

## Prudential Factors and Quoted Commercial Banks Capital Adequacy in Nigeria

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### **ABSTRACT**

*This study examined prudential factors and quoted commercial banks capital adequacy in Nigeria. The study objective was to determine prudential variables that affect commercial banks soundness in Nigeria. Time series data were sourced from Central Bank of Nigeria Statistical Bulletin while panel data were sourced from financial statement of the commercial banks. Capital adequacy was modeled as the function of Market size, Systemic Risk, Credit growth, Asset composition, Bank supervision, Financial Liberalization, Capital flow and Market liquidity. Panel data ordinary least square was used as data analysis methods. The study found that 31.2 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 68.8 percent is attributed to external factors not included in the model. The model is validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from autocorrelations. The regression value from the random effect model indicates that all the variables have positive effect on capital adequacy ratio except systemic risk of the bank operating environment. 51.7 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 48.3 percent is attributed to external factors not included in the model. The model is validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from autocorrelations. The regression value from the fixed effect model indicates that all the variables have negative effect on capital adequacy ratio except cash flow of the bank operating environment. The study concludes that the prudential variable does not explain significant variation in capital adequacy ratio of the commercial banks. The study recommends that the regulatory authorities such as the Central Bank of Nigeria should enforce compliance on the management of commercial banks for proper implementation of management strategies such as frequent stress testing of capital adequacy, asset quality and earnings and profitability indicators of Nigeria commercial banks.*

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**Keywords:** *Prudential Factors, Commercial Banks, Capital Adequacy, Nigeria*

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## INTRODUCTION

Bank is the most regulated business institution globally. It is a transmission mechanism for monetary policy and enhances the realization of macroeconomic and monetary policy goals such as price stability, full employment, economic growth and external balance. Prior to the Banking Ordinance of 1952, Nigerian banks operate without any regulation and guidelines such as Basel, an era known as free banking era. Apart from maintaining maximum liquidity and maximum profitability, bank management task also include maximum compliance to all rules, regulations and guidelines formulated by the regulatory authorities with the objective of achieving sound banking system that enhance the effectiveness of monetary policy to facilitate the realization of macroeconomic goals (Brunnermeier et al., 2019).

The term macro-prudential has taken on new meanings in more recent years. In the late 1990s, following the Asia crisis, the IMF focused more on the term and included indicators for it in their Financial Sector Assessment Program (FSAP) reports. The sense appears to be for a need to monitor financial developments that might lead to macroeconomic problems. A clearer definition of the prudential variables term appears in Crockett (2000) who saw two strands to it the procyclicality of the financial cycle, which called for a build-up of cushions in good times that could be run down in bad times and institutions having similar exposures being interconnected with each other, which calls for the calibration of prudential tools with respect to the systemic importance of individual institutions. Crockett (2017) differentiated between macro- and micro-prudential not in terms of the type of instruments, but rather in the objective of the tasks and the conception of the mechanisms influencing economic outcomes. This seems a reasonable goal, but a decade or so later the FSB conceptualizes it more narrowly.

Historically, the issue of bank capital in Nigeria dates back to the banking ordinance of 1952 Prudential variables summarize the information about the future state of the banking industry, the economy and the financial sector. It measure endogenous and exogenous shocks that affects the smooth operation of the banking institutions. An increasing trend in the ratio of nonperforming loans to total loans signals a deterioration in the quality of credit portfolios and, consequently, in financial institutions' cash flows, net income, and solvency (Goodhart, 2011). It is often helpful to supplement this information with information on nonperforming loans net of provisions, and on the ratio of provisions plus interest suspension on impaired loans to total loans particularly if impaired loans have not yet been classified as nonperforming. High ratio of connected lending to total loans indicates a concentration of credit risk on a small number of borrowers, that is, a lack of diversification, lending to entities that form part of the same group as the financial institution itself is common in many countries, and can be indicative of deficiencies in credit analysis

A rise in the ratio of the current account deficit to gross domestic product is generally associated with large external capital inflows that are intermediated by the domestic financial system and could facilitate asset price and credit booms. A large external current account deficit could signal

vulnerability to a currency crisis with negative implications for the liquidity of the financial system, especially if the deficit is financed by short-term portfolio capital inflows. The composition of capital flow portfolio versus direct foreign investment; official versus private; highly leveraged institutions and investment banks versus commercial banks and trade finance also are a good indicator of potential vulnerability (Turner, 2012). Countries are particularly vulnerable if their current account deficits are accompanied by low investment ratios, or by over-investment.

Empirical studies have shown that regulation has hitherto focused too much on the micro and too little on the macro (Turner, 2012). Understanding prudential links is in concert with the increasingly recognized twin objectives of monetary and financial stability. In addition, the rise in the frequency of banking crises in Nigeria has fueled the process. The significance and the need to strengthen prudential regulation of the banking system appear to be well understood in the aftermath of the 2007–2008 global financial crises.

One much-debated shift in policy paradigm following the global financial crisis has been the increasing acceptance of the concept of macro-prudential policy, which takes into account the interconnectedness of the financial institutions, as well as between the financial sector and the economy, often referred to as macro-financial links. For Asian policymakers, the intricate links between macroeconomic performance and financial stability have been recognized and appreciated since the 1997 Asian financial crisis. Many studies have been carried out on prudential variables; most of the studies are foreign Goodhart, 2011; Crockett, 2020; & Brunnermeier et al., 2019). This study wants to examine the effect of prudential variables on capital adequacy of quoted commercial banks in Nigeria.

