

## Capital Adequacy and the Value of Banks in Nigeria: A Post-Consolidation Review

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### Abstract

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This paper examines capital adequacy and the value of banks in Nigeria, using secondary data for the period spanning 2006 and 2016. Total Assets (explained variable), Capital, Provision for Bad Debts, and Provision for Loans/Lease Losses (explanatory variables) of deposit money banks (DMBs) were used as variables in the study. Data were analysed using Ordinary Least Square (OLS) regression technique. Unit Root tests (Augmented Dickey-Fuller and Phillips-Perron) were conducted to test the stationary levels of the variables. OLS results showed that capital has a positive and statistically significant relationship with DMBs total assets; loans/lease losses provision and provision for bad debts exhibited negative and statistically non-significant relationships with total assets. These positions were in line with a priori expectations of the study. The researchers recommend that banks should take risks that are commensurate with their level of capital in order to remain sound and stable for every stakeholder.

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**Keywords:** Capital adequacy, Credit Risk, Banks' value, Risk-weighted assets.

JEL Classification: E51, E52, G21, G24.

### 1. Introduction:

Before an entity obtains licence to operate as a bank in Nigeria and anywhere in the world, the organisation is expected to meet minimum requirements set out by regulatory agencies. One of such requirements is the minimum capital. In Nigeria, the Central Bank of Nigeria (CBN) sets the minimum capital requirement for all banks and finance houses. Even when all other requirements must have been met, the entity cannot operate as a bank without meeting the minimum capital requirement. The regulator is interested in the minimum capital because a bank is expected to have adequate funds in order to meet the needs of their present and potential customers.

Almost every aspect of banking is either directly or indirectly influenced by the availability of capital. One of the key factors to be considered when the safety and soundness of a particular bank is assessed is capital. An adequate capital base serves as a safety net for a variety of risks to which an institution is exposed in the course of its business. Capital absorbs possible losses and thus provides a basis for maintaining depositor confidence in a bank. Besides, the availability of capital determines the maximum level of assets (Greuning and Bratanovic, 2009).

According to Greuning (2009), the key purposes of capital are to provide stability and to absorb losses, thereby providing a measure of protection to depositors and other creditors in the event of liquidation. Consequently, the capital of a bank should have three important characteristics:

- It must be permanent.
- It must not impose mandatory fixed charges against earnings.
- It must allow for legal subordination to the rights of depositors and other creditors.

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Capital in banking is one of the major balance sheet concerns because it signals to what extent the bank is safe and sound, in other words 'solvent' (Casu, Girardone & Molyneux, 2006). In any case, there are two major sources of capital to a business. They are: equity (contributions by owners of the business) and Debts (borrowings from people outside the business). The choice of which one (debt or equity) should have greater weight in case of banks is guided by regulation. Capital is the corner stone of bank's strength, and it provides a means of responding to opportunity and in most cases, acts as a buffer against uncertainty, unanticipated losses, and in the event of different areas to continue operating whilst problems are being resolved (PricewaterhouseCoopers, 1994).

Rose and Hudgins (2008) assert that "capital position of banks has been regulated for generations longer than any other financial firm. Banks must meet minimum capital requirements before they can be characterised, and they must hold at least the minimum required level of capital throughout their corporate life." The fundamental purposes of regulating capital are threefold:

- i) To limit the risk of failures.
- ii) To preserve public confidence.
- iii) To limit losses arising from deposit insurance claims.

In this paper, knowing that banks are exposed to several risk factors, we will concentrate on the impact of credit risk on the capital of banks and not all other risks knowing that whenever a loan crystallizes, it leads to other risks. With this in mind, we state clearly that credit risk arises as a result of borrower's failure to pay back the loan principal and/or interest as agreed, as and when due. A lot of factors account for this failure and as such the lender (the bank) must be up and doing in its approach and effort to grant loans.

Credit risk appears to be one of the biggest risks that banks suffer owing to the fact that it generates more than half of the earnings of a bank in Nigeria. Consequently, for banks to be profitable, they must lend and in the process either specific risk factor or market risk factors can deter the borrower from meeting its obligation to pay back on due date. Whenever this happens, capital will be required to cushion the loss arising there from. In the process of cushioning, the bank's capital will be impaired. In view of this, it is necessary to hold adequate capital, hence, the term 'capital adequacy'. Capital adequacy, therefore, has to do with having enough capital to compensate for the risks to which banks are exposed. Besides, capital adequacy represents letter 'C' in the acronym CAMEL which is used by regulators to assess the stability and soundness of a bank. Other letters in the acronym are described as follows; C = Capital Adequacy; A = Asset Quality; M = Management; E = Earnings Quality  
L = Liquidity

