IMPACT OF MICRO-PRUDENTIAL INDICES ON CAPITAL ADEQUACY RATIO OF DEPOSIT MONEY BANKS IN NIGERIA

BY

ABBA, Gabriel Ogere
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DEPARTMENT OF ACCOUNTING,
FACULTY OF ADMINISTRATION,
AHMADU BELLO UNIVERSITY,
ZARIA.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Capital Adequacy Ratio (CAR) is one of the fundamental measures of the strength and wellness of banks the world over. The term is an important measure of "safety and soundness" for banks and depository institutions because it serves as a buffer or cushion for absorbing losses (Abba, Peter, & Inyang, 2013). Capital Adequacy is the first letter 'C', in the popular acronym 'CAMELS' in banking parlance. The importance of the concept has drawn the attention of financial experts and policy makers both locally and internationally, especially Central Banks, Federal Reserves, Deposit money banks, Insurance Companies and the World Bank and has led to the popular Basel Accords. The Basel Capital Accord is an international standard for the calculation of capital adequacy ratios. The Accord recommends minimum capital adequacy ratios that banks should meet. Applying minimum capital adequacy ratios serves to promote the stability and efficiency of the financial system by reducing the likelihood of banks becoming insolvent. When a bank becomes insolvent, this may lead to loss of confidence in the financial system, causing financial problems for other banks and perhaps threatening the smooth functioning of financial markets.

Lindgren, Garcia and Saal (1996) observed that since 1980, over 130 countries, comprising almost three fourths of the International Monetary Fund's member countries, have experienced significant banking sector problems, with 41 instances of crisis in 36 countries and 108 instances of significant problems. This situation posed serious concern for the policy makers and regulators. In the aftermath of the financial crisis, there have been efforts by regulatory authorities to make banks stronger. To accomplish this, governments across the developed and developing worlds are

compelling banks to raise fresh capital and strengthen their balance sheets, and if banks cannot raise more capital, they are told to shrink the amount of risk assets (loans) on their books. In the case of Nigeria, the Central Bank of Nigeria, being the apex regulator of the banking industry increased the minimum capital base for commercial banks to twenty-five billion naira in 2005. This policy popularly referred to as the recapitalization or consolidation policy resulted in the reduction of Nigeria motley group of mainly anaemic eighty-nine banks to twenty-five bigger, stronger and more resilient financial institutions (Williams, 2011).

The global response of the fragility and incessant crisis that characterised the banking world is the Basel Accords. The Basel Committee on Banking Supervision handed down the first Basel Accord in 1988 which is the popularly referred to as Basel I. This marked a significant milestone in the governance of the global financial system as it focused on defining regulatory capital, measuring risk-weighted assets, and setting minimum acceptable levels for regulatory capital (Blom, 2009). Basel I incorporated a risk-weighted approach and a two-tier capital structure. The latter means that there was base primary capital (stocks, retained earnings, general reserves, and some other items) and a second tier of limited primary capital including some types of subordinated debt. The second tier capital could not exceed half of total base capital in counting towards the capital adequacy ratio (Blom, 2009). So far there have been Basel I, Basel II and Basel III. Basel I and Basel II fixes minimum capital adequacy ratio at 8% while in 2010, the world's central bankers, represented collectively by the Bank of International Settlements (BIS) handed down Basel III hiked capital adequacy ratio requirement from 8% to at least 10.5% of a bank's risk-weighted assets (Hanke, 2013).

The aftermath of the international banking crisis and negative trends in the currency and banking markets attracted the attention scholars who investigated the immediate and remote causes of the crisis and the impact of capital adequacy ratio in the survival of banks. Some of these scholars include: Davidoff, Steven and Zaring (2008); Coffee (2009); Chorafas (2009); Brewer, George and Larry (2008); Bordo (2008); Bieri (2008); Bayne (2008); Atik (2011); Williams (2011); Al-Sabbagh (2004); Al-Tamimi and Obeidat (2013); Wong (2005) and Abba, Peter, and Inyang (2013). These various scholars raised a host of questions bothering on the linkages between capital adequacy ratio and financial sector deregulation as well as various micro and macro prudential issues such as risk level and risk behaviour of banks, asset quality, profitability, deposit level and macro-economic indicators including inflation rate, size and growth rate of the economy, money supply, lending rate, minimum wage and banking sector regulation. The scholars further studied the impact of these micro-prudential and macro-prudential indices on capital adequacy ratio.

In a bid to building the financial muscles of the Nigerian Banks and safeguard capital from erosion through rising risk level, the Nigerian Apex Bank increased banks' capital base and joined the league of Basel compliant Central Banks by adopting the Basel Capital Accord and it currently operates Basel II. Since the advent of bank consolidation, the capital base of Nigerian banks has steadily risen through merger, takeover and public offers, among others. The regulatory Capital Adequacy Ratio (CAR) has also risen over time. In a bid to understanding the behaviour of CAR in respond to changes in various economic indicators, Williams (2013) carried out a study on the determinant of Capital Adequacy Ratio (CAR) in Nigerian deposit

money banks with focus on macro-economic variables such as inflation rate, economic growth, money supply, interest rate, openness of the economy, exchange rate and total investment. Significant level of relationship was observed between CAR and the variables of the study.

Since macro-economic variables are purely external factors to deposit money banks, this study focuses on behaviours of variables that are considered internal to the operations of the banks. Based on studies conducted in other developing economies, landmark policies of the apex bank, the Prudential Guidelines of 2010, the Basel capital adequacy ratio computation model as well as the peculiarity of the Nigerian banking industry, certain variables have been selected and included in this study. These variables include level of deposits with banks, profitability, asset quality of banks and loans to deposits ratio.

Al-Sabbagh (2004) identified nine different variables which according to him were major determinants of capital adequacy ratio in Jordan. These variables include: total assets of banks, risk to assets ratio, loan to assets ratio, return on equity ratio, returns on assets, deposits to assets ratio, equity ratio, dividends payout ratio and loan provision ratio. Al-Tamimi and Obeidat (2013) also carried out a similar study in Jordan on the determinants of capital adequacy ratio using seven independent variables which were as follows: interest rate risks, liquidity risks, credit risks, capital risk, revenue power, return on equity and return on assets. They observed significant relationships between the various variables and capital adequacy ratio. Wong (2005) also studied the determinants of capital adequacy in Hong Kong and identified the following as the major determinants of capital level of banks in Hong Kong: risk level

of banks, bank size, business growth, cost of capital, regulatory framework, peer pressure, returns on equity and market discipline

In Nigeria, although not much research have been carried out on micro-prudential indices or bank-specific determinants of capital adequacy ratio, the increasing trend of non-performing loans in the banking sector attracted the intervention of the apex bank with several banks affected by the policy response of the bank. Since increase in non-performing loans affects the operations of banks in terms of lower profitability, an empirical study of the effect of the rising trend on the overall financial capacity and capability of banks is necessary. Also, as regards the effect of profitability on CAR, most of the relevant literature reviewed including Al-Sabbagh (2004), Al-Tamimi and Obeidat (2013) and Wong (2005) established the fact that profitability is a determinant of capital adequacy ratio. The three Basel accords also recognized the role of profit in determining the level of capital in a bank's balance sheet and as such, include retained earnings and various other statutory and discretionary reserves in the capital adequacy ratio computation model. This justifies the inclusion of asset quality ratio and profitability in the independent variables of the study. Furthermore, the Basel accord emphasizes risk measurement and management in banking operations and marked the beginning of the risk-base capital maintenance era. As such, all researchers on bank-specific determinants of capital adequacy ratio include banking risk among the determinants of capital adequacy ratio. Al-Tamimi and Obeidat (2013) and Abba, Peter, and Inyang (2013) focused their study primarily on the impact of risk level on capital adequacy ratio and observed significant relationship between the variables. The Basel Accord also has among many of its objectives, protection of depositors fund against bank failure and to this end, it is expected that banks should

secure deposits with commensurate capital adequacy ratio level. To measure the reaction of banks capital adequacy ratio to changing deposit level of deposit money banks, deposit to asset ratio has been introduced in the model of this study. Al-Sabbagh (2004), Al-Tamimi and Obeidat (2013) and Abba, Peter, and Inyang (2013) also measured the effect of changing deposits levels on capital adequacy ratio of banks.

Thus in the wake of rising level of non-performing loans, expansion of banking operations and the attendant rise in their risk portfolio with the adoption of Basel II and preparations for the adoption of Basel III by the Nigerian banking industry, there is a great need for an empirical study on the major determinants of capital adequacy ratio, especially from the perspective of micro-prudential factors of deposit money banks in Nigeria.

1.2 Statement of the Problem

It has been widely observed that throughout the seventies, the capital ratios of many banks throughout the world declined significantly. In an attempt to reverse this decline, the bank regulators in several countries issued explicit capital standards for banks (and bank holding companies, as in the United States in December 1981). These standards required banks to hold a fixed percentage of their total assets as capital. Although these minimum regulatory standards have been given credit for increasing bank capital levels, the eighties also witnessed a number of bank failures (Nachane, Narain, Ghosh & Sahoo, 2000). Several authors, including Lindgren *et.al.* (1996) have observed that, since 1980, over 130 countries, comprising almost three fourths of IMF's member countries have experienced significant banking problems.

Recent researches by Alfriend (1988) have also confirmed the fact that a weakness of the minimum capital standards was that they failed to acknowledge the heterogeneity of bank assets and, as a result, banks had an incentive to shift their portfolios from low-risk to high-risk assets.

In response to the widespread criticism about declining capital standards of banks and the consequent bank failures, in 1989, the Basle Committee on Banking Supervision (BCBS) announced the adoption of risk-based capital standards. The primary purpose of these standards was to make bank capital requirements responsive to the risk in the asset portfolio of banks. Although capital ratios at commercial banks have increased since the risk-based standards have been introduced, the question arose as to what degree of these increases were a response, specifically to risk-based capital maintenance, other bank specific ratios such as deposit asset ratio, asset quality ratio, loans to deposits ratio as well as financial performances of banks such as profitability. Furthermore, although the adoption of risk-based standards has focused attention on capital levels and bank lending, insufficient attention has been devoted to the related issue of how the adoption of the risk-based standards may have impacted bank-portfolio risk levels. In general, at least some theoretical and empirical research have raised the possibility that increasing regulatory capital standards might have caused banks to increase, rather than decrease, portfolio risk. Furthermore, greater amounts of capital, *per se*, are no guarantee that banks are adequately capitalised. Rather, from a public policy perspective, what is important is the amount of capital a bank holds relative to the level of risk in its portfolio.

Therefore this study employed multiple regression model to determine the extent to which changes in capital adequacy ratio in the risk-based capital regime are primarily

determine by key bank-specific ratios as contained in the Basel accord model for capital adequacy computation as well as the Prudential Guideline of the Central Bank of Nigeria. Thus, the study used OLS, fixed and random effect models to determine whether there is significant linear relationship between capital adequacy ratio and risk indicators and other variables in the Nigerian banking industry; and if there is, whether the degree of linearity is such that capital adequacy could be largely a matter of operational effectiveness and movements of key banking sector indicators, as opposed to the current flex of legal muscles by the regulatory authorities (Williams, 2013).

Furthermore, the study is necessary in that there have not been sufficient researches on bank-specific determinants of capital adequacy ratio since the wake of the banking sector consolidation in 2005 and the adoption of Basel II and III in Nigeria. Thus, this study is an attempt to fill the identified gaps and thus contribute to literature on the subject matter in Nigeria.

1.3 Objectives of the Study

The main objective of this research is to use multiple regression model to assess the impact of micro-prudential indices on capital adequacy ratio of deposit money banks in Nigeria.

The specific objectives of the research are as follows:

i) To examine the relationship between Deposit to Assets Ratio (DAR) and Capital Adequacy Ratio (CAR);

ii) To determine the nature of relationship between Return on Assets (ROA) and Capital Adequacy Ratio (CAR) of Deposit Money Banks; and

iii) To analyse the relationship between Asset Quality Ratio (AQR) and Capital Adequacy Ratio (CAR).

iv) To investigate the relationship between Loans to Deposits Ratio (LDR) and Capital Adequacy Ratio (CAR);

1.4 Hypotheses Formulation

The hypotheses for this study are stated below:

H_{01}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Deposits to Assets Ratio (DAR)

H_{02}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Returns on Assets (ROA)

H_{03}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Assets Quality Ratio (AQR)

H_{04}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Loans to Deposits Ratio (LDR)

1.5 Significance of the Study

In spite of the importance of banks as financial intermediaries, capital adequacy modeling has not been in the mainstream of econometric research in the financial sector in Nigeria. Analyses of the banking sector have so far focused on qualitative assessment of growth trends and sectoral behaviour patterns in the industry. Discussion in those studies has, for instance, suggested a number of factors that may influence the failure pattern of banks, bank products and management. There has been no model designed to determine the relative impact of various bank wide and bank

specific indices on capital adequacy ratio as well as the possible direction of linkages between the various indices and capital adequacy ratio. Since independence, no consensus has been reached by different Scholars as regards the determinants of capital adequacy within the Nigerian banking industry. A good understanding of the relationship between the variables will aid good policy formulation as well as capital regulation in the financial sector of the economy.

Thus, this study will be of great importance to the Central Bank of Nigeria (CBN) in its policy formulation on minimum capital requirement for Deposit money banks (MDBs). Recently the Central Bank proposed an increase in the minimum capital base of the commercial banks. This research will show the major factors to be considered in setting this limits and the relative impact on the capital strength of the banks, thus contributing to CAMELS analysis and decision. The Nigerian Deposit Insurance Corporation (NDIC) in safeguarding the interest of depositors will also find the research relevant; commercial banks and other related financial institutions will find the research relevant in capital planning and maintenance, which is one of the elements in the Financial Reporting Framework as contained in the International Financial Reporting Standards (IFRS). Other researchers, academicians, financial analysts, economists as well as accountants in practice will also find the research and data analysis useful either for financial decisions, client advisory services or for the expansion of the frontiers of knowledge in capital adequacy ratio re-engineering.

1.6 Scope of the Study

This study covers ten years period, that is 2005 – 2014. The period before 2005 was not considered in this research due to the anemic nature of the large number of banks that ceased to exist with effect from 31st December, 2005 with the dawn of the

twenty-five billion naira recapitalization policy of the Central Bank of Nigeria. Thus capital regulation in 2005 brought about a sharp increase in capital base of the banks that survived the policy and a drastic decrease in the number of deposit money banks from eighty-nine to twenty five. However, this study is not primarily focused on the impact of banking sector consolidation on the capital adequacy ratio (CAR); rather the study is an attempt to study the impact of micro-prudential indices on capital adequacy ratio of deposit money banks in Nigeria within a ten years period. Within this ten years period, there have been series of mergers and acquisitions which have also significantly affected the value of the banking sector capital base and capital adequacy ratio. This consideration has been factored into the study in determining the appropriate and reasonable sample size.

The population of the study was the fifteen listed deposit money banks in the Nigerian financial system as at 31st December, 2014. The sample of twelve deposit money banks was drawn from the fifteen listed deposit money banks, thus leaving out only three deposit money banks due to non-availability of their financial statements on their websites during the major parts of the period of the study. See Appendix J for the list of all the deposit money banks and sample selected.