## **LITERATURE REVIEW**

### **Prudential Variables**

The first references to macro-prudential policy were in closed meetings, such as in the Cooke Committee in 1979, which was the forerunner of the Basel Committee of Banking Supervision (BCBS). The chairman noted that micro-prudential issues were being interfaced with macro-prudential issues. The concern was about bank lending globally in the face of high oil prices. He attempted to draw the boundary of supervisory interest as not in the macroeconomic problems per se, but how the latter had (and could) lead to bank problems not treatable with micro regulation.

Lamfalussy (2016) around the same time explained that macro-prudential issues are problems that bear on the market as a whole, and may not be obvious in individual banks at the micro prudential level. The first public appearances of the term were in the Euro-currency Standing Committee (ECSC) report and in the Cross Report (BIS, 1986) where it merits an entire chapter. The introduction to the report launches into bank risks that are related to innovations, capital markets banking, derivatives, securitization, large bank off-balance-sheet responses to investment banks, liquidity risk, and the under-pricing of risk. These developments might cause concerns – such as technology failures, the evaporation of liquidity in a crisis situation, and problems with counterparty risk that could have macro consequences and negative feedback loops on the macro economy.

In short, the Cross Report sets on the table all the topics that were never adequately dealt with in subsequent years, and which resulted in the global financial crisis (GFC) of 2008 until the present. The term “macro-prudential” has taken on new meanings in more recent years. In the late 1990s, following the Asia crisis, the IMF focused more on the term and included indicators for it in their Financial Sector Assessment Program (FSAP) reports. The sense appears to be for a need to monitor financial developments that might lead to macroeconomic problems.

### **Market Size**

It is possible for stock markets to be large relative to their economies, but still concentrated. That is, only a few companies dominate the given market. Consequently, market concentration may be measured by looking at the share of market capitalization accounted for by the large companies in the market. These large companies are seen by some analysts as being the leading three to five companies in the market (Maunder et al 1991) Yet, Another commonly used indicator of the degree of stock market concentration is the share of market capitalization accounted for by the ten largest stocks (e.g. International Finance Corporation, S&P).

Concentration adversely affects market development as it hampers market breadth by the concentration of capitalization within a handful of large companies, limiting the range of attractive investment opportunities and thus adversely affecting liquidity in the stock market in question. In addition, having a stock market which is driven by only a few companies could weaken the link between stock prices for non-leading companies and/or their performance and growth prospects. That is to say, the prices of stocks in non-leading companies are affected by market movements of stock prices of leading companies more than their own performance and prospects. This distorts the “signaling” function of stock markets. Market concentration also might encourage speculative activities as investment alternatives are limited and diversification possibilities are limited as well.

### **Systematic Risk**

The risk inherent to the entire market or an entire market segment, systematic risk, also known as undiversifiable risk volatility or market risk, affects the overall market, not just a particular stock or industry. This type of risk is both unpredictable and impossible to completely avoid (Pandey, 2005). It cannot be mitigated through diversification, only through hedging or by using the right asset allocation strategy. Pandey (1993) stated that systematic risk is the relevant risk measure for assets a risk arises from the uncertainty about economic fluctuation, earthquake and changes in world energy situation. This risk affects all securities and consequently cannot be diversified away by an investor.

According to Van Horne (1989) while stating the principles of systematic risk that expected return on a risky asset depends only on that asset and systematic number of assets to a greater or lesser extent. The normalized systematic risk is of the individual risky assets. Berger and Udeu (1993) were of the opinion that the relevant measure of risk for a risky asset is its systematic risk covariance of returns with the market portfolio of a risky asset. For when the covariance (systematic risk) which is normalized beta coefficient is derived it relates the stocks’ variance to market total variance.

### **Sectoral Credit Concentration**

A large concentration of aggregate credit in a specific economic sector or activity, especially commercial property, may signal an important vulnerability of the financial system to developments in this sector or activity. Many financial crises in the past (including the Asian crises) have been caused or amplified by downturns in particular sectors of the economy spilling over into the financial system via concentrated loan books of financial institutions. In practice, this has often been the case for concentration in real estate, which can be subject to severe boom and bust price cycles (Owen, Alfredo, Le., Mahinder, & Paul, 2000). Loan concentration can be dangerous in almost any sector of the economy, however, including commodities and certain export industries. Several financial crises have been preceded by periods of fast growth of foreign currency-denominated credit to domestic firms that frequently lacked a stable source of foreign exchange revenues. These transactions shift the foreign exchange risk to final borrowers, but often imply a higher credit risk to the lenders.

### **Nonperforming Loans**

An increasing trend in the ratio of nonperforming loans to total loans signals a deterioration in the quality of credit portfolios and, consequently, in financial institutions' cash flows, net income, and solvency. It is often helpful to supplement this information with information on nonperforming loans net of provisions, and on the ratio of provisions plus interest suspension on impaired loans to total loans particularly if impaired loans have not yet been classified as nonperforming. Although these indicators are primarily backward looking, reflecting past problems that have already been recognized, they can be useful indicators of the current health of the financial system, and are often used in connection with stress tests of financial institutions (FDIC, 2012). Trends in nonperforming loans should be looked at in conjunction with information on recovery rates for example, using the ratio of cash recoveries to total nonperforming loans. Such information points to the level of effort or the ability of financial institutions to cope with high nonperforming loan portfolios.