The Basel Committee on Banking Supervision (1999) asserts that loans are the largest and most obvious source of credit risk, while others are found on the various activities that the bank involved itself with. Therefore, it is a requirement for every bank worldwide to be aware of the need to identify measure, monitor and control credit risk while also determining how credit risks could be lowered. This means that a bank should hold adequate capital against these risks and that they are adequately compensated for risks incurred. This is stipulated in Basel II, which regulates banks about how much capital they need to put aside to guard against these types of financial and operational risks they face. In response to this, commercial banks have almost universally embarked upon an upgrading of their risk management and control systems. This paper is motivated by recent development in the Nigerian banking sector where some of the banks that were licensed as international bank based on meeting a stipulated minimum level of capital were given deadline by the CBN to recapitalise. The decision to recapitalise was based on their inability to collect major credits that were granted by the bank, and in which the CBN has set off against their shareholders' funds, thereby causing the bank to have capital adequacy ratio (CAR) below the acceptable minimum. This consequently rendered their capital inadequate at a point, and to be able to be in business of lending the bank had to take immediate actions to restore customers' confidence on the bank. This brings to the fore the fact that issue of capital adequacy is an ongoing thing and that banks should always be alive to it.

In order to meet the macro-prudential regulation objective of International Monetary Fund (IMF), Financial Soundness Indicators (FSIs) evolved. The FSIs have the potential of serving as an early warning signal by exposing the vulnerability of the financial system. Core set of FSIs for deposit takers include Capital adequacy, Asset quality, Earnings and Profitability and Liquidity.

The indicators for capital adequacy are: Regulatory Capital to Risk Weighted Assets (RWAs); Regulatory Tier 1 Capital to Risk Weighted Assets and Nonperforming Loans Net of Provision to Capital (Yaaba and Adamu, 2015). Nigeria has complied with these indicators. Regulatory capital as defined by Basel Committee on Banking Supervision has three Tiers (1, 2, & 3). Tier 3 is yet to be operational in Nigeria. While the international convention provides that regulatory capital should not be less than 8.0 per cent of banks RWAs, Nigeria sets the minimum requirement at 10.0 per cent. In Nigeria, currently, Deposit Money Banks (DMBs) are categorised into three – International Banks, National Banks and Regional Banks with different capital adequacy requirement. International banks have the minimum threshold of 15.0 per cent while National/ Regional banks have 10.0 percent (CBN, 2014).

A review of banks' prudential ratios in 2015 showed that the industry average capital adequacy ratio (CAR) stood at 17.7 per cent, compared with the 15.9 per cent at end of December 2014. The improvement in the CAR was attributed, largely, to increase in the qualifying capital of banks resulting from additional capital raised during the year and capitalised retained earnings. Similarly, the industry average liquidity ratio (LR) was 48.6 per cent, compared with 45.7 per cent at end-December 2014, and exceeded the prescribed minimum LR of 30.0 per cent by 18.6 percentage points. The asset quality of banks, measured by the ratio of non-performing loans to industry total, deteriorated as it increased from 2.9 per cent at end-December 2014, to 4.9 per cent in 2015. The decline in credit quality reflected the adverse effect of recent macroeconomic developments, such as falling global oil prices on banks' credit portfolios (CBN, 2015).

The objective of this paper, therefore, is to determine the influence of credit risk on banks' capital and their joint influence on the value of Deposit Money Banks (DMBs) in Nigeria. The paper is organised into five sections which include; introduction, literature review, methodology, results and discussion and conclusion and recommendations.

Capital adequacy will be represented by Capital of DMBs for the chosen period, credit risk will be represented by total provision for bad debts of DMBs, total provision for loans and lease losses of DMBs while value of banks will be represented by total asset base of DMBs in Nigeria.

## 2. Literature Review

This section of the paper will take care of what other researchers have written on capital adequacy, credit risk and value of firms in Nigeria and other countries and other related topics.

### 2.1 Conceptual Literature

Here, the concept of bank capital will be highlighted. According to Rose and Hudgins, (2008) for bankers and many of their competitors the word capital has a special meaning. It refers principally to the funds contributed by the owners of a financial firm. This contribution is done in the hope of earning a competitive rate of return. Capital accounts of banks play several vital roles in supporting the daily operations and ensuring the long run viability of financial firms.

- i. Capital provides a cushion against the risk of failure by absorbing financial and operating losses until management can address the institution's problems and restore its profitability.
- ii. Capital provides the funds needed to charter, organise, and operate a financial firm before other sources of funds come flowing in.
- iii. Capital promotes public confidence and reassures creditors concerning an institution's financial strength. Capital must also be strong enough to reassure borrowers that a lending institution will be able to meet their credit needs even if the economy turns down.
- iv. Capital provides funds for the organisation's and the development of new services and facilities.
- v. Capital is required before a bank is licensed (Rose, 2008).