The explanatory variable for this study was Capital Adequacy Ratio (CAR) which was computed using the Basel Capital Accord table. The explained variables are Deposits to Assets Ratio (DAR), Asset Quality Ratio (AQR), Returns on Assets (ROA) and Loans to Deposits Ratio (LDR).

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter contains the conceptualization of the research work where different concepts that are fundamental to the study are discussed. The chapter also encapsulates the review of empirical literature on the subject matter as well as the theoretical framework that underpin the study.

2.2 Conceptualization

This section discusses the various concepts that are considered to be the bedrock of the study. Some of these fundamental concepts are bank capital, capital adequacy, banking risk, value at risk, the Basel Accords, and banking regulation.

2.2.1 The Concept of Bank Capital and Capital Adequacy

Bank capital is those fund attributed to the proprietors as published in the balance sheet (Nwankwo, 1991). According to Nwankwo (1991) therefore, bank capital is simply the balance of the shareholders' funds of a bank. These proprietary funds are the proportion of the assets of banks that are due to equity shareholders otherwise referred to as ordinary shareholders of banks. These funds perform a number of functions but a consensus exists that the fundamental and overriding function is to provide a cushion against losses not covered by current earnings and to protect depositors and other creditors against loss in the event of liquidation (Olalekan & Adeyinka, 2013). The conceptual framework for financial reporting views capital as equity and defines equity as the residual interest in the assets of an entity after deducting all of its liabilities. Thus, bank capital is the residual item in bank balance sheets calculated as the difference between assets and those other liabilities which have more senior (prior) claims on the bank's revenue stream and (in case of failure)

assets. It represents the claim of the bank's owners on the net assets of the firm and acts as a buffer to absorb fluctuations in the value of assets (such as due to loan defaults or variations in securities prices) and liabilities. It is this latter characteristic which gives rise to its role in prudential regulation, with minimum capital requirements being seen as a way of protecting other stakeholders – particularly depositors (or a deposit insurance fund standing in their stead). In principle, capital corresponds to shareholder equity and is associated with control (voting) rights over the organization.

According to Ikpefan (2013), bank capital can be seen in two ways. Narrowly, it can be seen as the amount contributed by the owners of a bank (paid-up share capital) that gives them the right to enjoy all the future earnings of the bank. More comprehensively, it can be seen as the amount of owners' funds available to support a bank's business (Athanasoglou et al., 2005). The latter definition includes reserves, and is also termed shareholders' funds (Anyanwaokoro, 1996). Adewumi (1997) gives two connotations of capital in banking. He opines that at the outset, capital in the form of issues and paid-up share is money with which the business of banking is started. Overtime, the capital funds of the bank reflect the accumulated (addition or depletion) capital.

Regulatory practice, however, has broadened the definition of capital to include some other liability items (such as some forms of debt and hybrid securities) which rank below deposit liabilities and which therefore also serve as a buffer to protect depositors from loss. And since the riskiness of the banks' activities is an important determinant of the adequacy of the capital buffer, minimum required regulatory

capital since the Basel I Accord has been calculated by applying risk weights to assets and off-balance sheet items (Davis, 2010). Because it is calculated as a residual item, the measured quantity of bank capital depends crucially on the methods of valuation of assets and other liabilities. If a loan previously recorded as an asset is actually worthless after becoming non-performing in accordance of the standards or the market value of a security which the bank has purchased has fallen, the true quantity of capital will be overstated by that same amount. This has led to a longstanding debate on appropriate accounting practices for banks – most specifically relating to the use of historical cost versus mark-to-market accounting. But also relevant has been the question of provisioning for loan losses, because the creation of such provisions involves a corresponding reduction in shareholder equity.

Recent accounting standards had overturned previously long-standing banking practice of creating provisions on the basis of forward looking expected losses, in favour of provisions based on realized or identified potential losses. In "boom" periods, when loan defaults are below long term averages, this practice can be argued to overstate capital available for dealing with credit losses in a downturn. Discussion of bank capital is also complicated by another perspective – that of the market value of the bank's equity. This may vary substantially from accounting values, because it reflects investor's expectations of the value of future profits of the bank (adjusted for the perceived riskiness of the bank's activities). This will differ from the "book" (accounting) value because of differences between the mark-to market value of bank assets (and liabilities) and their accounting values, as well as the "franchise" value of the bank. Bank owners will prefer management (who, in principle, they control) to operate the bank in such a way such that the stock market value is maximized while

their exposure to loss is minimized. Where their share investment provides limited liability, there is an incentive to minimize the amount of contributed capital. Using the terminology of option pricing, the owner's stake in the bank has a payoff which resembles that of a call option on the value of the bank's assets – unlimited upside and limited downside – with the value of that payoff increasing with the volatility of the bank's assets and leverage.

As much as it is important to define what constitute bank capital, another equally important question that needs to be answered is what constitutes adequate capital. In line with this, Ipkefan (2013) observed that the question of adequate capital of a bank is more crucial especially in the light of the global financial meltdown where bail out measures is now being employed by the regulatory authorities to keep the financial system afloat. In fact, question as to whether existing levels of capital are considered adequate for the increasing levels of risk has been an issue of debate between bankers and the supervisory authorities. Universally, Basle Committee's specified minimum capital adequacy ratio of eight percent (in Basel II) relating to banks' credit is taken as the benchmark of measuring the capital adequacy of a bank. This implies that for every Naira given as credit, a bank needs eight kobo capital. A bank that has lesser ratio is said to be undercapitalized. Ikpefan (20130 further observed that no empirical method has been used to determine banks' capital adequacy in Nigeria.

As much as opinion differs among experts in banking and finance as to what constitutes adequate capital, they all agree that it is an age long issue for which there do not seem to be any consensus in sight (Nwankwo, 1991). Thus as noted by Nwankwo (1991), the issue of what constitutes an adequate capital for banks has a

long history. It is in fact, almost as old as banking itself. According to Nwankwo (1991) he stated that adequate capital is that quantum of funds which a bank should have or plan to maintain in order to conduct its business in a prudent manner. Functionally, adequate capital was regarded as the amount of capital that can effectively discharge the primary capital function of preventing bank failure by absorbing losses. As these losses were related to the risks which banks undertake as a natural corollary of their efforts to serve the legitimate credit needs of the community. Adequate capital will provide the ultimate protection against insolvency and liquidation arising from the risk in banking business. Any company or bank with inadequate capital faces hidden constraints. Its management time is spent on the defensive, working out how to raise capital or how to guard against takeovers.

Developments in the national and international environment affect capital adequacy. The current situation of banks will undoubtedly be influenced by the prevailing and expected economic conditions of the entire economy and the specific area served by the bank. It will also be influenced by the quantity, quality and liquidity of the bank assets and liabilities and by the quality of bank management. A bank operating in a prosperous economy, with excellent quality assets and adequate liquidity in relation to deposit volatility and economic conditions and having a sound management is likely to require a small amount of capital to adequately maintain solvency. An unfavorable change in any of these factors would increase the possibility of insolvency and would necessitate additional capita (Olalekan & Adeyinka, 2013).

The importance of adequate capital in any banking operation cannot be over emphasized. Mayes & Stremmel (2012) observed that not only does capital

adequacy comes first in the list of CAMEL but it is the key variable considered important in the Basel framework for ensuring healthy banks. What constitutes adequate capital depends upon the amount of risk assumed by a firm. Capital is adequate either when it reduces risk of future insolvency to some predetermined level or when the premium paid by the bank to an insurer is "fair"; that is, it covers the expected losses of the insurer, given the risk and capital of the firm and the terms of insurance with respect to when insolvency will be determined and what losses will be paid.

Abba, Peter and Inyang (2013) observed that bank's capital serves as a cushion to absorb losses and shocks. The decline in capital relative to assets is an indication for potential financial difficulties. Not surprisingly, nearly all previous research has included such measures. Due to the large amount of information disclosed and the different definitions of equity there is a wide variety of potential measures. The most important distinction can be made in the weighting of risks. In the Basel framework the weighting is determined by risk-sensitivity ratios for each asset group and has to be authorised by the regulatory body. Although these risk-weighted capital ratios measures are often used, for example, in Poghosyan and Cihák (2009), the ratios face a clear drawback. They are open to manipulation and provide space for discretion to cover up the real condition of the bank. Accordingly, other studies employ non-risk-weighted capital ratios. The potential benefit is the avoidance of any risk assessment.

2.2.2 The Basel Accord

Banks are a vital part of a nation's economy. In their traditional role as financial intermediaries, banks serve to meet the demand of those who need funding. As such,

banks make it possible for people to buy homes and for businesses to expand. Banks therefore facilitate spending and investment, which fuel growth in the economy. However, despite their important role in the economy, banks are nevertheless susceptible to failure. Banks, like any other business, can go bankrupt. However, unlike most other businesses, the failure of banks, especially very large ones, can have far-reaching implications. As we saw during the Great Depression and, most recently, during the global financial crisis and the ensuing recession, the health of the banking system (or lack thereof) can trigger economic calamities affecting millions of people. Consequently, it is imperative that banks operate in a safe and sound manner to avoid failure. One way to ensure this is for governments to provide diligent regulations for banks. With the advent of globalization, banking activities are no longer confined to the borders of any individual country. With cross-border banking activities rapidly increasing, the need for international cooperation in bank regulation has likewise increased.

Ready to meet this need is the Basel Committee on Bank Supervision (BCBS). In its role as the international advisory authority on bank regulation, the BCBS has promulgated guidance on issues critical to ensuring health in the banking systems across the world. One such issue, and one that played an important role in the recent global financial crisis, is the regulation of bank capital. Addressing this issue has been an ongoing process for the BCBS over many years, and has resulted in the promulgation of capital adequacy standards that national regulators can implement. These standards are known collectively as the Basel Accords, named after the city in Switzerland where the BCBS resides. The Basel Accords are some of the most influential and misunderstood agreements in modern international finance (Balin,

2008). The Basel Accords have caused disagreement at times, but they are nevertheless important to the formulation of regulatory policy relating to bank capital. In all, the BCBS has produced three such accords. Basel III, published in 2010, is the most recent Accord. Each Accord has purported to improve upon the previous one, but early indications suggest that Basel III is not flawless and so it will likely not be the last Accord (Larson, 2011).

Lutz (2000) traced the history of this international capital convergence and regulations issue from the 70s when there was divergence in the concept of regulatory capital of banks among the banks especially in G10 countries. According to her, there was on the one end the more static or fixed rate approach (gearing ratio) long used in the United States, Canada, and Japan. On the other end was the more flexible, risk-based approach implemented in the United Kingdom, Germany, France, Switzerland, Belgium, Sweden, and the Netherlands. The fixed rate model in the United States by then prescribed banks to calculate their reserves based on a fixed capital-to-asset ratio of 5.5%. This meant that for every $100 in bank investment, American banks were required to put $5.50 in reserves, regardless of the actual risk involved in the transaction.

For Germany and the United Kingdom the regulatory capital was more risk- based as banks booking riskier loans were being made to provide larger reserves, while the less risky assets were rewarded with lower percentages of regulatory capital. In the United Kingdom, for example, the capital ratios were set through informal agreement between representatives of the Bank of England and the managers of the individual

banks, whereas in Germany the national regulatory authorities worked out a trade wide standard in cooperation with the banking associations (Akinyooye, 2006).

2.2.2.1 Overview of Basel I: The Cradle of Capital Regulation

The 1988 Basel Capital Accord (Basel Committee, 1988) popular referred to as Basel I is the cradle of capital regulation. It is a commitment by financial authorities within the G-10 countries to apply a minimum capital requirement to internationally-active banks in the G-10 (Balin, 2008). Basel 1 is simply represents the outcome of the Basel Committees work over several years to secure international convergence of supervisory regulations governing the Capital adequacy of international banks (Akinyooye, 2006). It defines a measure of *capital* and a measure of *risk*, the latter measure known as 'risk-weighted assets'. The rule is that a bank's capital must be no less than 8% of its risk-weighted assets. The Accord is an example of 'soft law' (Alexander, 2000). Its signatories do not legally bind their nations. Although they are expected to fulfil their promises, there is no explicit sanction for violation (Ward, 2002).

To determine capital adequacy, Basel I adopted the use of a capital ratio. This ratio would measure capital (the numerator) against the bank's assets (the denominator). As will be discussed below, the value of bank assets included in this ratio was not the face value of each of the assets, but rather their value adjusted for their risk level, otherwise known as the bank's risk-weighted assets (RWA). The capital ratio is thus expressed as capital/risk-weighted assets. To be considered sufficiently capitalized under Basel I, a bank had to maintain a capital ratio of 8%. That is, the value of the bank's capital had to equal at least 8% of the value of the bank's risk-weighted assets.

Several scholars have reviewed the Basel Capital Accord. Some of these scholars include: Balin (2008), Furlong (1992), Haubrich (1993), Bernake (1995), Peristiani (1996), Furfine (2000),Ferri (2001). They all concluded that capital regulation has significantly strengthened the financial strength of banks through significant reduction of possibility of failure as a result of undercapitalization. A review of Basel I being the cradle of international capital regulation, revealed that in formulating the capital adequacy ratio, the BCBS had to first address the issue of what would constitute "capital" for regulatory purposes, i.e., what would be included in the numerator. Since each member of the Committee had a different approach to defining capital, the issue was a contentious one. As mentioned previously, in the most general sense, capital is defined as the excess of a bank's assets over its liabilities (Nwankwo, 1999).

However, there are many items that could be included in this category, with some more reliable than others in achieving the purpose of cushioning losses in the bank's assets. Ultimately, the BCBS decided that, under Basel I, the definition of bank capital would be broken down into two components: tier 1 capital and tier 2 capital (BCBS, 1988). Tier 1 capital consists of higher-quality forms of capital, in the sense that it is comprised of items that have lower priority of repayment in the event that a bank becomes insolvent, and therefore have the greatest ability to absorb asset losses. Tier 1 capital consists primarily of "core capital." Core capital, also known as common equity, represents items arising from pure ownership in the bank and includes the paid-in value of common stock, as well as the amount of any reserves (i.e., retained earnings) that the bank has accumulated and disclosed (Balthazar, 2006; Casu 2006; Eun & Resnick, 2008). Because these items arise from ownership in the bank, they

have the lowest priority of repayment in the event of insolvency, and therefore represent the highest quality capital (BCBS, 1988). As mentioned above, for a bank to be considered sufficiently capitalized under Basel I, it had to maintain a capital ratio of 8%. However, Basel I also required that half of this 8% consist of tier 1 capital i.e. tier 1 must equal at least 4% of the bank's risk-weighted assets (Balin, 2008; BCBS, 1988).

Tier 2 capital is considered less reliable and is comprised of items such as subordinated debt and reserves held for loan-losses. Subordinated debt is debt (e.g., bonds) issued by the bank that the bank need not pay back until it has paid all its other creditors. Thus, the debt that the bank owes to these creditors is "subordinate" to the debt it owes to other creditors. Therefore, a bank can use the proceeds it obtained through the issuance of subordinated debt to pay its other liabilities, including the deposits it owes to its customers. As one can see, tier 2 capital is clearly of lower quality than tier 1. Whereas tier 1 consists primarily of unencumbered equity in the bank, tier 2 is permitted to include debt held by the bank (BCBS, 1988). The fact that these lower quality items were allowed to be included in the definition of capital at all reflects the fact that there were banks in the countries of some of the BCBS members that were not sufficiently capitalized with owner's equity, but instead had to rely, at least partially, on debt. Recognizing the lower quality of tier 2 capital, Basel I limited the amount of tier 2 capital that could be included in the bank's capital to 100% of tier 1 capital (Balin, 2008; Allen, 2003).