### **Financial sector liberalization**

Financial liberalization is the removal of all restrictions, controls, regulations and distortions imposed by the government on financial assets and its prices. Okpara (2010) observed that, financial liberalization grants market forces a dominant role in setting financial asset prices and returns, allocating credit, and developing a wider array of financial instruments and intermediaries. He also noted that, the wave of liberalization in many developing countries in the 1980s was characterized by more attention given to market forces in allocating credit through freely determined interest rates. Khazri and Djelassi (2011) asserted that financial liberalization policy would increase savings which consequently spurs investment and induce economic growth and development. They also argued that higher interest rates brought about liberalization that will lead to a more efficient allocation of resources, higher level of investment, economic growth and development. The focus of liberalization has been to replace the severely constrained command and control system with a relatively liberalized regime with prices reflecting economic costs (Ogwumike and Ikenna 2012).

### **Capital Adequacy Ratio**

Since Capital adequacy ratio (CAR) is the ratio that is set by the regulatory authority in the banking sector, and this ratio can be used to test the health of the banking system. Hence, capital adequacy ratio for banking organizations is an important issue that has received a considerable attention in finance literature. According to Al-Sabbagh (2004), capital adequacy is defined as a measure of bank's risk exposure. Bank's risk is classified into credit risk, market risk, interest rate risk and exchange rate risk that are included in the calculation of capital adequacy ratio. Therefore regulatory authorities used capital adequacy ratio as an important measure of safety and soundness for banks and depository institutions because they view capital as a buffer or cushion for absorbing losses.

CAR also called Capital to Risk (Weighted) Assets Ratio (CRAR) is a ratio of a bank's capital to its risk. It is a measure of the amount of a bank's core capital expressed as a percentage of its 10 risk-weighted asset (Berger et al., 1995). The NBE keep track of a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory Capital requirements as these ratios are a measure of the amount of a bank's capital in relation to the amount of its credit exposures. They are usually expressed as a percentage. For instance, a capital adequacy ratio of eight (8) percent means that a bank's capital is eight percent of the size of its credit exposures (Alfon et al., 2004). The purpose of having minimum capital adequacy ratios is to ensure that banks can absorb a reasonable level of losses before becoming insolvent, and before depositors funds are lost (Harley, 2011).

### **Measurement of Bank Capital Adequacy Ratio**

Traditionally, bank capital is measured by Capital Assets Ratio (CAR). The banking sector crisis prior to the establishment of Nigerian Deposit Insurance Corporation (NDIC) may have been examined using this ratio.

**Capital to Deposit Ratio:** The banking Act of 1969 provided that the paid-up capital and statutory reserve of banks operating in Nigeria should not fall below 10% of a bank's total deposit. It is expected that for every unit of 10 deposit liabilities there should be at least 1 unit of bank Capital for the protection of the deposit. There has been criticism about this ratio. Opponent of the ratio argued that it will lead to fall in the operating profit of the banks as significant proportion of the bank's capital will be held in idle cash or near cash which is low interest income. The principle of striking balance between liquidity, safety and liquidity by banks would not be achieved if higher level of cash or near cash instruments were kept by banks.

**Equity Capital- Total Assets Ratio:** The ratio of equity capital or primary capital to total assets is another good measure for the capital adequacy of banks. A high ratio position the bank in a better measure to absorb shocks in the operating environment.

**Capital to Risk Assets Ratio:** Bank operation and the operating environment is characterized with risk, this ratio measures the depth of exposure of a bank to risk assets and the number of times risk assets can be covered by capital, the higher the ratio of risk assets to total capital, the worse the capital adequacy disposition of the bank.

**Adjusted Capital to Risk Assets Ratio:** This ratio is used to measure the strength of adjusted capital to risk assets of the bank. Adjusted capital is defined as: Total Capital (AC) - (55% Bank

Premises) Risk Assets (R.A) is calculated as: Total Assets - (Liquid Assets + 55% Bank premises)  
Therefore  $AC - RA \text{ Ratio} = TC - (55 \text{ BP})$

$TA - (LA + 55 \text{ BP})$

**Adjusted Equity Capital to Risk Assets Ratio:** This is the variant of the adjusted capital to risk assets ratio. It indicates the extent to which a unit of adjusted equity capital is able to cover a unit or units of risk assets at a given period of time. Adjusted equity capital is defined as: Total Capital - (Subordinated notes + debentures + 55% Bank premises).

**Capital to Weighted Risk Assets:** Bank assets differ and the degree of risk also differs. Appropriate weight can be assigned to match each class of bank assets according to the perceived degree of risk exposure of the assets with the assets quality. This was adopted by the Basle of International settlement to determine the standard of Bank capital adequacy.

**Capital -Net Loans and Advances Ratio:** This measures bank capital to loans and advances in the banking system. This rating is influence by the monetary and macroeconomic condition of the country.