According to Soludo (2004) the issue of bank capitalization in most economies today has been how to resolve the problem of unsound bank, enhance efficient management of the banking system, provide better funding for banks lending activities, reduce non-performing loans and advances, increase profitability, reduce risk, to ensure quality asset management and to put banks in a strong liquid position to meet customers obligation at all times.

#### 2.1.1 BASEL Agreement on International Capital Standards:

In 1988 the Federal Reserve Board, representing the United States, and representatives from other leading countries announced agreement on new capital standards – usually referred to as the Basel Agreement for the city in Switzerland where this agreement was reached. The original Basel capital standards are known today as Basel I. Under the terms of Basel I, the various sources of capital are divided into two tiers: Tier 1 (core) capital and Tier 2 (supplemental) capital (Rose, 2008). The Basel I Accord offered a definition of regulatory capital, measures of risk exposure, and rules specifying the level of capital to be maintained in relation to these risks. It introduced a de facto capital adequacy standard, based on the risk-weighted composition of bank's assets and off-Balance-sheet exposures, which ensured that an adequate amount of capital and reserves was maintained to safeguard solvency (Rose, 2009).

There was an increasing concern whether the Basel 1 Accord provided an effective means to ensure that capital requirements matched a bank's true risk profile; in other words, there was a growing belief that the Basel 1 Accord was not sufficiently risk sensitive (Greuning, 2009). In 1999, the Basel Committee started consultations that led to a new Capital Accord (Basel II Accord) that is better attuned to the complexities of the modern financial world. By 2006, the development of Basel II Accord had been completed.

### 2.1.2 Sources of Capital

Generally, there are two major sources of capital to firms, including banks. Banks capital is divided into Tiers depending on their quality and source.

**Tier 1 Capital:** This must be permanent, issued, and fully paid; noncumulative; able to absorb losses within the bank on a going-concern basis; junior to depositors, general creditors, and subordinated debt of the bank; and callable only after a minimum of five years with supervisory approval and under the condition that it will be replaced with capital of equal or better quality. They include

- Common stock and surplus,
- Retained earnings,
- Qualifying noncumulative perpetual preferred stock,
- Minority interest in the equity accounts of consolidated subsidiaries, and
- Selected identifiable intangible assets less goodwill and other intangible assets.

**Tier 2 Capital:** They do not have the permanence of a core capital. They include

- The allowance (reserves) for loan and lease losses
- Subordinated debt capital instruments,
- Mandatory convertible debts,
- Intermediate term preferred stock,
- Cumulative perpetual preferred stock with unpaid dividends, and
- Equity notes and other long-term capital instruments that combine both debt and equity features.

In 1996, the Basel Committee introduced the concept of Tier 3 capital to allow banks, at the discretion of national regulators, to cover a part of their market risks. Tier 3 capital covers only market risks that derive from equities and interest-bearing instruments in the trading book, as well as foreign exchange and commodities in the banking and trading books. The Tier 3 capital instruments consist mostly of short-term subordinated debt. Statutory conditions placed on Tier 3 capital specify that it must have a maturity of at least two years and be subject to a lock-in provision that stipulates that neither interest nor principal may be paid if such payment results in a bank's overall capital dropping below minimum requirements (Greuning, 2009). The minimum risk-based standard for capital adequacy is set by the Basel accords at 8 percent of risk-weighted assets, of which Tier 1 be at least 4 percent. The capital ratio is calculated using the definition of regulatory capital and risk-weighted assets. The risk-weighted assets are related to credit, market, and operational risk. Total risk-weighted assets are determined by multiplying the capital requirements for market risk and operational risk by 12.5 (that is, the reciprocal of the minimum capital ratio of 8 percent) and adding the resulting figures to that of risk-weighted assets for credit assets for credit risk. Thus, the formula for determining capital adequacy is:  $(\text{Tier 1} + \text{Tier 2} + \text{Tier 3}) \text{ capital} \div (\text{risk-weighted assets} + (\text{market risk capital charge} \times 12.5) + (\text{operational risk capital charge} \times 12.5))$  equals 8 percent. Where

- Tier 1 is the entire amount of the bank's Tier 1 capital
- Tier 2 is limited to 100 percent of Tier 1 capital; subordinated debt included in Tier 2 is limited to 50 percent of total Tier 2 capital
- Tier 3 is limited to the amount that is eligible to support market risk (that is, subject to the Tier 3 restrictions).