As noted above, the purpose of bank capital is to provide a cushion against losses in the bank's assets (Abba, Peter & Inyang, 2013). Therefore, in the process of drafting

Basel I, the BCBS took a risk-based approach to developing the capital adequacy guidelines (Balin, 2008, Furlong, 1992, Haubrich 1993, Bernake 1995, Peristiani 1996, Furfine 2000 & Ferri 2001). The BCBS wanted to incorporate the idea that the required level of capital should be proportionate to not only the quantity of assets held by a bank, but also to the risk of loss inherent in those assets. In other words, riskier assets (i.e., those that have a higher chance of default, or loss) should be offset by a higher amount capital. This idea of risk-sensitivity was incorporated in the denominator of Basel I's capital adequacy ratio. Instead of using a capital ratio that compared a bank's capital to the total face value of its assets, Basel I used a ratio that would compare a bank's capital to the value of the bank's assets after they had been adjusted for their risk of loss or default. The resulting total was called the bank's risk-weighted assets (RWA). To do this, Basel I established four risk categories or "buckets" (0%, 20%, 50%, and 100%) into which each of the bank's assets would be placed (Balin, 2008, Allen, 2003 & BCBS, 1988). Which category an asset fell into determined how much of that asset's value would be included in the bank's RWA. Riskier assets were placed in higher-percentage brackets, which meant that more of that asset's value was included in a bank's RWA total, which, in turn, meant that a bank's capital requirement would increase.

An asset's assignment into a risk class was predetermined by the Basel I guidelines. The BCBS established these guidelines based on the perceived risk associated with the counterparty involved in the transaction underlying the asset (e.g., the borrower of a loan). According to the standard, holding cash poses no risk of loss to the bank. Therefore, the Basel I guidelines placed all cash in the 0% risk category, which meant that the bank would not have to include the value of its cash in its total risk-weighted

assets (i.e., the denominator of the capital adequacy ratio). Likewise, according to Basel I, a loan made to a government that is a member of the Organization for Economic Cooperation and Development (OECD), such as the United States, was perceived as low-risk, and therefore would be placed in the 0% risk category. Conversely, Basel I considered assets such as commercial loans (i.e., loans made to businesses) to be high-risk and, therefore, included them in the 100% risk category. This means that 100% of the value of all commercial loans would be included in the denominator of the capital adequacy ratio (Balin 2008; Allen, 2003; BCBS, 1988 & Furlong, 1992).

Below is a table that provides the types of assets that were placed in each risk category:

Table 2.1: Bank Assets and their Risk-Weight Categories

Risk-Weight Category	Types of Assets Included in the Risk Category
0%	Cash; assets involving the governments of OECD countries
20%	Assets involving banks located in OECD countries; cash items in the process of collection
50%	Loans secured by mortgages on residential property
100%	Assets involving businesses; personal consumer loans; assets involving non-OECD governments (unless the transaction is denominated and funded in the same currency)

Source: Basel I, 1988

Basel I's methodology to determine capital adequacy also incorporated a process to take into account the risk posed by a bank's off-balance sheet items. As the term

suggests, off-balance sheet items are those items held by the bank, but that do not appear on that bank's balance sheet. The determination of whether an item belongs on-or off-balance sheet can sometimes be complex. However, in general, an off-balance sheet item, whether it be an asset or liability, is one that that the bank's claim to has not materialized completely. For example, when a bank extends a home equity line of credit to a customer, any unused portion of that line of credit is considered an off-balance asset to the bank. The reason for this is that, although a line of credit is a type of loan, and therefore is like an asset, the bank cannot derive benefit from any unused portion of it because there is no balance from which the bank can earn interest. Thus, off-balance sheet assets can be thought of as contingent on-balance sheet assets that remain off-balance sheet until an event occurs (e.g., a borrower draws on a line of credit) that gives the bank the right to the benefit of that asset (BCBS, 1988).

When an off-balance sheet asset becomes an on-balance sheet asset, it carries with it a risk of loss just like any other asset. Recognizing that off-balance sheet assets have this potential, Basel I devised a method to incorporate this risk into a bank's capital adequacy ratio. To do so, Basel I created a two-step process. The first step involved applying a "conversion" factor to the value of the off-balance sheet asset. The application of this factor essentially converted the value of the off-balance sheet asset to take into account the probability that the off-balance sheet asset would become an on-balance sheet asset. Higher conversion factors were applied to off-balance sheet items with a higher likelihood of becoming on-balance sheet items (BCBS, 1988).

The application of off-balance sheet conversion factors can be illustrated by comparing a commercial letter of credit and a standby letter of credit. A letter of credit

is essentially a promise by a bank to ensure payment by one its customers in a transaction with a third party. With a commercial letter of credit, if a customer, e.g., a buyer of goods, engages in a transaction with a third party, e.g., a seller of goods, a bank initially pays the seller and is repaid by its customer, once the buyer receives the goods. A standby letter of credit, on the other hand, acts as a credit enhancement and backs a financial obligation of a bank's customer to a third party. If the customer defaults, the bank must pay the third party and is unlikely to be repaid by its customer given the fact that the customer defaulted. The commercial letter of credit supports the payment of goods in a specific transaction where neither party wants to take the risk that the other will not perform their end of the trade. A standby letter of credit supports the longer-term risk that a customer will not fulfill its end of the bargain, like repayment of a loan over time. Consequently, Basel I applied a conversion factor of 100% to the standby letter of credit because the risk is known and confined to a particular transaction. Basel I applied a 20% conversion factor to the commercial letters of credit issued by banks because the banks assume the greater risk of non-performance over a longer period of time. In other words, the more likely an item will be called and the greater the risk that the bank's customer would be unable to repay the bank, the higher the conversion factor (Balin, 2008; BCBS, 1988).

Once the conversion factor was applied to an off-balance sheet asset, the discounted value of the off-balance sheet asset was treated like any other on-balance sheet asset and placed in the appropriate risk category. This step resulted in the risk-adjusted value of the off-balance sheet item, which was then included in the total value of the bank's risk-weighted assets. Once all of the bank's on- and off-balance sheet assets were adjusted for risk, the values were added up. The resulting sum of this calculation

equaled the bank's risk-weighted assets, which represented the denominator in the bank's capital adequacy ratio. As mentioned above, the bank must then ensure that value of its total capital levels (tier 1 + tier 2) are equal to at least 8% of the bank's risk-weighted assets, with tier 1 capital equaling at least 4% of risk-weighted assets.

Most banks in the world including Nigeria embraced this particular provision of capital for risk-weighted assets and it seems to have become the standard except that CBN stopped short of requiring banks to actually charge it to their operating profit (Akinyooye, 2006). Its circular BSD/11/2003 of August 4, 2003 (effective January 2004) re-calibrated the capital adequacy measurement of the Basel 1 Accord in an apparent effort to make it fit into the Nigerian setting. Thus KPMG (2004) rated Nigerian banks in terms of compliance with Basel 1 Accord as follows:

(1) Corporate Governance – Partially Compliant

(2) Statutory Returns – Partially Compliant

(3) Capital Adequacy (credit Risk) – Fully Compliant

(4) Capital Adequacy (Market Risk) – Not Compliant

(5) Risk weights (On-Balance Sheet) – Fully Compliant

(6) Risk weights (Off-Balance Sheet) – Fully Compliant

(7) Asset-Liability Management – Partially Compliant

(8) Accounting Standards – Partially Compliant

(9) Internal Control – Partially Compliant

(10) Banking Legislation – Partially Compliant

As Basel I was the first coherent international attempt at regulating bank capital, it may come as no surprise that Basel I was the target of many criticisms. David

Clementi (2000) who was one of the critics of Basel 1 was of the opinion that, "we should of course be under no illusion that the ratios chosen in 1988 were arrived at through a scientific process". He also did not mince words in saying that the Basel 1 Accord was "aimed principally at internationally active G10 banks" and that it was designed to spread the risk and penalty of failure between shareholders and regulatory authorities that could be forced to become lenders of last resort or liquidators.

Milne and Whalley (1998) argued along the same vein but against regulatory minimum capital requirement, which they said, once it has fallen below the required minimum could increase the owners' appetite for high risks for the sake of survival. Should the high risks fail then the moral hazard of transferring as much as possible of the banks resources into the hands of the shareholders (looting) would come in. Either way the shareholders lose because as what Arturo (1999) called Charter value (an intangible value that disappears with the closure of the institution) would have disappeared. According to them, the charter value of the bank produces a strong incentive to the owners of the bank to manage as a going concern. As long as it remains a going concern owners could always benefit by either selling their shareholding or watching it appreciate. It would thus be in their interest to keep the bank afloat and that would also be in the interest of the regulatory authorities that would no longer have to worry much on a bank failure that could upset the financial applecart. The Basel 1 Accord was in effect a subtle method of getting banks in G10 countries especially the internationally active ones to be more risk-averse so as not to threaten the economy of their home countries and by extension those of the entire Group.

Krainer (2002) links the risk-based capital requirements of Basel I to the resolution of an agency conflict between risk averse depositors and less risk averse bank shareholders. Thus, if the bank increases its risk exposure, the resulting increase in capital requirements prevents the shifting of wealth to shareholders from depositors and other bank creditors. However, Krainer (2002) argues that Basel I is insufficient to accomplish this goal because of the regulation's crude assessment of risk, which is easily subverted through capital regulation arbitrage. Greenspan (1998) noted that Basel I has been successful in raising bank capital levels, but not necessarily in controlling bank insolvency risk. This is because Basel I regulations are not tied to any chosen insolvency probability standard. Moreover, except for trading account activities, Basel I does not adjust capital standards to reflect hedging, diversification and risk management techniques.

Other critiques of Basel I are Balthazar (2006) and Eun and Resnick (2008). Balthazar (2006) was of the view that Basel I only focused on credit risk. Banks are exposed to more risk than that. Basel I had almost the same requirements for all type of activities of the bank. Meaning that different risk levels etc. were ignored. The lack of recognition of diversification is also pointed out as a critique. Eun and Resnick (2008) also gave critique to Basel I regarding the lack of recognition of other risks. They focus especially on the omission of market risk in the framework, which made banks fail even though they followed the minimum capital requirement set out by Basel I. Other critiques of Basel I pertain to its risk-weighting system. In particular, critics saw Basel I's bucket approach to risk-weighting assets as arbitrary, overly broad, and not nearly sensitive enough to the unique risks associated with each asset held by a bank.

Within each bucket, there are assets with very different levels of risk, but because they all share a common type of counterparty (e.g., businesses, governments, etc.), they are assumed to possess the same type of risk. The flaw in Basel I's approach to risk-weighting assets can be seen when one applies it to the example of commercial loans. Under Basel I, all types of commercial loans are 100% risk-weighted, thus requiring the bank to include the entire value of the loan in the total of its risk-weighted assets. Yet, clearly not all commercial loan recipients have the same amount of risk. A loan to a well-established company is far less risky than a loan to a start-up company (Allen, 2003).

The effect of this shortcoming in Basel I's risk-weighting methodology is that banks have an incentive to engage in what is known as regulatory arbitrage. Essentially, regulatory arbitrage describes a situation where, if a bank is presented with two options, both of which receive the same regulatory treatment, but each of which result in differing profit-making opportunities, the bank will choose the more lucrative option. In the commercial loan example above, from a regulatory perspective, it doesn't matter whether the bank makes the loan to the start-up company or the well-established company; in either case the bank will have to include 100% of the loan in its risk-weighted assets. However, from a profit-making perspective, the loan to the start-up company will be riskier, and therefore will demand a higher interest rate. Consequently, the bank will have an incentive to make the loan to the start-up company. The same principle holds true for potential borrowers within other risk categories, where no two borrowers will have the same risk profile, and yet all will be treated the same from a capital adequacy perspective. Given this situation, the bank will usually pursue the opportunity with higher earning potential. However, as seen

with the example of the start-up company, pursuing greater profit usually means that the bank is taking on higher risk. This again leads to a situation where the level of capital required under the Basel I methodology is not sufficiently commensurate with the risk in the bank's assets.

Akinyooye (2006) also pointed out a number of weaknesses in the Basel 1 accord as follows: it does not assess capital adequacy in relation to a bank's true risk profile i. e. one size fits all; focus on a single risk measure i.e. credit risk; the OECD/non-OECD does not properly address country risk; it does not provide proper incentives for credit risk mitigation techniques like hedging and it enables regulatory arbitrage through securitization.

In summary then, the common theme running through the criticisms of Basel I was that Basel I's method to determine the proper amount of capital to be held by a bank was not sufficiently or accurately connected to the actual risks confronting the bank and that it is not purely scientific. As the criticisms of Basel I mounted, the members of the BCBS decided that reform was in order. After several years of negotiations and consultations, the BCBS released a set of revisions to Basel I, entitled "International Convergence of Capital Measurement and Capital Standards: A Revised Framework," also known as Basel II.

2.2.2.2 Basel II: The Three Pillar Approach to Banking Regulation

Larson (2011) observed that the BCBS organized Basel II around what it called the "Three Pillar" approach. For purposes of this study, however, attention will primarily be given to Pillar I, which is the Pillar that most directly addresses the issue of

calculating capital adequacy, and is also the Pillar that specifically attempts to correct the deficiencies identified in Basel I. Pillars II and III, which deal with supervisory review standards and market discipline issues, respectively, while important aspects of capital regulation, do not have a direct bearing on the calculation of bank capital adequacy, and therefore are outside the scope of this study.

Before exploring Pillar I in depth, it is worthwhile to note what portions of Basel I that Basel II did not change. Basel II still requires that a bank's total capital equal at least 8% of the bank's risk-weighted assets. It also still assesses banks' capital adequacy using the same capital adequacy ratio, which is equal to a bank's capital divided by the bank's risk-weighted assets. Basel II did not alter Basel I's definition of capital, i.e., the numerator of the ratio. However, as will be seen below, Basel II, or more specifically, Pillar I, does alter how a bank arrives at the denominator, i.e. the calculation for risk-weighted assets. As mentioned above, Pillar I addresses the way in which banks calculate their risk-weighted assets. Pillar I was specifically designed to redress the deficiencies identified in Basel I. As such, Pillar I focuses primarily on reforming the method of measuring credit risk, i.e., the risk inherent in the bank's assets. The goal of these reforms is to ensure that the calculation of risk in a bank's assets more accurately reflects the actual risk in those assets, which should reduce the opportunity for banks to engage in regulatory arbitrage, which was one of the major problems with Basel I (Johansson, 2012; BCBS, 2004; Balin, 2008).

Pillar I's approach to measuring credit risk actually consists of three approaches: the Standardized Approach, the Foundation Internal Ratings-Based Approach (FIRB), and the Advanced Internal Ratings-Based Approach (AIRB). Thus, Basel II offers a

menu of options to determine the credit risk in banks. The standardized approach is the least complex of the three approaches and most similar to Basel I's approach. The standardized approach retains the use of risk buckets to determine an asset's risk-adjusted value (BCBS, 2004; Johansson, 2012).