### **Portfolio Regulatory Theory**

The operational philosophy of every bank is profit making to maximize shareholders wealth. The theory stated that the regulation of bank is necessary to maintain safety and soundness of the banking system, to the extent which put them in a position to meet its liabilities without difficulties. This made the regulatory authorities to enforce greater solvency and liquidity on individual banks than making it optional (Ikpefan, 2013). Peltzman (1970) argued that if the asset portfolio is seemed too risky or capital inadequate; the relevant supervisory agency will attempt to enforce a change in negative externalities resulting from bank default that are not reflected in market requirements. It is assumed that unregulated bank will lake excessive portfolio and leverage risks in order to maximize its shareholders value at the expense of deposit insurance, (Benson et al 1986, Furlong and Keeley, (1989). Capital requirement can reduce these moral hazards incentives by forcing banks shareholders to absorb a larger part of the losses, thereby reducing the value of the deposit insurance put option.

### **Application of Theory**

The theoretical background of this study is anchored on the buffer capital theory, this theory attempt to explain that banks may prefer to hold a buffer of excess capital to reduce the profitability of falling under the legal capital requirements, especially if their capital adequacy ratio is very volatile (Ikpefan, 2013). Capital adequacy has in recent time gone beyond that of banking supervision instrument and become a monetary policy tool of achieving financial stability.

### **Empirical Review**

Leesi (2021) developed a stress test framework that facilitates the analysis of the direct effects of monetary policy shocks on the asset quality of Nigeria commercial banks and feedback effects of assets quality on monetary policy variables using causality test. The framework ensures consistency in the key relationships between monetary policy variables and asset quality. This is accomplished by embedding a standard stress-testing framework based on aggregate commercial banks' data in a semi-structural monetary policy model. The framework has numerous applications that can strengthen stress testing and macro financial analysis. The paper found that asset quality

respond strongly to volatility of prime lending rate and monetary policy but weak respond to volatility of Treasury bill rate, reserve requirement and maximum lending rate. The paper recommends that commercial bank managers formulate policies that will managed the volatility of the variables.

Farayibi (2016) examined stress testing in the Nigerian banking sector from 2004-2014 using error correction mechanism (ECM) and Ordinary Least Square (OLS) methodologies. The study adopted the bottom-up approach to stress management. Evidence from the analysis showed that stress testing is important to building a strong and viable financial system in the country. Bank's going concern depends on profitability, solvency and liquidity whereas banks performance index depends on the behaviours of macroeconomic variables. The study found that Nigerian banking system is susceptible to various risks both within and outside the country. They are also exposed to macroeconomic risks as their performance index is based on these variables. The study concluded that how banks respond to risks determines the going concern and the viability of the nation's financial system. Thus, a thorough credit risk management framework championed by the major stakeholders involved in the credit disbursement was recommended

Orobah and Anwarul (2020) examined the literature on financial stability implication of stress testing for risk-taking and credit growth in banks. Macro prudential considered one of the most stress testing tools by Applying countercyclical Macro prudential tools to build up capital buffers in good times that can be run down during bad times. But to improve timing, monitories authorities may need to develop a comprehensive framework to monitor Macro prudential conditions and establish appropriate warning and trigger thresholds. Regarding scope, they examine the entire financial system. This entity contributes to fire sales whose default has follow-on effects, or which can exacerbate a credit crunch that is included. Liability Considerations contain a Scale of wholesale funding that is run-prone is paramount. Capital adequacy depends on the health of the overall financial system. For asset Considerations, the test indicates whether the financial system is vulnerable to deleveraging that might amplify adverse shocks, at the end authorities' development guidance about whether to close a bank and when to sell its assets to maximize taxpayer recovery. The authors concluded that the financial stability implications of stress tests for risk-taking and credit growth among banks are the following: A reduction in credit is a feature on stress tests. Post-crisis reforms traded the expectation of lower credit growth for reducing the probability that the larger banks would fail. This has a high negative impact on the economy. Higher capital requirements for the larger banks have prompted a reduction in the supply of credit, especially to riskier borrowers. Smaller banks have increased their share of local market-wide lending, and larger businesses have seen quite generous credit availability in bond and leveraged loan markets. Consider the structure of the financial system and its complexity long the levels of economic integration and openness.

Kithinji (2010) assessed the effect of credit risk management on the profitability of commercial banks in Kenya using data on the amount of credit, level of non-performing loans and profits from 2004 to 2008. His findings revealed that the bulk of the profits of commercial banks were not influenced by the amount of credit and non-performing loans, and therefore suggested that other variables other than credit and non-performing loans impact on profits. Chen and Pan (2012) examined the credit risk efficiency of 34 Taiwanese commercial banks over the period 2005-2008. Their study employed financial ratio to assess the credit risk and was analyzed using Data



Envelopment Analysis (DEA). The credit risk parameters were credit risk technical efficiency (CR-TE), credit risk allocative efficiency (CR-AE), and credit risk cost efficiency (CR-CE). Their findings showed that only one bank was efficient in all types of efficiencies over the evaluated periods. Based on their result, they concluded that banks in Taiwan showed relatively low average efficiency levels in CR-TE, CR-AE and CR-CE in 2008.