Nwankwo (1991) posits that capital has to be viewed in a dynamic, not static context. What is adequate today may not necessarily be adequate tomorrow. What will happen tomorrow will undoubtedly be influenced by the prevailing and expected economic conditions of the entire economy and the specific area served by the bank. Also, the quantity, quality and liquidity of the bank assets and liabilities and the quality of bank management can influence banks capital.

Nwude (2005) identified the imperatives for bank recapitalization in Nigeria to include too many banks with sizes being too small to support any sound banking business; stunted growth of the real sector arising from incapability of bank capital ratio and size to fund industrial development; high lending rate and lack of interest in the real sector, and unprofessional and unethical practices by bankers. Others include the need to promote public confidence in the banking sector; curtailment of excessive risk taking by banks; reduction in the incidence of insolvency and distress and the need to dilute ownership structure giving rise to professionalism. All equity firms are characterized by greater liquidity positions than levered firms. Bank use a mix of debt but more of equity in their financing. Naceur and Goaied (2001) showed that the best performing banks are those who have maintained a high level of deposit accounts relative to their assets. Increasing the ratio of total deposits to total assets means increasing the funds available to use by the bank in different profitable ways such as investments and lending activities. The performance of commercial banks is influenced by a host of factors some of which are macroeconomic, institutional, regulatory and legal.

Uchendu (1995) posited that in attempting to maximize profits, banks must do so under capital adequacy and liquidity considerations. He noted that the regulatory influences of monetary authorities include those on interest and exchange rates, bank reserves (indicating credit availability), labour costs or productivity. Yudistira (2003) in his study of bank capital requirement in Indonesia found that there is a strong positive relationship between bank capital and the growth rate of bank deposit. Secondly, the results from the effect of deposits and loans showed that poor capitalized banks operated with low net worth relative to asset.

Ikpefan (2013), "Capital inadequacy has affected the financial health of banks. He explained that an analysis of bank capitalization revealed that as at the end of 1992, almost all banks (120) operating in Nigeria required additional capital totaling N0.6billion to support their volume of trading. This amount was the variance between the amount stipulated by the monetary authorities for prudential minimum capital and the aggregate capital outlay. By 1993, this variance further deteriorated to N9.1 billion".

**2.1.3 The Concept of Banks' Value:** The concept of banks' value like every other firms' value can be seen from different perspectives. These include; Book Value, Replacement Value, Liquidation value, Going Concern value, Market value, and enterprise value. Generally, we talk about present and future values. According to Pandey (2014) as cited in Ubom, Michael & Akpan (2017), present value is the most valid and true concept of value. This applies wholly to banks. Any day the value of a bank is in doubt, there is tend to be a run on the bank and this may ultimately lead to the bank's failure, an undesirable situation and the reason for banks regulation. Other concepts of value that apply to this study are: going concern value, market value, and enterprise value. This study rejects liquidation value because regulation of banks capital is meant to forestall liquidation and ensure continuity – going concern.

## 2.2 Theoretical Framework

This sub-section of the study is concerned with known theories of capital adequacy related to this study.

**2.2.1 Buffer Theory of Capital Adequacy:** Buffer theory of capital adequacy is anchored on the volatility of capital adequacy ratio as well as reliability and dependability on capital for long term planning. Also, a bank faces the danger of capital base erosion if it is unable to mobilise sufficient deposits. In that case, the bank may be endangered by capital adequacy ratio volatility. Therefore, the theory postulates that banks may prefer to hold a 'buffer' of excess capital to reduce the probability of falling under the legal capital requirements, especially if their capital adequacy ratio is very volatile.

This is to hedge against prolonged undercapitalisation and avoid sanctions and possible closure by the regulatory authorities which consider breach of the capital requirements as a major infringement of banking legislation. The buffer theory by Calm and Rob (1996) predicts that a bank approaching the regulatory minimum capital ratio may have an incentive to boost capital and reduce risk in order to avoid the regulatory costs triggered by a breach of the capital requirements.

**2.2.2 Deposit Insurance Theory:** This theory views banks as portfolio of risky claims. It posits that as insured banks increase their risk of failure without limit, there is an expected value transfer of wealth from government deposit Insurance Corporation to bank owners. Regulators are concerned about soundness of the banks particularly with respect to solvency or the probability of bank failure. Thus, regulation of bank risks exposure is necessary to reduce the expected losses incurred by the deposit insurance corporation. The theory provides an insight into the behaviour of commercial banks.