However, Basel II's standardized approach to risk-weighting is different from Basel I's approach in a couple of ways. First, Basel II's standardized approach expands the number of risk buckets from four to six. In addition to the 0%, 20%, 50%, and 100% risk categories used under Basel I, the standardized approach also includes a 150% risk category, as well as a 35% risk bucket specifically reserved for residential loans secured by mortgages. The next difference between Basel I and the standardized approach is the process to determine in which bucket an asset is placed. As mentioned above, under Basel I, assets were placed in risk buckets based on the generic identity of the counterparty involved (e.g., an OECD country, business, etc.). Recognizing that no two assets bear identical risk profiles, Basel II's standardized approach attempts to make the risk-weighting determination based on the unique risk associated with each of the bank's assets.

To achieve this, Basel II's standardized approach utilizes credit-rating agencies, such as Standard & Poor's and Moody's. Accordingly, under the standardized approach, assets are placed into risk buckets based on the credit rating assigned to the counterparty involved in that asset, with higher rated counterparties assigned to lower risk buckets. Under the standardized approach's guidelines, if a commercial borrower receives an AAA rating from Standard & Poor's, that loan would be placed in the 20% risk bucket. Contrast this result with Basel I, where all such commercial loans,

regardless of the credit-worthiness of the borrower, were placed in the 100% risk bucket. In the event that a borrower is not rated by a credit agency, Basel II's standardized approach automatically places that loan in the 100% risk bucket (BCBS, 2004; Johansson, 2012).

The standardized approach makes an exception to the credit rating method for residential loans, which automatically receive a risk weight of 35%. Under the standardized approach, the risk-weighting an asset receives depends not only on that asset's credit rating, but also on whether that asset represents a claim on a sovereign national government. Reflecting the belief that government assets pose less risk, the standardized approach places government assets with a given credit rating in a lower risk category than if that asset is a claim on a private party, even if the credit rating is the same. As an example, an asset involving a AAA-rated government (using Standard & Poor's methodology) would be risk-weighted at 0%, whereas a loan involving a AAA-rated business would be risk-weighted at 20% (BCBS, 2004; Johansson, 2012).

Below is a table that provides examples of the risk-weightings received by assets as determined by their credit ratings (using Standard & Poor's ratings scale) and whether they represent claims on governments or private counterparties. The table excludes the 35% risk category because that category is reserved exclusively for loans secured by mortgages on residences and such assets are automatically included in that category regardless of the borrower's credit rating.

Table 2.2: Assets and their Credit Ratings

Credit Rating (S&P)	Government Risk Weighting	Private Counterparty Risk-weighting
AAA to AA-	0%	20%
A+ to A-	20%	50%
BBB+ to BB-	50%	100%
Below BB-	150%	150%
Unrated	100%	100%

Source: Basel II

The standardized approach is the simplest method in Pillar I to calculate credit risk, and is therefore more suitable for smaller banks. The two remaining approaches, the Foundation Internal Ratings-Based (FIRB) approach and the Advanced Internal Ratings-Based (AIRB) approach, are suited more for larger and more sophisticated banks. The main difference between the standardized approach and the two IRB approaches is that with the latter two approaches, banks can use their own internal methodology to determine the risk level of their assets, whereas with the standardized approach, banks must rely on the external ratings guidelines to risk-weight their assets. Because of the sophisticated nature of the IRB approaches, if banks wish to use them, they must demonstrate their technical ability to implement them and also receive approval from their regulators (BCBS, 2004, Johansson, 2012).

To understand the methodology underlying the IRB approaches, one must first understand the concept of unexpected losses. In essence, within the IRB framework, unexpected losses theoretically approximate a bank's credit risk, and therefore determine how much capital a bank must maintain. Unexpected losses estimate losses

in a bank's assets that are not foreseeable. Losses in a bank's assets are a normal part of the banking business, and banks, for the most part, can anticipate and prepare for those expected future losses by looking at historical loss rates. However, there are instances where a bank incurs losses greater than usual. These above-average loss levels are a bank's unexpected losses. Since expected losses are, by definition, expected, banks often set aside reserves (called loan-loss reserves) to absorb those losses. Therefore, it is those unexpected losses that a bank's capital levels are meant to cushion (Balin, 2008).

To arrive at a bank's estimate of unexpected losses, four inputs are used, all of which are common to both the FIRB and AIRB approaches. The first of these inputs is the probability of default. As its name implies, this factor provides an estimate of the probability, over the course of a year that a given borrower will default on his or her loan. The next input is the loss given default (LGD). This input provides an estimate of amount the bank stands to lose if a given borrower defaults. This estimate can be thought of as the bank's net loss, since banks are usually able to recover some amount from the borrower. The third input is the exposure at default (EAD). This input represents the additional amount that a bank could lose at the time of a borrower's default. An example would be the unused portion of any credit line available to a defaulting borrower, where the borrower still has the ability to draw on the line, thereby creating additional assets for the bank that can also go into default. The final input is the maturity of the asset (i.e., the duration of the loan). The longer the duration of a loan, the greater the chance that something will go wrong with the borrower that causes default. Therefore, an asset with a longer maturity will, holding

other factors constant, lead to a higher risk weighting for that asset (BCBS, 2004 & Johansson, 2012).

Just as with Basel I, Basel II experienced its own share of criticisms. One of the criticisms centered on the standardized approach to rating of risks under the accord. Many such as Kraussl (2003) and Cantor (2001) questioned the use of rating agencies to determine an asset's risk. Since the rating agencies are paid by those they are supposed to rate, concerns arose regarding the reliability and objectivity of the ratings they provided. According to Kraussl (2003) the credit rating agencies have expressed concern that the utilization of their risk assessments for capital adequacy requirements has the propensity to undermine the objectivity of the rating process and may negatively influence the agencies independence. They are worried that an increasing application of their risk assessments to the regulatory process will ultimately lead to calls for official supervision and regulation of their business. Cantor (2001) argues that such regulation would result in conformity and weaken the role of credit ratings as beneficial independent evaluation of financial market risk.

Tarullo (2008) explains that the biggest news in Basel II compared to Basel I was the IRB approach that let bank use there own method for setting capital requirements. It is also this method that has got a lot of the critique directed towards Basel II. He explains that this model was developed with the benefit that banks could shape their requirements after the specific risks that they were exposed to. A good thought but it is also here the critique lies. Credit risk models were in the time of Basel II implementation a relative new phenomenon and had not been used that much. Tarullo (2008) explains that it was risky to let banks develop their own credit risk models

because knowledge of credit risk models was not that widespread yet. He raises the question of reliability of the banks own models. Five points are laid out concerning the reliability. First, is the question of the model's assumptions. If these are not good the model cannot be good either. It is hard to test these models because good test data did not exist when Basel II was developed. Third, correlations among variables may not be correctly captured in the models. The forth point is an important one. Banking failures and crises are events that are likely to be found in the tails of models, which are important to capture in a good way. The last point comes from the fact that not all risks come from the outside. Risks may as well come from inside the bank and this might not be reflected in models (Tarullo, 2008; Johansson, 2012).

Mostert (2003) critically evaluated the Basel II proposals and raised issues like the geographical spread of credit ratings and the sovereign ceiling on ratings in developing countries. Research has also indicated that the rating agencies tended to be pro cyclical during the Asian crisis. The methodology used to determine credit rating is also based on historical information whilst the capital adequacy of banks is more forward looking. Despite these criticisms, Basel II was a proactive step to make the regulation of the capital adequacy of banks more risk based.

Wilson (1998) criticized Basel II's adoption of Basel I's definition of capital. According to him, the exact definition of what constitutes a bank's capital remains subjective even though Basel 1 Accord had attempted an international convergence for regulatory capital purposes. Wilson (1998) further says that several forms of measurement can be applied; including a wider range of liabilities that can extend any particular definition.

Clementi (2000) also cautioned that we should not overstate the role of capital in ensuring the health of the banking system. He said if other fundamentals are shaky, such as the macroeconomic environment, the legal system, or the framework for asset valuation and auditing, capital is likely to produce limited comfort. He identifies capital adequacy ratio as only one aspect of prudential regulation, others being: liquidity management along with systems and control. The drawbacks of Basel II led to the introduction of Basel III.

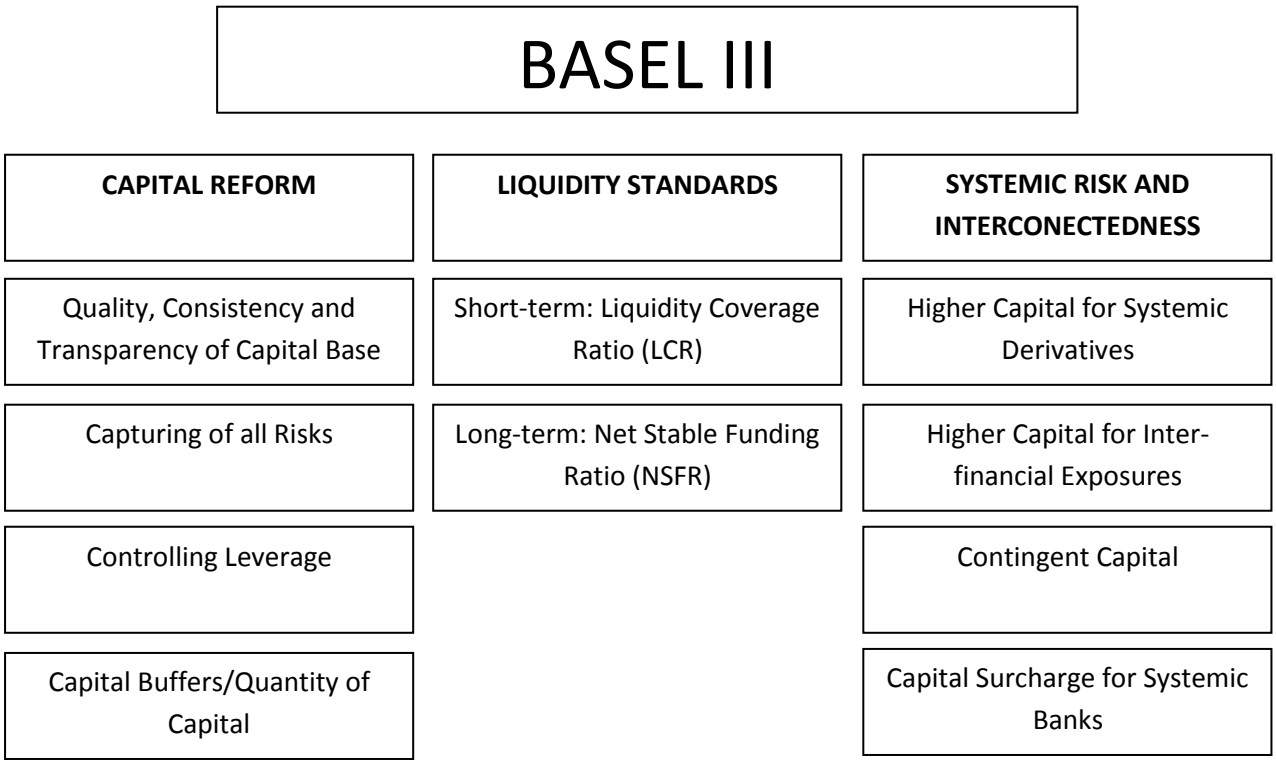
2.2.2.3 Basel III: Quantity and Quality of Capital

The global economic crisis has provided an opportunity for a fundamental restructuring of the approach to risk and regulation in the financial sector. The Basel Committee on Banking Supervision (BCBS) has collectively reached an agreement on reforms to strengthen global capital and liquidity rules with the goal of promoting a more resilient banking sector which is being referred to as Basel III. Under Basel III, each area of proposed changes has a separate consultation, debate and implementation phase. As a result, compared with the implementation of the previous agreements (Basels I and II), this enhanced level of dynamism, complexity and interdependence within the global regulatory landscape will likely add significant challenge to the implementation of Basel III (KPMG, 2011). The BCBS promulgated Basel III in September of 2010. Formally titled, "A Global Regulatory Framework for More Resilient Banks and Banking Systems," Basel III reflects the BCBS' attempts to apply lessons learned from the financial crisis and apply them to the existing framework of banking regulation. Thus, Basel III does not replace Basel II, but rather augments it. The primary goal of Basel III is to improve the ability of banks to absorb asset losses

without affecting the rest of the economy (BCBS, 2010; Johansson, 2012). Avery (2011) explains that Basel III is not itself legally binding. Hence, Basel III will only work if national authorities all over the world implement it.

The summary of Basel III is presented in the diagram below:

FIGURE 2.1: THE MATRIX OF BASEL III



Source: KPMG, 2011.

In terms of capital reforms and regulation, as seen in the diagram above, Basel III focuses mainly on the quantity and quality of capital held by banks. Overall the Basel III is structured to achieve the following:

i) Increased quality of capital;

ii) Increased quantity of capital;

iii) Reduced leverage through introduction of backstop leverage ratio;

iv) Increased short-term liquidity coverage;

v) Increased stable long-term balance sheet funding; and

vi) Strengthen risk capture, notably counterparty risks.

Among the most important parts of Basel III is its new definition of regulatory capital, which is more restrictive and emphasizes greater quality. Basel III retains the tier 1 and tier 2 distinction, but limits their composition to higher-quality capital that is better able to absorb losses. Under Basel III, Tier 1 capital must be mostly of "core capital,' which consists of equity stock and retained earnings. In addition, many items that were formerly included in a bank's capital calculation under Basel II, including some forms of subordinated debt, will be excluded under Basel III. Those capital instruments that will no longer qualify as "capital" under Basel III will be phased out of a bank's capital calculation over a ten-year period starting in 2013. This transition period will help those banks that do not currently possess the sufficient amount and types of capital comply with the new requirements (BCBS, 2010; Johansson, 2012).

In addition to increasing the quality of capital, Basel III increases the quantity of capital that banks must hold. By the time participating countries fully implement Basel III in 2019, banks are expected to maintain a total capital ratio of 10.5%, an increase from the 8% requirement under Basel II. As with Basel I and Basel II, banks under Basel III must maintain a minimum total capital ratio of at least 8% of risk-weighted assets. However, under Basel III, after a bank has calculated its 8% capital requirement, it will have to hold an additional capital conservation buffer equal to at least 2.5% of its risk-weighted assets, which brings the total capital requirement to 10.5% of risk-weighted assets. The purpose of the capital conservation buffer is to

ensure that banks have sufficient capital levels to absorb asset losses, especially during periods of financial and economic stress (BCBS, 2010).

To improve the quality of capital held by banks, Basel III also increases the amount of tier 1 capital that banks are required to hold. As mentioned above, tier 1 capital includes higher quality capital in the sense that it is comprised of items representing ownership in the bank and unencumbered sources of funds. Under Basel III, banks will be required to maintain an amount of tier 1 capital equal to at least 6% of risk-weighted assets, a 2% increase over the current requirement of 4%. In addition, banks will also have to hold more core capital. As mentioned above, core capital is a subset of tier 1 capital that includes common equity, and thus represents the highest quality capital. Under Basel III, banks will have to hold an amount of core capital equal to at least 4.5% of risk-weighted assets, whereas in the previous Basel Accords, core capital had to represent only 2% of risk-weighted assets. The total amount of core capital that banks are required to hold increases to 7% if one includes the capital conservation buffer, which must also be comprised of core capital (BCBS, 2010).