Poudel et al. (2009) studied the factors affecting commercial bank performance in Nepal for the period of 2001 to 2012 and followed a linear regression analysis technique. The study revealed a significant inverse relationship between commercial bank performance measured by ROA and credit risk measured by default rate and capital ratio. Poudel (2012) further analyzed the impact of the credit risk management in bank's financial performance in Nepal using time series data from 2001 to 2011. The results of the study indicated that credit risk management is an important predictor of bank's financial performance.

Boahene (2012) found a positive and significance relationship of commercial banks performance and credit risk in his study of six Ghanaian commercial banks covering a period of 2005-2009. The panel data analysis model employed in the study revealed that indicators of credit risk, namely: non-performing loan rate, net charge-off rate, and the pre-provision profit as a percentage of net total loans and advances were positively related with profitability measured by ROE. The author suggested that Ghanaian commercial banks enjoy high profitability at time when the levels of credit risk variables are high. It is reasoned out on this study that this might be, because of prohibitively lending/interest rate, fees and commissions. While existing studies focus on prudential stress test of commercial capital adequacy; this study stress tested prudential variables and the responses of commercial banks capital adequacy in the post global financial crisis.

Akani and Lucky (2015) examined capital adequacy ratios and the impact on the profitability of Commercial Banks in Nigeria from 1980 – 2013. The objective is to investigate whether there is a dynamic long run relationship between capital adequacy ratios and the profitability of commercial banks. Time series data were sourced from Stock Exchange factbook and financial statement of quoted commercial banks and the Johansen co-integration techniques in vector error correction model setting (VECM) as well as the granger causality test were employed. The study has Return on Asset (ROA), Return on Investment (ROI) and Return on Equity (ROE) as the dependent variables and the independent variables are Adjusted Capital to Risk Asset Ratio (ACRR), Capital to Deposit Ratio (CTD), Capital to Net Loans and Advances Ratio (CNLAR), Capital to Risk Asset Ratio (CRA) and Capital to Total Asset Ratio (CTAR). The empirical result demonstrated vividly in the models that there is a positive long run dynamic and significant relationship between return on asset and capital to risk asset ratio and capital to deposit ratio while others are negatively correlated. The findings also revealed that there is bi-directional causality running from ROA to ACRR and ROA to CNLAR.

Asikhia and Sokefun (2013) studied the effect of capital adequacy on the profitability of Nigerian banks using both primary and secondary data from 2006 – 2010. The findings from primary data shows no significant relationship but the secondary data results shows positive and significant relationship between capital adequacy and bank profitability.

Ikpefan (2013) examined the impact of capital adequacy, management and performance of Nigerian commercial banks from 1986 – 2006 using time series data obtained from Central Bank of Nigeria statistical bulletin and Annual financial statement of sampled banks. The overall capital adequacy ratios of the study shows that shareholders fund/Total Assets which measured capital adequacy of bank (risk of default) have negative impact on ROA. The efficiency of management measured by operating expenses indicates negative impact ROC.

Al-Sabbagh (2004) analyzed determinants of capital adequacy ratio in Jordanian banks, by studying the financial statements of a sample of 17 banks in two periods. The first period is conducted from (1985-1994) which represent a time before applying Basel committee standards for capital adequacy ratio in Jordanian banks while the second period covers from 19 (1995-2001) which is a time after applying Basel committee standards for capital adequacy ratio that represented in a minimum capital adequacy ratio (CAR) of 8%. The study found that most Jordanian banks are committed by a minimum 8% capital adequacy ratio. He used a model of nine independent variables expected to affect CAR using correlation coefficients and regression analysis. He found a negative relation between CAR and bank's size, while CAR was positively affected by ROA, loan to assets ratio (LAR), and equity ratio (EQR). CAR has a positive relation to risky assets ratio (RAR) in the period (1985-1994), while the relations become negative over the period (1995-2001). CAR is negatively affected by deposits assets ratio between (1985-1994) and positively affected by a size of banks' deposits in a period (1995-2001). CAR is negatively affected by loan loss provision (LPR), and positively affected by dividend payout ratio (DR) over the period (1995-2001).

Wong (2005) examined the Determinants of the capital level of banks in Hong Kong. They examined the behaviour of licensed banks in Hong Kong towards their capital adequacy decisions. A qualitative analysis is carried out and an econometric model is constructed to assess the relevance of hypotheses made in various studies. Licensed banks incorporated in Hong Kong are the set of banks considered. The data are on a quarterly basis, covering the period from 1992 Q1 - 2004 Q3 and involving 31 banks. The dependent variable CAR is the capital adequacy ratio. The explanatory variables regulatory capital requirement, risk, bank size, GDP growth rate, return on equity, average CAR of other banks in the same peer group, one-period lagged CAR, ratio of the interbank borrowing to the total borrowing and Asian financial crisis. In line with the experience in other economies and consistent with findings in banking literature, the CAR levels of banks in Hong Kong are determined by a number of factors, in addition to the regulatory requirements. Among banks' internal factors, risk appears to be highly relevant. It was found that banks' own assessments of risk, which may be different from that of the regulator, could have resulted in banks holding a high level of capital.

Isaac, Samuel and Mailafia (2014) reported a positive but insignificant relationship between capital adequacy and bank's profitability. Secondary data of 14 listed deposit money banks in Nigeria from 2005 to 2012 was employed. The study employed correlation research design. In examining the relationship between profitability (dependent variable) and bank-specific factors (independent variables), ordinary least square (OLS) regression model was conducted. However, the study failed to test for Fixed Effect and Random Effect estimates, associated with panel data regression.