**2.2.3 Portfolio Regulation Theory:** The theory explains that regulation of banks is necessary to maintain safety and soundness of the banking system to position it to meet its liabilities without difficulty. By so doing, regulatory authorities ensure solvency and liquidity on individual banks than making it optional. It gauges liquidity position of banks as liquid asset-deposit (LAD) ratio. The higher the ratio, the better the liquidity and solvency of the individual banks. If the asset portfolio is deemed too risky or capital inadequate, the relevant supervisory agency will attempt to compel a change in the bank's balance sheet.

**2.3.4 Expense Theory:** According to expense theory of Williamson (1963) as cited in Ikpefan (2012) and Tochukwu (2016), managers have the option in pursuing policies which maximise their own utility rather than profit maximisation for shareholders. It is also known as the theory of managerial discretion. The central objective is the satisfaction managers derive from certain types of expenditure such as prestige, power and status associated with luxurious buildings/offices, company cars among others. All the above mentioned theories are relevant to this study.

## 2.3 Empirical Review

This sub-section embodies empirical works done by various scholars and researchers on capital adequacy, credit risk and the value of banks in Nigeria.

Ikpefan, 2012 investigated the impact of shareholders' fund on bank performance in the Nigerian deposit money banks for the period spanning 1986 and 2006. The study captured their performance indicators and employed cross-sectional and time series of bank data obtained from Central Bank of Nigeria (CBN). The formulated models were estimated using ordinary least square regression method. The study identified a positive relationship between shareholders fund and bank loan. The researcher also found that there is significant relationship between shareholders' fund and banks' liquidity, bank deposits, and bank loans. The study confirmed that the efficiency of management measured by operating expenses is negatively related to return on capital. The implication of the study, among others, is that adequate shareholders fund can serve as a veritable stimulant in strengthening the performance of Nigeria deposit money banks and also heighten the confidence of customers especially in this era of global economic melt-down that has taken its toll in the Nigerian financial system.

Olalekan and Adeyinka (2013) examined the effect of capital adequacy on profitability of deposit-taking banks in Nigeria. They sought to assess the effect of capital adequacy of both foreign and domestic banks in Nigeria and their profitability. The paper presented primary data collected by questionnaires involving a sample of 518 distributed to staff of banks with a response rate of 76%. Also published financial statement of banks were used from 2006 - 2010. The findings for the primary data analysis revealed a non-significant relationship but the secondary data analysis showed a positive and significant relationship between capital adequacy and profitability of bank. That implied that for deposit-taking banks in Nigeria, capital adequacy plays a key role in the determination of profitability. It was discovered that capitalization and profitability are indicators of bank risk management efficiency and cushion against losses not covered by current earnings.

Umoru and Osemwegie (2016) examined the degree of significance of the capital adequacy ratio in influencing the financial deeds of Nigerian banks by applying the feasible GLS estimator technique on the pooled panel model for the period of 2007 to 2015. Empirical evidence supported the overriding impact of capital adequacy in enhancing the financial needs of Nigerian banks.

Nevertheless, the impact of the estimated capital adequacy was below 30%. The policy stance of the empirics holds thus that depositor's money in the banking sector has not been absolutely assured. Hence, the deposit money banks might not be able to fulfil their liabilities and risk. They suggested a constant reassessment of the least amount of capital required of banks by the regulator.

Tochukwu (2016) opines that capital adequacy ratio is one of the relevant measures of safety and soundness of a banking institution because it serves as a buffer or cushion for absorbing losses. The researcher employed pooled regression analysis model to examine capital adequacy-risk management outcomes of the banks during the 2009-2015 periods. Analysis was based on twelve (12) banks whose selection was guided by convenience criteria. Variables of interest were capital adequacy ratio, risk-weighted assets ratio, deposit asset ratio, and nonperforming loans ratio. Data were extracted from published financial statements of the banks. Pooled least squares (PLS) techniques were used to obtain estimates of parameters of the model, as well as relevant inferential statistics. Results showed that risk management variables exerted differing degrees of negative effects on capital adequacy. Only risk-weighted asset ratio singularly exerted statistically significant at the 5% level. The explanatory variables jointly exerted statistically significant effect on, and were strong in explaining variations in the explained variable. The paper concluded that degree of negative effects of variables differed, and recommended objective deposit drive by the banks to attract more deposits. Also that loans should be adequately secured to reduce the incidence of non-performing loans to dampen the negative effects of risk management and, thus, enhance capital adequacy of the banks.

Ikpefan (2013) investigated the impact of bank capital adequacy ratios, management and performance in the Nigerian commercial bank (1986 - 2006). The study captured their performance indicators and employed cross sectional and time series of bank data obtained from Central Bank of Nigeria (CBN) and Annual Report and Financial Statements of the sampled banks. The formulated models were estimated using ordinary least square regression method. The overall capital adequacy ratios of the study showed that Shareholders Fund/Total Assets (SHF/TA) which measure capital adequacy of banks (risk of default) have negative impact on ROA. The efficiency of management measured by operating expenses index is negatively related to return on capital. The implication of the study, among others, is that adequate shareholders fund can serve as a veritable stimulant in strengthening the performance of Nigerian commercial banks and also heighten the confidence of customers especially in this era of global economic meltdown that has taken its toll in the Nigerian financial system.

