funds (unimpaired by losses) to a single obligator. Nigerian banks should be well capitalized even without the promptings of the regulatory authority.

It is therefore recommended that bank should establish an appropriate credit risk environment. This will entail approving and periodically reviewing the credit risk strategy and significant credit risk policies of the bank. The strategy should reflect the bank's tolerance for risk and the level of profitability the bank expects to achieve for incurring various credit risks. The Banks should ensure that the risks of products and activities new to them are subject to adequate risk management procedures and controls before being introduced or undertaken, and approved in advance by the board of directors or its appropriate committee. The Banks must operate within sound, well-defined credit-granting criteria. These criteria should include a clear indication of the bank's target market and a thorough understanding of the borrower or counterparty, as well as the purpose and structure of the credit, and its source of repayment. They should establish overall credit limits at the level of individual borrowers and counterparties, and groups of connected counterparties that aggregate in comparable and meaningful manner different types of exposures, both in the banking and trading book and on and off the balance sheet. They must have in place a system for monitoring the condition of individual credits, including determining the adequacy of provisions and reserves

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