Therefore, Ordinary Least Squares (OLS) estimate could lead to biased result, (Christos and Geoffrey 2011) about determinants of bank profitability.

Stephen, Kolapo and Aluko, (2014) investigated the determinants of bank profitability- panel evidence from Nigeria. The study used panel data method to examine time series and cross-sectional data obtained from 2000 to 2013 on a sample of 14 listed deposit money banks in Nigeria. A positive but insignificant relationship between capital adequacy and bank's profitability was shown but was spuriously analyzed as being significant in the research conclusion.

Ejoh and Iwara (2014) investigated the impact of capital adequacy on Deposit Money Banks' profitability in Nigeria, using secondary data of five selected banks from the period 1981 to 2011. The study used the Engle and Granger two steps procedure in co-integration. The research findings showed a positive and significant relationship between capital adequacy and banks' profitability, implying that banks with equity financing appear to have more safety and subsequently, higher profitability. It was then, recommended that Nigerian banks should be well capitalized for cheaper sources of funds and for improvements in returns. However, the result of an investigation conducted with only five banks and equally carried out only during the pre-IFRS adoption era in Nigeria may not be used for generalization in a region such as Nigeria.

Khaled and Samer (2013) examined the determinants of capital adequacy in Deposit Money Banks of Jordan for the years 2000 to 2008 using annual reports of banks listed on Amman Stock Exchange. Multiple linear regression analysis was employed to ascertain the factors that mostly affect the degree of capital adequacy. Pearson Correlation Coefficient was also used to determine the directions of the expected relationship between independent and dependent variables.

Chris (2010) examined the relationship between profitability and capital adequacy of all licensed Commercial Banks in Kenya from 2004 to 2009. Profitability was measured using ROA and ROE while capital adequacy was represented by the capital asset ratio. The regression model was applied for the analysis. It was then, reported that there is a significant negative relationship between capital adequacy and ROA while insignificant relationship was found between capital adequacy and ROE. It was then suggested as areas for further research, that a similar study could be conducted over a longer period of time, which would also focus on the impact of the macro-economic environment such as inflation and GDP because they do influence bank profitability. Nonetheless, the result of the study may not be used for generalization in a region such as Nigeria because it was conducted before and during the global financial crisis, leaving the events after the crisis un-investigated.

Ronoh and Ntoiti (2015) examined the effects of capital structure on financial performance of listed commercial Banks in Kenya, a case study of Kenya Commercial Bank Limited. The study adopted descriptive research design. Overall annual financial reports of 230 branches of Kenya Commercial Bank limited formed the target population. The main source of data for the study was Secondary data. The multiple regression models used considered performance as the dependent variable and was measured in terms of ROA and ROE. Results indicated that deposits, debt and equity was negative and significantly related to financial performance of listed commercial banks in Kenya as measured by return on assets. The regression analysis results indicated that the relationship between Retained Earnings ratio was positive although insignificantly related to

financial performance as measured by return on assets. It was therefore concluded that capital structure of listed commercial banks in Kenya is significant and affects financial performance of commercial banks negatively. The above studies confirm that researchers are yet to agree on the degree to which capital adequacy ratio influence financial performance of second tier commercial banks.

## METHODOLOGY

The study adopted the quasi-experimental research design. This is because the variable under study cannot be manipulated or is not under the control of researcher. The study is designed after correlation or regression research methodology. Here we try to see how two or more variables can relate or influence each other. According to Nigeria Deposit Insurance Corporation reports 2019, there are 24 commercial banks reporting to Central Bank of Nigeria, therefore the population of the study comprises the 24 reporting commercial banks to central banks of Nigeria. The study made use of annual time series data from the Central Bank of Nigeria. The study used random sampling procedure to select 24 commercial banks which have been in existence within the time scope this study and are reporting to Central Bank of Nigeria. Therefore, the sample size of the study is the 24 reporting commercial banks to Central Bank of Nigeria.

### Data Collection Method

This study utilized secondary data. The data is described as time series data that is information on a variable of study over the periods of one year. We collected secondary data for estimation from the Central Bank of Nigeria financial stability report, Central Bank of Nigeria Economic reports and Journals, Textbooks and Seminar papers. Thus the data for this study are time series data ranging from 1988 – 2019. The data consist of yearly data of two dependent variables of liquidity of commercial banks and five independent variables that measures financial sector liberalization.