Kayode, Obamuyi and Owoputi (2015) investigated the impact of credit risk on banks' performance in Nigeria. A panel estimation of six banks from 2000 to 2013 was done using the random effect model framework. Their findings showed that credit risk is negatively and significantly related to bank performance, measured by return on assets (ROA). This suggests that an increased exposure to credit risk reduces bank profitability. They also found that total loan has a positive and significant impact on bank performance. Therefore, to stem the cyclical nature of non-performing loans and increase their profits, the banks were advised to adopt an aggressive deposit mobilization to increase credit availability and develop a reliable credit risk management strategy with adequate punishment for loan payment defaults.

According to Nawaz and Munir (2012), banks recently witnessed rising non-performing credit portfolios and these significantly contributed to financial distress in the banking sector. Banks collect deposits and lends to customers but when customers fail to meet their obligations, problems such as non-performing loans arise. Hence, they evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were the data collected from secondary sources mainly the annual reports and accounts of sampled banks from 2004 - 2008. Descriptive, correlation and regression techniques were used in the analysis. The findings revealed that credit risk management has a significant impact on the profitability of Nigeria banks. Therefore, management need to be cautious in setting up a credit policy that might not negatively affect profitability and also that they need to know how credit policy affects the operation of their banks to ensure judicious utilization of depositors funds. Varotto (2011) sampled twelve US bond indices spanning different maturities, credit ratings and industry sectors, investigated the impact of new bank capital regulation for trading portfolios introduced by Basel III.

Specifically, they estimated the new capital requirements for (a) liquidity risk and credit risk through the so called Incremental Risk Charge, and (b) the risk of extreme market movements, which they measured with stress tests based on the 2007-2009 financial crisis. They found that capital requirements should increase substantially more than suggested by extensive impact studies conducted by the regulators with the participation of a large sample of banks. They suggested that the lower impact on capital reported by the banks may be due to the assumed risk reduction stemming from their hedging strategies. However, their effectiveness in crisis scenarios remained an open question.

Kargi (2011) investigated the impact of credit risk on the profitability of Nigerian banks, using data on six selected banks for the periods of 2004 to 2008. The ratio of non-performing loans to total loans and advances and the ratio of total loans and advances to total deposit were used as indicators of credit risk while return on asset indicates performance. From their findings, it is established that banks profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits, thereby exposing the banks to great risk of illiquidity and distress. Also, Dietrich and Wanzenried (2011) in their study approximating credit risk by the loan loss provisions over total loans ratio, suggest a negative relationship between credit risk and banks' profitability

Osinubi (2006) studied the effects of recapitalization on financial performance in selected banks 2001-2005 and found that the asset quality of the Nigerian banking industry does not depend on its capital base. The study calculated the CAMEL ratios for each of the selected banks and related these to their capital base. Data were collected on shareholders' fund, which constituted the bank's capital base; data were also collected on the total asset, classified loans, Earnings Before Interest Taxes (EBIT) and Gross Loans and Advances. Using the CAMEL indicators, the study found that the asset quality of the Nigerian banking industry does not depend on its capital base. However, the study showed that the more the capital base the higher the liquidity and capital adequacy of the banking industry. The return on assets also increases as the firm's capital base increases.

Kaanya and Pastory (2013) studied the relationship between the credit risk and bank performance as measured by return on asset. Regression model was used to develop the relationship between the indicators of credit risk and bank performance, the credit risk indicators have produced negative correlation which indicate the higher the credit risk the lower the bank performance. Regression model was statistically fit producing R square and adjusted R square of 70% and 64% respectively. The study recommended that the banks studied should increase the capital reserve to protect the bank for the future losses and to increase bank credit risk management techniques.

### 3. Methodology

**3.1 Research Design:** In this study the researcher adopted ex post facto research design.

**3.2 Types and Sources of Data:** Financial data of secondary origin where used in the study. Data for the study spanning 2006 and 2016 were obtained from CBN Statistical Bulletin, 2016 Edition. The period 2006 – 2016 was selected to highlight the post-consolidation era of banking reform in Nigeria.