To combat procyclical behavior, Basel III will require banks to maintain a counter-cyclical buffer. The amount of the counter-cyclical buffer will range from 0%-2.5% of risk-weighted assets. The exact amount of the counter-cyclical buffer will be decided by national regulatory authorities and will generally be determined by the amount of credit in an economy, with more credit leading to a higher buffer. The purpose of the counter-cyclical buffer is to ensure that banks are sufficiently capitalized during periods of excess credit growth, which usually occur when the perceived risk in assets is low. Thus, the counter-cyclical buffer can be viewed as an extension of the capital

conservation buffer in the sense that it counteracts the trend of low capital levels during times of low risk. Consequently, by maintaining high capital levels during "good" economic times, banks can avoid drastic measures to conserve capital during bad economic times, and thus avoid credit crunches. Assuming a counter-cyclical buffer of 2.5%, Basel III could potentially require banks to maintain, at a minimum, a capital level equal to 13% of its total risk-weighted assets (BCBS, 2010).

When it issued Basel III, the BCBS also indicated that it would work with the Financial Stability Board (FSB) to implement even higher capital requirements, in addition to those mentioned above, for large and systemically important banks. The specific details of these higher capital requirements had not yet been developed at the time Basel III's release, but the BCBS stated that they would most likely consist of a combination of capital surcharges, contingent capital, and/or bail-in debt. Like the BCBS, the FSB is another international standard-setting organization comprised of financial regulatory authorities from numerous nations. However, unlike the BCBS, the FSB advises nations on the regulation of all aspects of the financial sector, not just the banking sector.

Basel III also implements a leverage ratio, which will require banks to maintain an amount of capital that is at least equal to 3% of the bank's total assets. As opposed to the risk-weighted capital ratios, which compare a bank's capital to the bank's risk-adjusted assets, Basel III's leverage ratio will compare a bank's capital level to its total assets, regardless of their risk level. By requiring a leverage ratio, Basel III ensures that banks maintain at least some amount of capital at all times, and thereby limits the ability of banks to engage in practices designed to evade minimum capital

requirements. Thus, the leverage ratio will serve as a capital floor to ensure that banks have at least some amount of capital to protect it against unforeseen losses.

The Basel III has been in its finalized form only since September of 2010, so it is too early to tell whether it will be effective in practice. Nevertheless, critics have already begun to voice their opinions on Basel III. One of the obvious criticisms of Basel III surrounds the level of capital it requires banks to hold. Critics who say the amount is too high point to the impact it will have on lending. By requiring banks to have higher levels of capital, Basel III reduces the amount of money a bank can lend. Critics point out that a reduction in lending will inhibit economic growth. Banks, and their ability to inject money in the economy through lending, are an important component in economic growth. Therefore, by imposing lending restrictions in the form of higher capital requirements, Basel III is effectively restricting banks from doing their part in sponsoring a robust and healthy economy. Related to the economic argument is the concern raised by banks that higher capital levels will hurt bank profits. Critics argue that banks will compensate for the income lost from their reduced lending ability by increasing the interest rates they will charge on loans, thus making credit more expensive to borrowers. To accomplish this, banks will take on riskier assets regardless of the concomitant higher capital requirements. Therefore, with the higher capital requirements, not only will there be less lending, but the lending that does take place will be more expensive and riskier.

The most important argument brought up against Basel III is that the risk-weight system is not properly reflecting reality. If the risk-weights, especially for sovereigns, are not corrected to reflect reality then the success of Basel III to protect against

banking failures will be small. The whole underlying idea with the risk-weights does not work if the risk-weights are not correctly determined. The capital base may not be large enough to protect the bank. Furthermore, if loopholes are found in Basel III through financial innovation then the capital base may not be correctly built up either. And from supervisors' and banks' view loopholes are likely to be found (Johansson, 2012).

2.2.3 The Concept of Risk and Value at Risk

There is no discussion on capital adequacy without due recourse to the concept of risk. Like any other business organization, banks are risk takers except that the magnitude and nature of banking risks defer considerably from any other form and type of business. Al-Jarrah (2012) observed that the world of banking has witnessed various important development and risks over the last decade. For instance, the menu of services provided by this sector is expanding especially services related to the new technology products. In addition, the deregulation and globalization of the financial activities have increased competition and necessitate a need for effective risk management in the sector.

Furthermore, the recent financial crisis that began in mid of 2007 and intensified in 2008 has threatened the existence and stability of the financial systems and the banking sectors all over the world. These changes and developments had influence directly or indirectly on the banking sectors all over the world including the banking sector of Nigeria. In their turn, the banking regulatory authorities have undertaken various actions that aimed to gauge and mitigate the adverse impact of these developments especially those related to the financial crisis on their banking sectors.

Thus risk is a major concern for all financial institutions especially banks given that risk accompanies their normal business. Risk therefore is the possibility of an economic loss. It is also seen as the possibility of fluctuations in returns on an investment. Risk is defined as "a condition in which there exists an exposure to adversity." In addition, there is an expectation of what the outcome should look like (Gallati, 2003). It is the likelihood that a return on investment different from what is expected will be received. Thus, risk includes not only the bad outcomes, i.e, returns that are lower than expected, but also good outcomes, i.e., returns that are higher than expected. In fact, we can refer to the former as downside risk and the latter is upside risk; but both are considered when measuring risk. Although banks are in the business of taking risk, banking institutions need not engage in business in a manner that unnecessarily imposes risk upon it nor should it absorb risk that can be transferred to other participants.

In this regard, the sources of risks facing financial institutions can be decomposed into two main categories: systematic and non-systematic. The systematic or market risk is the risk that has a broad impact on all financial institutions in the market though the magnitude of the impact might not be uniform. Furthermore, the sources of systematic risk are related to variables that are outside of the bank's control. On the other hand, the non-systematic sources of risk vary and related partly to bank-specific variables. Thus, the impact of such sources of risk on any banking institution depends partly on the structure and the mix of bank's sources and uses of funds.

Financial institutions may be exposed to market risk in variety of ways. Market risk exposure may be explicit in portfolios of securities and instruments that are actively traded. Conversely, it may be implicit such as interest rate risk due to mismatch of loans and deposits. Therefore, market risk is the risk that the value of on and off-balance sheet positions of a financial institution will be adversely affected by movements in market rates or prices such as interest rates, foreign exchange rates, equity prices, credit spreads and/ or commodity prices resulting in a loss to earnings and capital.

The equity price risk is the risk to earnings or capital that results from adverse changes in the value of equity related portfolios of a financial position. It associated with equities and could be systematic or unsystematic. The former refers to sensitivity of portfolio's value to changes in overall level of equity prices, while the later is associated with price volatility that is determined by firm specific characteristics.

Interest rate risk, the most important type of market risk, arises when there is a mismatch between positions, which are subject to interest rate adjustment within a specified period. The bank's lending, funding and investment activities give rise to interest rate risk. The immediate impact of variation in interest rate is on bank's net interest income, while a long term impact is on bank's net worth since the economic value of bank's assets, liabilities and off-balance sheet exposures are affected.

The second type of systematic risk is the foreign exchange risk which is the current or prospective risk to earnings and capital arising from adverse movements in currency exchange rates. It refers to the impact of adverse movement in currency exchange

rates on the value of open foreign currency position. The banks are exposed to exchange rate risk, which arises from the maturity mismatching of foreign currency positions. In the foreign exchange business, banks also face the risk of default of the counter parties or settlement risk.

The other important sources of risks facing banking institutions include credit, liquidity and operational risks. Credit risk arises from the potential that an obligor is either unwilling to perform on an obligation or its ability to perform such obligation is impaired. The liquidity risk, on the other hand, is the potential loss to an institution from either its inability to meet its obligations or to fund increases in assets as they fall due without incurring unacceptable cost or losses. The operational risk is the risk of loss resulting from inadequate or failed internal processes, people and system or from external events. It is the risk of loss arising from the potential that inadequate information system; technology failure, breaches in internal controls, fraud, unforeseen catastrophes, or any other sources of operational problems.

Based on this review for risk in banking, one can end that an effective informed risk management in banking can mitigate the impact of adverse sources of risks that accompany their business. As indicated earlier, banks are operating in a rather volatile environment and facing a large number of risks that can be categorized into systematic and non-systematic risks. Carey (2001) indicates in this regard that risk management is more important in the financial sector than in other parts of the economy. In this regard, knowing the most important sources of risks facing the banking sector is supposed to help the banks stakeholders especially the managers and the regulatory authorities to undertake the necessary steps to mitigate the adverse

impact of these sources on the performance of the financial institutions under their discretion.

Gallati (2003) defined Value at Risk (VaR) as the predicted worst-case loss at a specific confidence level (e.g., 95 percent) over a certain period of time (e.g., 10 days). The elegance of the Value at Risk (VaR) solution is that it works on multiple levels, from the position-specific micro level to the portfolio-based macro level using instruments or organizational entities as portfolio positions. Value at Risk (VaR) has become a common language for communication about aggregate risk-taking, both within and outside of an organization (e.g., with analysts, regulators, rating agencies, and shareholders). Bessis (2002) observed that the Value at Risk concept is a foundation of risk-based capital or, equivalently, 'economic capital'. The Value at Risk methodology aims at valuing potential losses resulting from current risks and relies on simple facts and principles. Value at Risk recognizes that the loss over a portfolio of transactions could extend to the entire portfolio, but this is an event that has a zero probability given the effective portfolio diversification of banks.

2.2.4 The Concept of Asset Quality

Asset Quality Ratio (AQR) is also referred to as Non-performing Loan Ratio (NPR), and it is measured as non-performing loans to total loans (Mayes & Stremmel, 2012). The ratio can also be computed as the ratio of total non-performing loans to total assets of a bank.

Chisti (2012) observed that asset quality is one of the most critical areas in determining the overall condition of any bank. Gros (2013) opined that the name

‘Asset Quality Review’ suggests a simple underlying problem: some assets are overvalued on the balance sheets of the banks. Asset Quality is the second element “A” in the popular bank rating acronym CAMELS. The prudential guideline in Nigeria classifies banks loans and advances into two broad categories namely: performing and non-performing loans. Non-performing loans are further classified into three. These are: sub-standard, doubtful and lost facilities. A provision of 10% is made on sub-standard facilities while provisions of 50% and 100% are made on doubtful and lost facilities respectively. An aggregate provision of 1% is made on risk assets not specifically provided for.

The primary factor effecting overall Asset Quality is the quality of the loan portfolio and the credit administration program. Loans are usually the largest of the asset items and can also carry the greatest amount of potential risk to the bank’s capital account. Securities can often be a large portion of the assets and also have identifiable risks. The Asset Quality rating reflects the quantity of existing and potential credit risk associated with the loan and investment portfolios, other estate owned, and other assets, as well as off-balance sheet transactions. The ability of management to identify, measure, monitor and control credit risk is also reflected here. The quality of assets is an important parameter to gauge the strength of the bank. The main motto behind measuring the Asset Quality is to ascertain the component of Non-Performing Assets (NPA) as a percentage of Total Assets. These non-performing assets should be considered against not just Total Assets but also against the Advances because NPAs primarily arise from Advances. This indicates what type of Advances the bank has made to generate interest income. Thus, Asset Quality indicates the type of the debtors of the bank.

The asset quality rating reflects the quantity of existing and potential credit risk associated with the loan and investment portfolios, other real estate owned, and other assets, as well as off-balance sheet transactions. The ability of management to identify and manage credit risk is also reflected here. The evaluation of asset quality should consider the adequacy of the Allowance for Loan and Lease Losses (ALLL) and weigh the exposure to counter-party, issuer, or borrower default under actual or implied contractual agreements. All other risks that may affect the value or marketability of an institution's assets, including, but not limited to, operating, market, reputation, strategic, or compliance risks, should also be considered.

Ogunleye (2005) disclosed that the magnitude of non-performing loans in the banking industry has been of concern to the Regulators. According to him even though the proportion of this category of loans to the Total Assets of the industry was recording a downward trend after peaking at 45.5% in 1992, its sheer size of N199.62 billion in 1992 (21.27%) and N260.19 billion (21.59%) in 2003 was disturbing.

2.3 Capital Adequacy Ratio and Deposits to Assets Ratio

One of the key functions of commercial banks is to accumulate funds in the form of deposits from the surplus sectors of the economy and make same available to the deficit sectors of the economy. Thus deposits constitute a significant proportion of banks total current liabilities and as such require maintenance of adequate capital by banks. Yu (1996) defined adequate capital for banks as the level at which the deposit insuring agency would just break-even in guaranteeing the deposits of individual banks with the premium the bank pays. An option theoretical framework was

employed in his study for measuring fair capital adequacy holdings for a sample of depository institutions in Taiwan, during 1985-1992. Sharpe (1977) defined capital as a difference between assets and deposits, so the larger the ratio of capital to assets (or the ratio of capital to deposit) the safer the deposits. As capital was adequate, deposits were "safe enough". His idea was that if the value of an institution's assets may decline in the future, its' deposits will generally be safer, the larger the current value of assets in relation to the value of deposits.

Blum (2002) and Cordella and Yeyati (1998) show that in the absence of bankruptcy, costs and corporate governance problems between bank shareholders and manager, if bank deposits are uninsured and the bank's risk choice is observable by depositors, the bank's risk choice will be efficient. The reason is that banks internalize the impact of their risk choice on depositors since these in turn will demand higher compensation if the bank incurs higher risk. In an atmosphere of this nature, there would be perfect market discipline and no moral hazard. On the other hand however, if deposits are insured or the bank's choice is not observable by depositors, the bank will most likely choose a higher risk profile at their peril. The reason is that depositors will not demand a higher return in response to higher risk choices by the bank. There will be no market discipline in such a situation and the bank's choice of its risk of default is subject to moral hazard.

Dowd (1999) found in his study that the imposition by regulators of minimum capital standards on financial institutions can be seen as a means of strengthening the safety of deposits and soundness of the banking system. He also suggested that an information asymmetry between bank managers and depositors could produce market

failure that provides a rationale for government intervention in the financial system. This intervention would take the form of capital adequacy regulation to force banks to maintain a stronger capital position. Also, Harold (1999) found the same result as Dowd (1999), in that many regulators and consumers were concerned about the safety of deposit insurance system. His study applied existing bank risk-based capital requirements to current credit union data to measure credit union's risk-based capital strength. Furthermore, users of the products of financial sector of the economy benefit from the competition within this sector, and in response banks, and other firms, seek to optimize their business mix. In order to allow competition within the financial sector those agents responsible for monitoring capital adequacy need to give firms the freedom to take risks. On occasions, this means that firms in the financial sector will fail. If this never happened either the costs to the users of banking services would be prohibitive (and/or the range of services themselves extremely limited) or the lender of last resort would effectively be taking all of the risks, but have no influence over which risks it acquired.

Permitting banks to fail indicates a possible conflict between capital adequacy, deposit protection (Stone & Zissu, 1994), and the perspective of other stakeholders such as shareholders. Deposit protection schemes are operational in many countries, but most do not protect the full value of every depositor's claim. The intention is usually to ensure that depositors bear some responsibility for their actions when a bank is liquidated. If the deposits were entirely risk free then a significant group of stakeholders would have no interest in the risks being taken and banks might be tempted into acquiring inappropriate types and levels of risk. The Nigerian Deposit

Insurance Corporation (NDIC) is the government agency in Nigeria saddled with the responsibility of safeguarding the deposits of bank customers.