### Model Specification

The functional terms are as follows:

$$CAR = f(MS, SR, CG, AC) \quad (1)$$

$$CAR = f(BS, FL, CF, ML) \quad (2)$$

To have the estimable version of above models (1) and (2) can be rewritten to have

$$CAR = \beta_0 + \beta_1 MS + \beta_2 SR + \beta_3 CG + \beta_4 AC + \mu \quad (3)$$

$$CAR = \beta_0 + \beta_1 BS + \beta_2 FL + \beta_3 CF + \beta_4 ML + \mu \quad (4)$$

Where

CAR= Commercial banks capital adequacy ratio measured by tier 1 and tier 2 capital to risk assets

MS = Market size

SR = Systemic Risk

CG= Credit growth

- AC = Asset composition  
 BS= Bank supervision  
 FL= Financial Liberalization  
 CF= Capital flow  
 ML= Market liquidity  
 $\phi_0 \alpha_0 =$  Constant  
 $\beta_1 - \beta_5 =$  Coefficients of independent variables  
 $\mu_{it} =$  Error Term

#### A-Priori Expectation

Base on theories such as financial intermediation theory and empirical results examined in this study, the variables are expected to have a positive effect on the dependent variables. The mathematical implication is stated as follows:  $\beta_1, \beta_1, \beta_1, \beta_1 >$

### ANALYSIS AND DISCUSSION OF FINDINGS

**Table 1 Regression Results of Prudential Variables and Commercial Banks Capital Adequacy CAR** =  $\beta_0 + \beta_1MS + \beta_2SR + \beta_3CG + \beta_4AC + \mu$

Variable	Pooled Effect			Fixed effect			Random effect		
	$\beta$ coefficient	T. stat	p. value	$\beta$ coefficient	T. stat	p. value	$\beta$ coefficient	T. stat	p. value
MS	0.148625	1.507153	0.1376	0.078310	0.604458	0.5486	0.113456	1.016388	0.3140
SR	-0.192515	-1.607329	0.1138	0.052741	0.341880	0.7340	-0.062976	-0.470742	0.6397
CG	0.622104	5.390628	0.0000	0.594419	4.236145	0.0001	0.621364	4.983027	0.0000
AC	1.795160	1.289044	0.2029	1.930450	1.463949	0.1502	1.903991	1.471854	0.1469
C	4.587419	2.231603	0.0298	2.965692	1.204819	0.2346	3.532629	1.590599	0.1175
R <sup>2</sup>	0.439038			0.631479			0.360257		
AdjR <sup>2</sup>	0.397486			0.525017			0.312868		
F-statistic	10.56582			5.931506			7.602212		
F- Prob	0.000002			0.000003			0.000062		
D W	10.56582			2.139366			1.773717		
Effects Test						Statistic		d.f.	Prob.
Cross-section F						2.610975		(9,45)	0.0162

Cross-section Chi-square	24.789052	9	0.0032
Hausman Test			
Cross-section random	2.547784	4	0.6361

Source: E-view page 9.0

From the random effect model 31.2 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 68.8 percent is attributed to external factors no included in the model. The model is validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from autocorrelations. The regression value from the random effect model indicates that all the variables have positive effect on capital adequacy ratio except systemic risk of the bank operating environment.

**Table 2 Regression results of Prudential Variables and Commercial Banks Capital adequacy**

$$CAR = \beta_0 + \beta_1 BS + \beta_2 FL + \beta_3 CF + \beta_4 ML + \mu$$

Variable	Pooled Effect			Fixed effect			Random effect		
	$\beta$ coefficient	T. stat	p. value	$\beta$ coefficient	T. stat	p. value	$\beta$ coefficient	T. stat	p. value
BS	0.031876	0.455749	0.6504	-0.089468	1.326536	0.1914	-0.059849	-0.928629	0.3572
FL	-0.005308	-0.133859	0.8940	-0.026842	0.842099	0.4042	-0.021463	-0.679823	0.4995
CF	0.091047	0.603850	0.5485	0.233101	1.787617	0.0806	0.201724	1.579846	0.1200
ML	0.006578	0.177444	0.8598	-0.011139	0.334829	0.7393	-0.005666	-0.175118	0.8616
C	11.74427	18.79303	0.0000	12.17721	22.19156	0.0000	12.05265	19.07939	0.0000
R <sup>2</sup>	0.010604			0.515421			0.071086		
AdjR <sup>2</sup>	-0.062685			0.375432			0.002277		
F-statistic	0.144687			3.681857			1.033094		
F- Prob	0.964582			0.000543			0.398680		
D W	1.257586			2.296105			1.992811		

**Redundant Fixed Effects Tests**

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.208824	(9,45)	0.0001
Cross-section Chi-square	42.115058	9	0.0000

**Correlated Random Effects - Hausman Test**

Cross-section random	2.714876	4	0.0066
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Source: E-view page 9.0

From the fixed effect model 51.7 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 48.3 percent is attributed to external factors no included in the model. The model is validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from

autocorrelations. The regression value from the fixed effect model indicates that all the variables have negative effect on capital adequacy ratio except cash flow of the bank operating environment.

### **Discussion of Findings**

This study examined prudential factors that determine commercial banks capital adequacy in Nigeria by formulating two regression models. Model one found that 36 percent variation in capital adequacy ratio of the commercial banks over the periods covered in the study. This implies that the variable does not explained significant variation in the capital adequacy of the commercial banks. This might be as results of management efforts directed toward managing the effect of bank business environments. The study found that market size has positive and no significant effect on capital adequacy ratio of the quoted commercial banks, systemic risk have negative and significant effect while credit growth and assets composition have positive and no significant effect on the capital adequacy ratios of the quoted commercial banks. The positive effect of the variables confirms the a-priori expectations of the study and in line with management efficiency theories such as the liquidity management theories.