**3.3 Model Specification:** In order to ease analysis of the data obtained for the study and capture all the selected variables in the study, we specified our model taking into consideration the following: Capital adequacy is proxied with shareholders funds of DMBs, Credit Risk is represented by total provision for bad debts and provision for loans/lease losses by DMBs for the period spanning (2006 and 2016). Value of banks is represented by total assets of DMBs for the corresponding period. Value of banks is the explained variable while shareholders funds, provision for bad debts and provision for loans/lease losses are the explanatory variables.

This relationship is represented functionally as:

$$TASSET = f(CAP, PBDEBTS, LLP)$$

(+)            (-)            (-)

Where

TASSET = Total Value of Assets of deposit money banks

CAP = Regulatory Capital Maintained by DMBs

PBDEBTS = Provision for Bad Debts by DMBs

LLP = Provision for Loans and Lease Losses by DMBs

The econometric model of the relationship is shown as:

$$TASSET = \beta_0 + \beta_1 CAP + \beta_2 PBDEBTS + \beta_3 LLP + \mu$$

Where

$\beta_0$  = Constant

$\beta_1 CAP$  = Regulatory Capital Maintained by DMBs

$\beta_2 PBDEBTS$  = Provision for Bad Debts by DMBs

$\beta_3 LLP$  = Provision for Loans and Lease Losses by DMBs

$\mu$  = Error Term A Priori Expectations: The operators/signs in parentheses represent a priori expectations about the coefficients of the variable above it.

**3.4 Technique of Data Analysis:** Diagnostic tests were carried out to ascertain the stationary level and order of integration of the variables used in the study. Also, multicollinearity test using Variance Inflation Factor (VIF) was conducted to ascertain if the variables are highly correlated or not. Ordinary Least Square (OLS) multiple regression technique was adopted to ascertain the nature of relationship among the variables.

**3.5 Hypothesis of the Study:** In line with the objectives of the paper, the hypothesis of the study in null form, therefore, is that DMBs capital and credit risk have no significant influence on the value of DMBs.

## 4. Results and Discussions

### 4.1 Data for the Study

PERIOD	CAP	PBDEBTS	LLP	TASSET	TCR
2006	1388.9	14	160.9	7172.9	2,524.3
2007	2225.4	28.8	280.9	10981.7	4,813.5
2008	3364.7	32.4	272.9	15919.6	7,799.4
2009	4930.6	93.1	1977.5	17522.9	8,912.1
2010	2217.8	42.8	930.1	17331.6	7,706.4
2011	3682.1	95.3	267.7	19396.6	7,312.7
2012	3637.7	101.1	234.8	21288.1	8,150.0
2013	3869.7	57.3	275	24301.2	10,005.6
2014	4483.8	31.2	314.1	27526.4	12,889.4
2015	5006.3	28.2	471.2	28173.3	13,086.2
2016	5595.2	42.3	954.4	31682.8	16,117.2

### 4.2 Unit Root Test

**Table 4.2.1: Result of Unit Root Test Based on Augmented Dickey – Fuller (ADF)**

Variable	ADF	CRITICAL VALUE @			Order of Integration	Max lag	P-value
		1%	5%	10%			
TASSET	-3.385058	-2.886101	-1.995865	-1.599088	I(2)	1	0.0042
CAP	-4.024450	-2.847250	-1.988198	-1.600140	I(1)	1	0.0012
PBDEBTS	-4.098596	-2.847250	-1.988198	-1.600140	I(1)	1	0.0011
LLP	-3.462279	-2.847250	-1.988198	-1.600140	I(1)	1	0.0033

\* This was tested at 5% level of significance

Source: Arthur's summarised Eviews 9 Results

**Table 4.2.2: Result of Unit Root Test Based on Phillips-Perron (PP)**

Variable	P-P	CRITICAL VALUE @			Order of Integration	P-value
		1%	5%	10%		
TASSET	-3.421904	-2.886101	-1.995865	-1.599088	I(2)	0.0040
CAP	-4.199233	-2.847250	-1.988198	-1.600140	I(1)	0.0009
PBDEBTS	-4.194831	-2.847250	-1.988198	-1.600140	I(1)	0.0009
LLP	-4.877178	-2.847250	-1.988198	-1.600140	I(1)	0.0003

Source: Arthur's summarised Eviews 9 Results

**Table 4.3: VARIANCE INFLATION FACTOR**

Variance Inflation Factors			
Date: 09/02/17 Time: 12:06			
Sample: 2006 2016			
Included observations: 11			
	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	13226108	10.55851	NA
CAP	1.011301	12.15920	1.268008
PBDEBTS	1682.230	4.727045	1.165238
LLP	5.999609	2.781783	1.289765