Williams (2011) in his study on the determinants of capital adequacy in the Banking sub-sector of the Nigerian Economy observed that the Deposit liabilities and liquidity risk variables are not correctly signed and are not statistically significant but may increase Capital Adequacy base via increase in money supply. Al-Shabbagh (2004) hypothesised a positive relationship between deposit asset ratio and capital adequacy ratio and opined that when deposits increase, banks should be more regulated and controlled to guarantee the depositors rights, and to protect a bank from insolvency. He further observed that if depositors cannot assess financial soundness of their banks, banks will maintain lower than optimal capital ratios. Optimal capital ratios are those that banks would have observed if depositors could have assessed their financial positions properly. But if depositors can assess a bank's capital strength, a bank will maintain a relatively strong capital positions because greater capital induces depositors to accept lower interest rates on their deposits.

2.4 Capital Adequacy Ratio and Asset Quality Ratio

The condition and quality of individual asset categories can trigger financial problems and act as an important accelerator of bank fragility. By holding qualitatively inferior assets, the bank is more vulnerable to losses. Recognising these losses requires write downs and hence reduces the capital cushion. As a consequence of the capital loss the risk of failure increases. Due to the wide spread of banks' activities and the range of asset figures disclosed, there is a wide variety of potential indicators. Since the dominating business of commercial banks and thrifts is lending, it is reasonable to

focus on this asset group. A potential measure of loan quality is to gauge the amount of provision to loan losses as in Poghosyan and Cihák (2009). As a reaction to higher expected loan losses banks are forced to make higher provisions. But by inverting the argument a higher provision cannot be traced uniquely backed to loan quality. Hence, another assessment might be more useful. The non-performing loan ratio, measured as non-performing loans to total loans, is more helpful, since the definition is more generalised, and is frequently used in the literature(Mayes & Stremmel, 2012).

Blose (2001) found that provision for loan losses caused a decline in capital adequacy ratio. Hassan (1992) and ChoI (2000) also argued a negative relationship between capital adequacy ratio and asset quality ratio. Al-Sabbagh (2000) also hypothesised a negative and significant relationship between capital adequacy ratio and ratio of total loan loss provision to total loan. He argued that loan loss provision otherwise called asset quality ratio is used in his model to determine the impact of new provisions for possible loan losses and loans written-off on bank's capital level. Banks with more loan loss reserves are more aggressive in their lending practices, and are willing to accept losses instead of negotiating concession with loan defaulters. In addition, a high loan loss reserves may signal banks that are willing to write-off problem loans which are expected to reduce bank credit risk. Thus he found out using multiple linear regression that there exist a negative and significant relationship between capital adequacy ratio and asset quality which he called loan provision ratio (LPR). He observed like Blose (2001), Hassan (1992) and ChoI (2000) who found also the same negative relationship, that Jordanian Banks have increased their loan loss reserves accounts since 1995, to reduce their credit risks and maintain a higher capital adequacy ratio.

Misra and Dhal (2010) analyzed the pro-cyclicality of bank indicators with a focus on the non performing loans (NPAs) of India's public sector banks. The analysis demonstrates that banks NPAs are influenced by three major sets of factors, i.e., terms of credit, bank specific indicators relating to asset size, credit orientation, financial innovations (non-interest income) and capital requirement and the business cycle shocks. The study found that the terms of credit variables such as interest rate, maturity and collateral and bank specific variables had significant effect on the banks' non-performing loans in the presence of macro-economic shocks. Debarsh and Sukanya (2011) emphasized that the reduction of non-performing asset is necessary to improve profitability of banks and comply with the capital adequacy norms as per the Basel Accord.

2.5 Capital Adequacy Ratio (CAR) and Loans to Deposit Ratio (LDR)

Commercial banks accept deposits and also lend money to the people who require it for various purposes. Lending of funds to traders, businessmen and industrial enterprises is one of the important activities of commercial banks. The major part of the deposits received by banks is lent out, and a large part of their income is earned from interest on such lending (Aspal & Nazneen, 2014). Loan to deposit ratio (LDR) examines bank liquidity by measuring the funds that a bank has utilized into loans from the collected deposits. It demonstrates the association between loans and deposits. Besides, it provides a measure of income source and also measures the liquidity of bank assets tied to loan (Makri, Tsagkanos and Bellas2014). This ratio also measures customer friendliness of banks and implies that relatively more customer friendly bank is most likely to face lower defaults as the borrower will have

the expectation of turning to bank for the financial requirements (Ranjan and Chandra, 2003). Thus, it represents a bank's preference for credit.

In order to further safeguard depositors and regulate the activities of banks in the country, the Central Bank of Nigeria in 2010 included loans to deposit ratio in its Prudential Guidelines for deposit money banks in the country. According to the Prudential guideline for deposit money banks in Nigeria, banks are expected to maintain at any point in time, a loan to deposit ratio that is not more than 80% (Prudential Guideline, 2010). In other words, at most 80% of deposits mobilized by banks are to be granted to customers as loans and advances. Banks with relatively low loans to deposit ratio can be considered to be averse to credit risk.

There is empirical evidence that shows that LDR has significant effect on the level of capital adequacy ratio of banks in different aspects. In this study, this ratio is expected to have positive relation with capital adequacy ratio. Aspal and Nazneen (2014) empirically analysed the capital adequacy ratios of Indian private sector banks for a five year period using multiple linear regression model. The study observed positive and significant relationship between capital adequacy ratio and loans. This position is consistent with the a priori position of this study in that a positive relationship is expected between capital adequacy ratio and loans to deposit ratio. In as much as the study result of Aspal and Nazneen, (2014) is consistent with the a priori expectation of this study, some of the drawbacks of their study are as follows: the study methodology is not robust enough in that OLS only was adopted which does not take care of some of the problems that may arise regarding the data such heteroskedasticity, non-normality of data and muti-colinearity. Also, a loans to

deposits ratio was not used for the analysis. Rather, only the value of loans and advances was used in the analysis.

Williams (2011) studied the determinants of capital adequacy ratio in Nigerian deposit money banks with a focus on the efficacy of the elements of the popular banking acronym "CAMEL". The study adopted the error correction model (ECM) and the Augmented Dicky-Fuller (ADF) test with macro-determinants and micro determinants of capital adequacy ratio, one of which is total loans represented by TL in the model. In line with Aspal and Nazneen (2014) and the a priori expectation of the study, Williams (2011) also observed positive relationship between capital adequacy ratio and total loans in the Nigerian deposit money banks. However, the results of Williams (2011) are not entirely the same with that of Aspal and Nazneen (2014) in that the relationship although positive, is not significant at 10%. Since Williams (2010) studied the Nigerian banking industry, the use of proper ratios for loans and advances such as loans to deposit ratio (LDR) as contained in the Prudential Guideline or the ratio of total loans to total assets (LA) would have improved the results of the analysis and the overall applicability of the study findings to the banking industry.

2.6 Capital Adequacy Ratio and Returns on Assets

Commercial banks are profit making organizations and as such profit plays a very significant role in the success of any bank. Profitability is the ability to make profit from all the business activities of an organization, company, firm, or an enterprise. It shows how efficiently the management can make profit by using all the resources available in the market (Olalekan & Adeyinka, 2013). According to Harward and

Upton (1991) profitability is the ability of a given investment to earn a return from its use. However, the term 'Profitability' is not synonymous to the term 'Efficiency'. Profitability is an index of efficiency; and is regarded as a measure of efficiency and management guide to greater efficiency. Though, profitability is an important yardstick for measuring efficiency, the extent of profitability cannot be taken as a final proof of efficiency.

Also, 'Profitability' otherwise known as 'earnings' is one of the key factors considered in the rating of banks and in the determination of their strength. Thus the importance of Earnings in banks has made it one of the elements in the popular acronym CAMELS with "E" in the acronym representing earnings. In literature, bank profitability is typically measured by return on assets (ROA), return on equity (ROE), and/or net interest margins (NIM). For any bank, ROA depends on the bank's policy decisions as well as uncontrollable factors relating to the economy and government regulations. Many regulators believe ROA is the best measure of bank profitability (Hassan and Bashir, 2003). Rivard and Thomas (1997) suggest that bank profitability is best measured by ROA in that ROA is not distorted by high equity multipliers and ROA represents a better measure of the ability of the firm to generate returns on its portfolio of assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings. Calculated by dividing a company's annual earnings by its total assets, ROA is displayed as a percentage (Olalekan & Adeyinka, 2013).

In determining the value of capital adequacy ratio capital is classified into tier 1 and tie 2 according to Basel 1 and both tie 1 and tier 2 capitals constitute the numerator in determining capital adequacy ratio. Earnings is one of the components of tier one

capital. It is therefore logical to deduce that higher earnings will translate to higher capital adequacy ratio where the risk portfolio is held constant or reduced. Al-Sabbagh (2004) and Harold (1999) hypothesised a significant positive relationship between profitability and capital adequacy ratio and gave the reason that banks as profit making organizations are interested in high returns for shareholders, and will optimize their capital levels to earn higher returns on their assets. Thus when return on assets increases, capital adequacy ratio should increase. Al-Sabbagh (2000) observed that the capital adequacy ratio had a high positive correlation (about + 0.75) with returns on assets of Jordanian banks during the period of his study, which meant that as return on assets increased, capital adequacy ratio also increased. His position was further corroborated by the coefficient of Returns on Assets (ROA) in his model which was positive and significant at 5%. Al-Tamimi and Obeidat (2013) analysed the determinants of capital adequacy ratio in Jordanian commercial banks and observed a strong direct and statistically significant relationship between ROA and capital adequacy among the study sample, where "t" value was (10.667) and ($\alpha = 0.000$), and the Pearson correlation coefficient was (0.520). Their finding is consistent with that of other previous studies such as Mekhlafi (2004) and Makhamrerh (2000).

Pasiouras and Kosmidou (2007) identified and studied the performance of domestic and foreign commercial banks in fifteen European Union countries during the period 1995-2001. They found that profitability of both domestic and foreign banks is affected by bank specific characteristics. The results suggest that capital adequacy, credit risk, bank size, liquidity risk have significant relationship with bank profitability, although their impacts and relation is not always uniform for domestic and foreign banks. Various other studies suggest that banks with higher levels of

capital perform better than their undercapitalized peers. Staikouras and Wood (2003) claimed that there exists a positive link between a greater equity and profitability among EU banks. Abreu and Mendes (2001) also trace a positive impact of equity level on profitability. Goddard (2004) supports the prior finding of positive relationship between capital/asset ratio and bank's earnings. A positive relation between capital adequacy ratio and profitability was further suggested by Kosmidou, (2008); Demirguc-Kunt and Huizinga, (1999); Ben (2003); Kosmidou and Pasiouras, (2005); Valverde and Fernandez, (2007); Brock and Suarez, (2000); Demirguç-Kunt, Laeven and Levine, (2004) and Saunders and Schumacher (2000).

However, this position is different from that of Olaleka & Adeyinka (2013) who observed and concluded that there is no significant relationship between capital adequacy and profitability in domestic banks in Nigeria. This may be as a result of the last bank recapitalization to N25 billion in 2005 after which some of these banks still declared huge losses in 2009 according to their published financial statement. Also, some of the capital that was raised on the stock exchange by some of these banks was fictitious (Sanusi, 2010).

2.7 Capital Adequacy Ratio and Capital Regulation (The Basel Accords)

Agents and agencies responsible for monitoring capital adequacy vary from country to country, and on occasions within countries. Hall (1993) describes the banking regulation and supervisory framework for Japan, the UK, and the USA. In some countries a single agency is responsible for capital adequacy of all participants in the financial sector of the economy; in other countries several agencies may be responsible for a given constituency. The lender of last resort is not necessarily the

same as the agency responsible for the monitoring of the capital adequacy of banks or other parts of the financial sector. However, in Nigeria, the Central Bank of Nigeria is the agency responsible for regulating the level of capital adequacy ratio for commercial banks with due consideration to the Basel Capital Accord.

One of the key objectives of the various Basel Accords is positive capital regulation. Since the first capital accord in 1988 where regulatory capital was pegged at a minimum of 8%, capital adequacy ratio for banks has been on the increase. In a study carried out by Abba, Peter & Inyang (2013) on capital adequacy ratio and banking risks in the Nigerian deposit money banks, they found that the average capital adequacy ratio for the sampled banks was 27% with a standard deviation of 10.4%, when the regulatory capital adequacy ratio was 17.4%. Thus all banks try to meet and exceed the minimum capital adequacy ratios as provided by the various regulatory national and international agencies. One of the fundamental and distinguishing features of Basel III is increase in the quality and quantity of the minimum capital adequacy ratio.

Although not fully operational in Nigeria, the accord among other things requires banks to maintain a total capital ratio of 10.5%, an increase from the 8% requirement under Basel II. As with Basel I and Basel II, banks under Basel III must maintain a minimum total capital ratio of at least 8% of risk-weighted assets. However, under Basel III, after a bank has calculated its 8% capital requirement, it will have to hold an additional capital conservation buffer equal to at least 2.5% of its risk-weighted assets, which brings the total capital requirement to 10.5% of risk-weighted assets. The purpose of the capital conservation buffer is to ensure that banks have sufficient

capital levels to absorb asset losses, especially during periods of financial and economic stress.

Davis (2010) observed that Basel I Capital Accord of 1988 (together with prior introduction of minimum capital requirements in some countries such as the UK and USA) led to a global stabilization of risk-weighted capital ratios. Jackson (1999) indicates that the average ratio of capital to risk weighted assets in the G10 countries increased from 9.3 per cent at the Accord's introduction (which prescribed a minimum 8 per cent risk-weighted ratio) to 11.2 per cent in 1996. There is however, some evidence that equity/asset ratios continued to decline, although interpretation is clouded by bank use of preference stock and valuations of intangible assets. In the US for example "tangible total assets rose from 16 times tangible common equity in 1993 to a multiple of 25 in 2007" (Hoenig, 2010).

Thiagarajan, Ayyappan and Ramachandran (2011) analysed the role of market discipline on the behaviour of commercial banks with respect to their capital adequacy. The study showed that the Capital Adequacy Ratio (CAR) in the Indian Commercial Banking sector shows that the commercial banks are well capitalized and the ratio is well over the regulatory minimum requirement. The private sector banks show a higher percentage of Tier-I capital over the public sector banks. However the public sector banks show a higher level of Tier-II capital. Although the full implementation of Basel II accord by the regulatory authority (RBI) may have influenced the level of capital adequacy in the banking sector. The study indicates that market forces influence the banks‟ behaviour to keep their capital adequacy well above the regulatory norms. The Non-Performing Assets significantly influenced the

cost of deposits for both public and private sector banks. The return on equity had a significant positive influence on the cost of deposits for private sector banks. The public sector banks can reduce the cost of deposits by increasing their tier I capital.