Empirically, the findings is in line with the findings of Thumbi (2013) that there was direct relationship between capital adequacy, credit risk, working capital ratios and size of the bank, Gudmundsson, Ngoka-Kisinguh and Odongo (2013) that capital was positive and significant while squared log of core capital was negative and significant which is an implication that an increase in core capital reduces competition up to a point and then increases competition, with the findings of Ochieng (2014), the findings of Mwongeli (2016) that most of the banks had complied with the minimum capital requirement and the government must continue to ensure that there is compliance of the stipulated guidelines in order to ensure the stability of the banking sector in Kenya and the findings of Karanja and Nasieku (2016) that the core capital to total risk weighted assets for the Tier I banks decreased from 2010 to 2014 while that of the Tier II banks decreased from 2010 to 2014 and that the total capital to total risk weighted assets for the Tier I banks decreased from year 2010 to year 2014 while that of the Tier II banks decreased from year 2010 to year 2014.

Model two of the study found that 51.6 percent variation in commercial banks capital adequacy ratios is explained by variations in the independent variables while the remaining is explained by other factors not captured in the model. The findings indicate that the independent variables explained moderately on the variation in capital adequacy of the quoted commercial banks. The study further established that bank supervision, financial liberalization and market liquidity have negative and no significant effect on capital adequacy of the quoted commercial banks while capital flows have positive and no significant effect on the commercial banks capital adequacy ratio. The negative effect of the variables contradicts our a-priori expectations and implies poor management quality. Empirically the negative effect of the variables contradict the findings of Ronoh and Ntoiti (2015) that the relationship between Retained Earnings ratio was positive although insignificantly related to financial performance as measured by return on assets, the findings of Million, Matewos and Sujata (2015) that credit risk had a positive and significant relationship with profitability, implying that lending business in the country's banks could be risky; though, it is associated with high returns., Noman, Pervin, Chowdhury and Banna (2015) that credit risk negatively influences the profitability of the deposit money banks, the findings of Anna and Chan (2009) that a bank's returns increase more with inflation than its expenses, the findings of Naser and Moghanloo (2015) that the inflation in the country was expected already and interest

rates were also expected to be modified for the purpose of banks' profitability. It was further observed that revenue grew faster than cost during the period of the study and the finding of Flamini, McDonald and Schumacher (2009).

### **Conclusion**

The study examined prudential factors that determine capital adequacy of quoted commercial banks in Nigeria. Two regression models were formulated using cross sectional data sourced from financial statement of commercial banks and time series data sourced from Central Bank of Nigeria Statistical Bulletin. Findings revealed that 31.2 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 68.8 percent is attributed to external factors no included in the model. The model was validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from autocorrelations. The regression value from the random effect model indicates that all the variables have positive effect on capital adequacy ratio except systemic risk of the bank operating environment.

51.7 percent movement in the commercial banks capital adequacy was traced to variation in the prudential variable while 48.3 percent is attributed to external factors no included in the model. The model judged validated by the implications of the f-statistic and probability while the Durbin Watson Statistic proved that the variables are free from autocorrelations. The regression values from the fixed effect model found that all the variables have negative effect on capital adequacy ratio except cash flow of the bank operating environment.

From the findings, the study conclude that there is there is no significant relationship between financial market size and capital adequacy of quoted commercial banks in Nigeria. That there is there is no significant relationship between systemic risk and capital adequacy of quoted commercial banks in Nigeria. That there is there is significant relationship between credit growth and capital adequacy of quoted commercial banks in Nigeria. That there is there is significant relationship between credit growth and capital adequacy of quoted commercial banks in Nigeria.

From the findings, the study concludes that there is there is significant relationship between market liquidity and capital adequacy of quoted commercial banks in Nigeria. That there is there is significant relationship between bank supervision and capital adequacy of quoted commercial banks in Nigeria. That there is there is significant relationship between financial liberalization and capital adequacy of quoted commercial banks in Nigeria and that there is there is significant relationship between capital flows and capital adequacy of quoted commercial banks in Nigeria

### **Recommendations**

- i. Rigorous risk management process should be followed and modern risk management technique should be used as well, when giving out loans.
- ii. The Basel risk management policy should be adopted and incorporated in the management of banking institutions. This will be serve the purpose of eliminating risk such credit risk and liquidity risk encountered by commercial banks in its operation.
- iii. The regulatory authorities such as the Central Bank of Nigeria should enforce compliance on the management of commercial banks for proper implementation of management



- strategies such as frequent stress testing of capital adequacy, asset quality and earnings and profitability indicators of Nigeria commercial banks.
- iv. The management of commercial banks should devise measures of managing business environment have adequate policy and management team that have full knowledge of bank management to minimize the effect of the prudential variables that affect capital adequacy.
  - v. There should be total compliance to all banking rules and regulations such as liquidity reserve and the management should ensure full corporate governance to avert the cases of miss-matching assets and liability of the banking industry.
  - vi. Increase in capital inflows should be integrated with the banking system capital adequacy objectives and the credit boom should be well managed to avoid financial system fragility and banking sector crises.
  - vii. The regulatory authorities should devise measures, policies and strategies of effective supervision and ensure that all banking rules and regulations such as reserve requirement are well complied.
  - viii. Macroeconomic policies such as investment policy should be reformed and the operating environment made investable for investors to enhance deposit mobilization, credit allocation and eliminate the rate of nonperforming loans.

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