Source: Computed Results of Eviews 9

**Table 4.4: ORDINARY LEAST SQUARES RESULTS**

Dependent Variable: TASSET

Method: Least Squares

Date: 09/02/17 Time: 10:47

Sample: 2006 2016

Included observations: 11

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2317.952	3636.772	0.637365	0.5442
CAP	5.725769	1.005634	5.693689	0.0007
PBDEBTS	-21.12809	41.01500	-0.515131	0.6223
LLP	-3.838259	2.449410	-1.567014	0.1611
R-squared	0.826546	Mean dependent var		20117.92
Adjusted R-squared	0.752209	S.D. dependent var		7457.066
S.E. of regression	3712.027	Akaike info criterion		19.55183
Sum squared resid	96454011	Schwarz criterion		19.69652
Log likelihood	-103.5351	Hannan-Quinn criter.		19.46063
F-statistic	11.11884	Durbin-Watson stat		1.890799
Prob(F-statistic)	0.004706			

Source: Computed Results Eviews 9

In spite of the existence of known ratios of capital adequacy as formulated by international banking community, the researcher in this study decided to adopt Ordinary Least Square regression technique to test the relationship between capital and total assets of DMBs in Nigeria. Considering the likely defects of time series data, pre-tests employing Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) analytics were conducted. At comparing the test statistics value against the MacKinnon critical value at 5% level of significance, it was observed that TASSET, the explained variable, was stationary at level in both ADF and PP tests. Also, independent variables - CAP, PBDEBTS & LLP were stationary at first difference {i.e. I(1)} in both ADF and PP tests.

Furthermore, data obtained in table 4.3 show clearly that the model for this study is free from multicollinearity as variance inflation factor (VIF) for the independent variables (CAP, PBDEBTS & LLP) are within acceptable limits.

Table 4.4 presents the regression results for the model estimated. The coefficient of determination ( $R^2$ ) for the model is 0.826546 indicating that the explanatory power of the independent variables is strong. That is, the independent variables explain or account for 82.7 percent of variations in the dependent variable. Put it differently, about 17.3 percent of variation in the dependent variable is caused by other factors not included in the model. The value of  $R^2$  here confirms the fact that credit risk and capital issues exert predominant influence on the value of banks.

In line with the output of the analysis, the estimated form of the model is as follows:  $TASSET = 2317.952 + 5.725769CAP - 21.12809PBDEBTS - 3.838259LLP + \mu$  The coefficient of capital assumes a positive and statistically significant value. This implies that one billion naira rise in Capital increases Total Assets by 5.725769 billion naira. This result conforms to the a priori expectation.

This is the general expectation of every person in the industry. Greuning (2009) posit that the availability of capital determines the maximum level of assets. Yudistira (2003) corroborates this finding. With this result, the null hypothesis that DMBs capital has no influence on the value of DMBs is hereby rejected and the alternate hypothesis is accepted.

The coefficient of provision for bad debts assumes a negative and statistically non significant value. This implies that one billion naira rise in provision for bad debts decreases total asset of DMBs by 21.12809 billion naira. This result conforms to the a priori expectation of the study. Kaanya & Pastory (2013) corroborate this position.

The coefficient of provision for loans/lease losses assumes a negative and statistically non-significant value. This implies that one billion naira rise in provision for loans/lease losses decreases DMBs total assets by 3.838259 billion naira. This result conforms to the a priori expectation of the study and is in line with the objective of banks' capital regulation, in order to forestall bank failures. Kargi (2011) and Kaanya & Pastory (2013) corroborate this position. Both the provision for bad debts and provision for lease/loans losses are proxies of credit risk and their relationships with total assets show that they both decrease total assets. With this result, the null hypothesis that DMBs credit risk has no influence on the value of DMBs is hereby rejected and the alternate hypothesis is accepted.

Besides, the results also confirm that the overall model chosen for this study is statistically significant at 5 percent level of significance. This is shown by the probability of F-Statistic of 0.004706. Moreover, Durbin-Watson statistic of 1.890799 indicates that the model is free from serial autocorrelation.

## 5. Summary, Conclusion and Recommendation

**5.1 Summary:** This study was conducted to examine the influence of capital adequacy on the value of DMBs in Nigeria. Value of DMBs here was represented by their total assets for the period spanning 2006 and 2016. This period was very strategic in order to assess the post-consolidation impact of capital adequacy in the face of credit risk on the total assets of DMBs. Obviously; credit risk reduces banks' capital and consequently their asset base and invariably, their value.

**5.2 Conclusion:** In line with the findings of the study, all variables chosen for the study reacted in line with the a priori expectations of the study. DMBs' capital showed a statistically significant relationship with total assets of banks.

**5.3 Recommendation:** The need for adequate capital and proper and conscious credit risk administration is hereby recommended as this will prevent capital erosion and asset diminution/impairment.

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