2.8 Capital Adequacy Ratio and Banking Risks

It has become impossible to discuss the concept of capital adequacy ratio in the banking industry without referring to value at risk (VaR). The 'capital adequacy' principle states that bank's capital should match risks. Since capital is the most scarce and costly resource, the focus of risk monitoring and risk measurement follows. The central role of risk-based capital in regulations is a major incentive to the development of new tools and management techniques. Undoubtedly a most important innovation of recent years in terms of the modelling 'toolbox' is the VaR concept for assessing capital requirements. The VaR concept is a foundation of risk-based capital or, equivalently, 'economic capital' (Bessis, 2002). The VaR methodology aims at valuing potential losses resulting from current risks and relies on simple facts and principles. VaR recognizes that the loss over a portfolio of transactions could extend to the entire portfolio, but this is an event that has a zero probability given the effective portfolio diversification of banks. Therefore, measuring potential losses requires some rule for defining their magnitude for a diversified portfolio. VaR is the upper bound of losses that should not be exceeded in more than a small fraction of all future outcomes. Management and regulators define benchmarks for this small preset fraction, called the 'confidence level', measuring the appetite for risk of banks. Economic capital is VaRbased and crystallizes the quantified present value of potential future losses for making sure that banks have enough capital to sustain worst-case losses. Such risk valuation potentially extends to all main risks.

Abba, Peter and Inyang (2013) examined the relationship between capital adequacy ratio and banking risks in the Nigerian deposit money banks and observed that the risk weighted asset ratio was higher than the capital adequacy ratio in the Nigerian banking industry. They further observed a negative relationship between capital adequacy ratio and the risk portfolio of banks represented by the risk-weighted assets ratio. The findings of Abba, Peter and Inyang (2013) were consistent with Al-Sabbagh (2004) whose study on the determinants of capital adequacy ratio in Jordanian banks produced similar result. Abba, Peter and Inyang (2013) however did not measure the individual risks faced by banks such as credit risks, liquidity risks, market risks, interest rate risks and exchange rate risks. Also, the tool of analysis is not robust enough for the analysis as only OLS was used. Al-Tamini & Obeidat (2013) also carried out a study on the determinants of capital adequacy ratio of commercial banks in Jordan and found out a negative but not significant relationship between credit risks and capital adequacy ratio. The research also studied the relationship between capital adequacy ratio and interest rate risks, liquidity risks and capital risks. They observed negative significant relationship between capital adequacy ratio and interest rate risk. In the case of liquidity risk, there result shows a direct relationship between liquidity risk and capital adequacy ratio, thus contradicting the findings of Khrawash et al. (2004), Williams (2011) and that of Berrospide et. al (2008).

Koehn and Santomero (1980) examined a portfolio reaction to capital requirements by investigating the effect of capital ratio regulation on portfolio behaviour of commercial banks. They examined the effects on bank portfolio risk of regulatory increases in a minimum capital asset ratio that is acceptable to the supervisory agency.

They assumed that the central purpose of bank regulation is to reduce the riskiness of banks' portfolio so as to reduce the probability of failure and to increase stability and viability. They found that an increase in variance of returns increases the probability of failure, while an increase in returns or capital ratio decreases failure risk. Their findings are consistent with Madura & Zarruk (1993).

2.9 Theoretical Framework

Capital adequacy ratio determination, maintenance and regulation is fundamental in banking and has attracted the interest of different scholars in finance, banking economics and accounting. Thus contributors to this all-important subject area have used different theories to carry out their studies.

Prominent among these theories are: the "moral hazard" theory and "safety net" theory of Morrison & White (2005) which is closely associated with economic theorists as well as public choice theory; the buffer theory of Calem and Rob (1996); the deposit insurance theory of Flannery (1989) and Cham, Greenbaum and Thakor (1992) and economic efficiency theory and the regulatory and efficient market-monitoring hypothesis.

The idea of the "moral hazard" theory is that if banks do not have sufficient equity "at stake" when they make their investment decisions then they may make decisions which, though optimal for equity-holders, are suboptimal from the point of view of society as a whole. The "safety net" theory, is more associated with practitioners, and this intuitive idea is yet to be formally modeled (Morrison & White, 2005). It is the idea that a bank's capital forms a kind of cushion against losses for depositors. One

might loosely capture this idea by saying that if the bank starts to lose money, equity value must fall to zero before debt-holders start to lose, so depositors cannot lose out if regulation ensures that the bank must be closed or recapitalized before this occurs. The buffer theory of Calem 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. However, poorly capitalized banks may also be tempted to take more risk in the hope that higher expected returns will help them to increase their capital. The deposit insurance theory provides an insight into the behaviour of commercial banks (Flannery, 1989; Cham, Greenbaum and Thakor, 1992). In the context of this theory, banks are viewed as portfolio of risky claims. 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.

This study was guided by the economic efficiency theory and the regulatory and efficient market-monitoring hypothesis as sighted in the work of Odunga, Nyangweso, Carter and Mwarumba (2013). The economic efficiency theory states that firms should achieve their output at the lowest possible cost per unit produced. According to this theory, optimal production can be achieved by economies of scale. Thus, in the short run, maximum operational efficiency is attained at the level of output at which all accessible economies of scale are taking advantage of such efficiency. In the long run, lifting the capacity of existing systems can increase the optimal level of productive efficiency (Zerbe, 2001; Said, 2011). There are two perspectives of economic efficiency theory; allocative (price) efficiency criteria that states that for banks to operate at efficient level, then all bank products have to be

priced optimally. This will in turn reduce unfair competition in the market and reduction in interest rate spreads. The productive efficiency (technical efficiency) which takes place when the business employs all of its resources efficiently, producing the most output from the least input (Sathye, 2001; Barr, et al 2002; Saad & El-Moussawi, 2009; Said 2012).

The regulatory and efficient market-monitoring hypothesis states that regulators encourage banks to increase their capital to commensurate with the amount of risk taken by banks. This may be achieved through efficient market monitoring, mechanisms that will call for increase in capital when capital positions are deemed inadequate (Calomiris and Kahn, 1991; Berger, 1995). Thus, an important factor contributing to a positive relationship between capital adequacy and credit risk management to banks efficiency relates to the actions of regulators and supervisors (Shrieves and Dahl, 1992; Jacques and Nigro, 1997; Aggarwal and Jacques, 1998; Editz et al., 1998). Banks could respond to regulatory actions forcing them to increase their capital by increasing asset risk (Kahane 1977, Koehn and Santomero, 1980 and Kim and Santomero, 1988). The need to control the high incidence of loan default occasioned by increased lending activities was a popular motive for reforms in financial systems in developing economies. The statutory minimum capital adequacy ratio for commercial banks in Kenya is 12%, which is measured by the ratio of Total Capital to Total Risk Weighted Assets (CBK, 2011). According to Gorton and Winton (1998) and Altunbas et al (2007), any empirical approach that is used to model the relationships between capital and credit risk also needs to take account of bank efficiency. Williams (2011), states that government should regulate investment policy for banks for them to be more efficient and be globally competitive. According to

Ezeoha (2011), sound regulatory structures ensure adherence to laid down rules, guide the corporate governance behaviors of banks, and specially moderate the conduct of bank managements.

The justification for the adoption of the economic efficiency theory is the fact that all the independent variables of the study are proxies for measuring various forms of bank efficiency. Return on assets (ROA), which is the proxy for profitability in the model is a measure of operational efficiency and is represented by "E" (Earnings) in the popular banking acronym CAMELS. Asset quality ratio (AQR) which is proxied by the ratio of total non-performing loans to total loans is a measure of the efficiency of bank loans and advances which is a key resource in banking operations. Asset quality is also a measure of efficiency represented by "A" in CAMELS. Deposit to asset ratio (DAR) represents the extent to which bank assets cover deposit liabilities and therefore measures the efficiency of deposit mobilization which is one of the key roles of banks in any economy. The total risk portfolio of banks which is represented by risk-weighted assets ratio (RAR) measures in relation to other variables, the efficiency of the size, combination and nature of banks risk portfolio. Since the study is an attempt to explain the extent to which the four independent variables determine the dependent variable (capital adequacy ratio), underpinning the study with the economic efficiency theory is necessary.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the research design adopted by the researcher and the logical that have been followed in conducting this research so as to ensure verifiable and reliable result–answer to problems, solution, knowledge, insight, etc. These procedures shall cover research design, population, sampling and justification, sources and methods of data collection, variable specification and model specification.

3.2 Research Design

Correlational and descriptive research designs have been employed in the study using panel data for a period of ten years i.e. 2005-2014. The justification for adopting correlational design is based on the purpose of the study which is to examine the relationship between capital adequacy ratio and its determinants during the period. This design is consistent with that adopted in similar studies conducted by Williams (2011), Al-Sabbagh (2004), Bokhari and Ali (2006) and Romdhane (2012). Descriptive design was also adopted with a view to clearly describing the historical trends and matrices of the dependent and independent variables.

3.3 Population, Sampling and Justification

The domain of the study is the banking industry. The rationale behind the use of the banking sector is the fact that the study emphasizes risk-based capital maintenance which was started in the banking industry with the various Basel Accords as banks are more involved in high risk commercial activities. Furthermore, the concept of capital adequacy ratio (CAR) was first used and popularized in the banking industry. The concept appeared in the middle of the 1970's because of the expansion of lending

activities in the banks without any parallel increase in its capital, since capital ratio was measured by (total capital/total assets). This lead to the evolution of international debt crisis and failure of one of the biggest American banks: Franklin National Bank (Koehn 1980). These events forced regulatory authorities to stress more control procedures and to improve new criteria and methods to avoid banking industry insolvency and crisis.

Thus the population of this study is the listed deposit money banks in the Nigerian Stock Exchange, who have operated in the Nigerian banking industry between 2005 and 2014 and published annual accounts during this period. The population therefore is the fifteen quoted banks on the floor of the Nigerian stock Exchange. It should be noted that there are twenty-one deposit money banks (commercial banks) on the website of the Central Bank of Nigeria with six being operated either as private limited liability companies or without listing on the floor of the Nigerian Stock Exchange.

Of the fifteen listed deposit money banks, three banks have been filtered out, and a sample of twelve banks have been selected on the basis of availability of data, compliance with the disclosure guidelines of the Central Bank of Nigeria, ownership structure and distress experience since 2005. See appendix J.

3.4 Sources of Data

The study used secondary data for the multiple regression analysis. As such the data for the study was gleaned purely from published financial statements of the sampled banks, thus making the data source completely secondary in nature. The financial

statements were obtained from the various websites of the sampled listed deposit money banks. The World Bank's data bank was also visited.

3.5 Techniques of Data Analysis

The tool of data analysis for the research is the Panel Multiple Regression Model (MRM). This tool is preferred for the analysis because the research is empirical in nature and the data for the study is a balance panel data. Panel data is used to account for individual heterogeneity of the sample companies. In regression analysis considering the linearity, normality, stability of variance and independence of observations is of vital importance. In this study, these assumptions have been taken into consideration.

Specifically the methods of analysis employed in the study were Ordinary Least Square (OLS), Random Effects Model (REM) and Fixed Effects Model (FEM). OLS was used as a basis of comparison with previous empirical studies. However, using traditional Ordinary Least Square (OLS) alone may produce spurious regression problem that can lead to statistical bias (Granger and Newbold, 1974). As such, REM and FEM have also been adopted after which Hausman's Specification test was carried out which suggested the adoption of REM rather than FEM for the study. However, the regression result for the REM was not materially different from the OLS result.

3.6 Variables Measurement

Ratios and percentages have been used to measure the proxies used for the variables of the study. Below are the details of the measurement indices for the variables used in the study.

3.6.1 Dependent Variable

3.6.1.1 Capital Adequacy Ratio (CAR)

Capital adequacy ratio is the dependent variable in this study. Capital adequacy ratio is measured by the ratio of total capital to total risk-weighted assets of a bank. The higher the capital adequacy ratio, the higher the level of soundness of banks. A high capital adequacy ratio means a bank could absorb losses without becoming insolvent (Mpuga 2002).

Mathematically, capital adequacy ratio is expressed as:

$$\textbf{CAR} = \frac{\text{Total Qualifying Capital}}{\text{Total Risk-weighted Asset}}$$

Total qualifying capital is expressed as:

$$\text{Total Qualifying Capital} = 1^{st} \text{ Tier Capital} + 2^{nd} \text{ Tier Capital}$$

This measurement criterion was provided by the Central Bank of Nigeria in 2009. According to the circular, total capital is classified into 1st Tier Capital and 2nd Tier Capital. 1st Tie Capital comprises ordinary share capital, statutory reserves, share premium, general reserves, reserves for SSI, other reserves, retained profit and loss and interim (half year) audited profit approved by the Central Bank of Nigeria. 2nd Tier Capital consists of fixed assets revaluation reserves, Forex revaluation reserves,

general provisions, non-controlling interest and hybrid capital instruments. Risk-weighted assets in the denominator of the capital adequacy ratio represent the assets in the bank's balance sheet weighted by their risk factors.

Risky assets represent all assets in a bank's balance sheet weighted by their risk factors as provided the Central Bank of Nigeria Guideline on capital adequacy computation. These weights are determined by an international standard ranging from 0%, 20%, 50% and 100%, which are based on risk-based capital standards and reflect risk inherent in bank's asset portfolio.

3.6.2 Independent Variables

The following independent variables have been adopted for the purpose of this study: Deposits to Assets Ratio (DAR), Returns on Assets (ROA), Assets Quality Ratio (AQR) and Loans to Deposits Ratio (LDR).

3.6.2.1 Deposits to Assets Ratio (DAR)

Deposit to Assets Ratio (DAR) is an accounting ratio which is measured by the ratio of total deposits to total assets of a bank. This is consistent with the measurement yardstick adopted by Al-Sabbagh (2004) and Abba, Peter and Inyang (2013). Deposits here represent all kinds of customers' deposits such as current deposits, savings deposits, time deposits, domiciliary deposits and bankers' acceptance. This ratio is used to measure the impact of changes in deposits on capital.

Mathematically, deposit to asset ratio is expressed as:

$$\textbf{DAR} = \frac{\text{Total Deposits}}{\text{Total Asset}}$$

3.6.2.2 Returns on Assets (ROA)

Return on Assets (ROA) is a proxy for profitability in the model of the study. Returns on Assets is measured by the ratio of annual earnings to total assets. Returns on Assets (ROA) is introduced into the model as profitability plays a very significant role in determining the level of shareholders fund and ultimately the level of capital and capital adequacy ratio. Rivard and Thomas (1997) suggest that bank profitability is best measured by ROA in that ROA is not distorted by high equity multipliers and ROA represents a better measure of the ability of the firm to generate returns on its portfolio of assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings.

Mathematically, Return on asset is expressed as:

$$\textbf{ROA} = \frac{\text{Annual Earnings}}{\text{Total Asset}}$$

3.6.2.3 Assets Quality Ratio (AQR)

Asset Quality Ratio is also referred to as the Non-performing Loan Ratio (NPR), and it is measured as the ratio of non-performing loans to total loans (Mayes & Stremmel, 2012), Al-Sabaagh (2000). The CBN Prudential Guidelines refers to Asset Quality

Ratio as non-performing loans ratio (NPL Ratio) and measures it as the ratio of non-performing loans to gross loans. Thus the basis of measurement of asset quality is the same for scholars and the regulatory authority.

Mathematically, asset quality ratio is expressed as:

$$\textbf{AQR} = \frac{\text{Total Non-Performing Loans}}{\text{Gross Loans \& Advances}}$$

3.6.2.4 Loans to Deposits Ratio (LDR)

Loans to deposits ratio is a measure of the proportion of total deposits mobilized by deposit money banks granted as loans and advances to customers. It is simply total loans and advances divided by total deposits for each bank on an annual basis.

Mathematically, asset quality ratio is expressed as:

$$\textbf{LDR} = \frac{\text{Total Loans and Advances}}{\text{Total Deposits}}$$

Table 3.1: Summary of Variables Measurement

VARIABLES	MEASUREMENT BASIS
Capital Adequacy Ratio (CAR)	Total Qualifying Capital / Total Risk-weighted Asset Total Qualifying Capital= 1st Tier Capital + 2nd Tier Capital
Deposit to Assets Ratio (DAR)	Total Bank Deposits / Total Assets
Return on Assets (ROA)	Annual Earnings / Total Assets = Net Profit / Total Asset
Asset Quality Ratio (AQR)	Total Non-performing Loans / Gross Loan
Loans to Deposits Ratio (LDR)	Total Loans and Advances / Total Deposits

3.7 Model Specification

The following model has been proposed for the study:

$$\mathbf{CAR_{it} = \beta_0 + \beta_1 DAR_{it} + \beta_2 AQR_{it} + \beta_3 ROA_{it} + \beta_4 LDR_{it} + \varepsilon_{it}}$$

Where:

CAR_{it} = Capital Adequacy Ratio of bank *i* at a period t

DAR_{it} = Deposits to Assets Ratio of bank *i* at a period t

AQR_{it} = Assets Quality Ratio of bank *i* at a period t

ROA_{it} = Returns on Assets of bank *i* at a period t

LDR_{it} = Loans to Deposits Ratio of bank *i* at a period t

β_0 = Intercept

$\beta_{1\text{-}4}$ = Coefficient of the independent variables

ε_{it} = Residual or error term

3.8 Regression Diagnostics

In order to avoid drawing spurious, incorrect and misleading inferences from the results of the multiple regression analysis, a number of tests were performed on the data in order to ascertain the extent to which the data complied with the assumptions of the classical linear regression model. Specifically, the tests were performed on the data to determine the degree of:

i) Normality;

ii) Autocorrelation;

iii) Multicollinearity; and

iv) Heteroskedasticity.

There are several tests that can be carried out to ascertain the normality or otherwise of panel data. For this study, histogram of dependent variable, histogram of residuals and normal probability plot (also called the Normal P-P Plot) regression standardized residuals have been used to test the normality of the data. The histograms of the dependent variable and the residuals are simple graphics used to understand the extent of normality of the data by mentally superimposing the bell shaped normal distribution curve on the histogram.

To test for the presence or absence of autocorrelation otherwise referred to as serial correlation, the Durbin-Watson Statistic, which is denoted by "*d",* was adopted in the study. As a rule of thumb, if *d* is found to be 2 in an application, one may assume that there is no first-order autocorrelation, either positive or negative.

The values of the tolerance and variance inflation factors (VIF) were used to test for multicollinearity. Tolerance and VIF values are two advanced measures of assessing multicollinearity between the independent variables. According to Gujarati (2004), if the variables have VIF above 10 and tolerance values above 1, there is strong indication of the existence of muticollinearity.

The test for heteroskedasticity is conducted to check whether the variability of the error terms is constant or not. Thus the presence of heteroskedasticity signifies that the variation of the residuals or error term is not constant and would affect inferences in respect of the beta coefficients, coefficient of determination (R^2) and the F-statistic of the study. To test for the existence of heteroskedasticity, the study adopted the Breusch-Pagan/Cook Wiesberg F-statistic tests.

Since the study also adopted the fixed and random effects models, Hausman Specification test was also performed to determine whether the study should adopt the fixed effects model or the random effects model.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter focuses on the presentation of the results of the multiple regression model carried out using E-Views 7, Stata 11 and IBM SPSS Statistics 20 as well as the interpretation of the results obtained from the various econometrics programmes. The policy implications of the findings are also presented in this chapter. The four hypotheses of the study presented in the first chapter were tested in line with the results of the analysis and methodology presented in chapter three. Tests for the presence of multi-collinearity, heteroskedasticity, normality and autocorrelation were also performed using the results of Tolerance, VIF, Durbin Watson statistics values, and Breusch-Pagan/Cook-Weisberg tests statistic. The results of the descriptive statistics which include the mean, maximum, minimum, range, standard deviation, and variances would first be presented and compared with the regulatory rates and ratios of the apex bank, industry average and the Basel Accord. Summary statistics for correlation matrix, model estimates and their statistical significance as well as residuals statistics using ordinary least squares (OLS), fixed effects model (FEM) and random effects model (REM) are presented and interpreted in this chapter.

4.2 Data Presentation

As stated in chapter three, the study employs a balanced panel data gleaned purely from secondary sources to investigate the relationship between capital adequacy ratio (CAR) with the annual amount of deposits held by banks, proxied by deposits to assets ratio (DAR), the level of profitability of banks proxied by return on assets (ROA), the quality of loan facilities granted to customers proxied by asset quality

ratio (AQR) and proportion of customers' deposits granted as loans and advances proxied by loans to deposits ratio (LDR). The data is said to be a balanced panel data in that each subject (in this case, each bank in the sample) has the same number of observations (Gujarati & Porter, 2009). The observation for each bank is 50. This brings the total observations to 600 for the 12 deposit money banks selected from the population of 15 deposit money banks quoted on the floor of the Nigerian Stock Exchange (NSE). The balanced panel data in this study can also be described as a short balanced panel data as the number of cross-sectional subjects, N (12 banks in this case), is greater than the number of time periods, T (10 years in this case) (Gujarati & Porter, 2009).

4.2.1 Descriptive Statistics

Descriptive statistics are measures of central tendencies and measures of dispersions for a sample data at a point or over a period of time. This section focuses on the presentation and description of the results of the analysis of the descriptive statistics. The sample descriptive statistic is first presented in Table 4.1 where minimum, maximum, mean, and standard deviation for the dependent variable and independent variables used in the study are described.

Table 4.1: Descriptive Statistics of Dependent and Independent Variables

VARIABLES	OBSERVATIONS	MEAN	STD. DEV.	MINIMUM	MAXIMUM
CAR	120	0.28	0.076	0.10	0.49
DAR	120	0.72	0.164	0.26	0.90
ROA	120	0.02	0.012	0.00	0.05
AQR	120	0.15	0.090	0.02	0.36
LDR	120	0.62	0.19	0.14	1.24

Source: Author's Computation Using Stata 11, 2016.

A total of 120 observations were made for each of the study variables over the ten years period of 2006-2015. CAR representing Capital Adequacy Ratio for the sampled banks averaged 28% during the period of the study. This figure is high compared with the regulator's requirement of 10% as enshrined in the Central Bank of Nigeria 2010 Prudential Guidelines for Deposit Money Banks. The minimum observed capital adequacy ratio during the study period was 10%. This therefore means that the Nigerian banking industry remained strong despite the challenges that bedeviled the sub-sector as a result of the global economic meltdown. This may be adduced to the various mergers in the banking industry and expansion of operations of the banks both within and outside the shores of Nigeria and Africa.

The high capital adequacy ratio may also not be unconnected with the ₦25 billion minimum capital base introduced by the Central Bank of Nigeria, effective December 31st, 2005. Furthermore, the standard deviation of capital adequacy ratio (CAR) which is the average measure of the spread of the observed annual capital adequacy ratios from the mean value of 28% is 0.076%. This shows a low disparity between the capital adequacy ratios of the various banks, thereby giving further credence to the earlier assertion that Nigerian Banks are strong and adequately capitalized. The average capital adequacy ratio from the descriptive statistics is also above the minimum requirement provided in the Basel Accord. Nigeria is currently adopting Basel II which provides for a minimum capital adequacy ratio of 8%. Thus the minimum and average observed value of CAR from the Stata11 result are also above the minimum requirement in Basel II. By the time participating countries fully implement Basel III in 2019, banks are expected to maintain a total capital ratio of

10.5%, an increase from the 8% requirement under Basel II. Although the minimum value of CAR from the research observations is less than the regulatory minimum of 10.5% as provided in Basel III, the average value of CAR is higher at 28%. As such, Nigerian deposit money banks would not be faced with much challenge in terms of compliance with regulatory minimum capital by the time the Central Bank of Nigeria fully adopts Basel III for the Nigerian banking industry. The maximum capital adequacy ratio from the result of the study is about 49%. From this result, the range of CAR from the study data is 39% [between 10% (minimum) to 49% (maximum)]. This reveals that some Nigerian deposit money banks have very high capital base.

The deposit to asset ratio on the other hand is 72% with an average dispersion of 16.4% represented by the standard deviation. This means that depositors money are secured as only an average of 72% percent of banks total asset will be required to pay back depositors in the event of liquidation. This position is further supported by the low standard deviation of DAR during the period of the study which stood at 16.4%. Aside the assurance provided to depositors of banks by the Nigerian Deposit Insurance Corporation (NDIC), bank customers first of all want to be sure that there is no risk of bank failure, where one exists, they would want to generally satisfy themselves that the assets of the banks sufficient to settle their claims.

One of the core components of Tier I Capital in the Basel Accord is the balance of profit and loss of a bank for any year. Thus profitability plays a key role in determining the level of CAR and the overall financial wellness of a bank. There are different measures and proxies for profitability. For this research, Return on Asset (ROA) has been adopted. The result of the descriptive statistics reveals that the mean

value of ROA for the study period was 2% with a standard deviation of 1.2% and it ranges from 0.0% to 5%. Profitability is low in the Nigerian banking industry and the extent of dispersion from the average value of ROA as depicted by the standard deviation is high. This is further supported by the range where some banks recorded 0.0% of ROA when the ratio is calculated to one decimal place as shown by the descriptive statistics result.

Furthermore, the Asset Quality Ratio (AQR) of banks which is a measure of the quality of credit facilities granted by banks is calculated by the ratio of non-performing loans to total loans per annum. The average value of AQR is 15% with a standard deviation of 9%. This is rather high compared with the minimum ratio of 10% as enshrined in the Central Bank of Nigeria Prudential Guidelines 2010. Although the average value of the asset quality ratio is high, the dispersion from the average AQR by the observed data is high, thus revealing that the real data are far lower than the average value of 15%. The asset quality ratio ranges from 2% to 36%. The range is high and should be a concern for the regulators of the Nigerian banking industry (the Central Bank of Nigeria) and the Asset Management Company of Nigeria (AMCON).

Finally, the result of the descriptive statistics reveals that average value of the loans to deposits ratio (LDR) during the ten-year period of the study was about 62% with a standard deviation of about 19% and minimum and maximum values of 14% and 124% respectively. The average LDR is within the range of the regulatory requirement of the Central Bank of Nigeria (CBN) prudential guideline of 2010 which clearly provides that, “all banks shall maintain a loan to deposit ratio of not more than

80%". This shows that banks strictly adhere to the provisions of the requirements of the Prudential Guidelines (2010) as one of the measures to mitigate against credit risk exposures in their operations. The standard deviation is also considered low and this shows that majority of the deposit money banks maintain a loans to deposits ratio (LDR) that is close to the average figure obtained in this study. Although the study shows that the average LDR is within the range of the regulatory requirement, two of the banks recorded LDRs that were not only above the regulatory ceiling of 80%, but also above 100%. This is confirmed by the result of the descriptive statistics for LDR which shows that the maximum statistics from the observations of LDR was 124%.

4.2.2. Correlation Matrix

Table 4.2 contains the correlation values between the dependent variable (CAR) and independent variables (DAR, ROA, AQR and LDR) as well as between the independent variables themselves. The values are obtained from Stata 11 and IBM SPSS Statistics 20 Pearson Correlation of 2-tailed significance. It shows the correlation matrix with the top values containing the Pearson correlation coefficients between all pairs of variables and the bottom values containing two-tail significance of these coefficients. Checking the pattern of relationships between dependent and independent variables, it is observed that the variables correlate perfectly well (between -0.68 and 0.71) and all are significant at 1 percent. Thus, there is no correlation coefficient particularly large (greater than 0.9) and there is no significant value less than 0.01. On the other hand, the relationships between most of the explanatory variables are not very high, and as such are not significant drawback to the study. This would further be proven by the result of the autocorrelation diagnostic. Hence there is no problem of singularity of data.

TABLE 4.2: Correlation Matrix of Dependent and Independent Variables

VARIABLES	CORRELATION	CAR	DAR	ROA	AQR	LDR
CAR	Pearson Correlation	1.000				
DAR	Pearson Correlation	0.708**	1.0000			
ROA	Pearson Correlation	0.543**	0.566**	1.000		
AQR	Pearson Correlation	-0.682**	-0.711**	-0.533**	1.000	
LDR	Pearson Correlation	0.246**	0.297**	0.184*	-0.273**	1.000

*** Correlation is significant at the 0.01 level (2-tailed)*

** Correlation is significant at the 0.05 level (2-tailed)*

Source: Stata 11 & IBM SPSS Statistics 20 Output

From the result in table 4.2, it is observed that capital adequacy ratio is positively and strongly correlated with deposits to assets ratio with a Pearson correlation coefficient of about 70.8% at 1% level of significance. This means that as deposit assets ratio increases, capital adequacy ratio rises. Depositors of banks would want to be reasonably assured that their deposits are secured and as such would want a good capital adequacy position in the financial statements of banks. As expected, return on asset which is a measure of profitability in the model of the study, is positively correlated with capital adequacy ratio with a correlation coefficient of 54% at a significance level of 1%. Profitability is a core item in Tier 1 Capital for Basel I, Basel II and Basel III. As such, an increase in profitability would lead to an increase in Tier 1 Capital and this would ultimately lead to a rise in capital adequacy ratio, given that the change in Tier 1 and Tier 2 capital is greater than the change in risk-weighted asset ratio which is the denominator in the ratio. Asset quality ratio is the only independent variable with a different behavior as reported in the correlation matrix table. Table 4.2 shows that asset quality ratio is negatively correlated with capital adequacy ratio with a Pearson correlation matrix of -0.682. The correlation is

significant at 1%. As asset quality ratio increases, capital adequacy ratio reduces. Asset quality ratio is a measure of the proportion of loans and advances that is non-performing and as such, has negative impact on profitability and Tier 1 capital and capital adequacy ratio. Finally on the correlation matrix, the table reveals that capital adequacy ratio (CAR) has a positive and significant relationship with loans to deposits ratio (LDR) as the correlation matrix shows a +0.25 Pearson Product Moment correlation coefficient which is significant at 1%. This reveals that as loans to deposits ratio changes, capital adequacy ratio also changes in the same direction.

4.2.3 Regression Diagnostics

Prior to performing the regression analysis a number of tests were performed on the sampled data. The test were performed to ascertain the among others, degree of normality, autocorrelation, multicollinearity and homoskedasticity of the sampled data. The various tests performed, the results and interpretations are presented in the adjoining sub-sections.

4.2.3.1 Test for Normality

There are several tests of normality that are available in the literature. However, histogram of the dependent variable as well as residuals test is considered for this work as it measures the normality of the data and regression residuals respectively. The histogram of the observations and the residuals are simple graphics used to learn something about the shape of the Probability Distribution Function (PDF) of random variables. On the horizontal axis, the values of the dependent variable and the values of the OLS residuals are divided into suitable intervals, and in each class interval rectangles are erected equal in height to the number of observations (frequency) in

that class interval. If mentally superimpose the bell shaped normal distribution curve on the histogram, an idea as to whether normal approximation may be appropriate will be Generated (Guajarati, 2004). The diagrams are presented and discussed below:

Figure 4.1: Histogram of Dependent Variable (CAR)

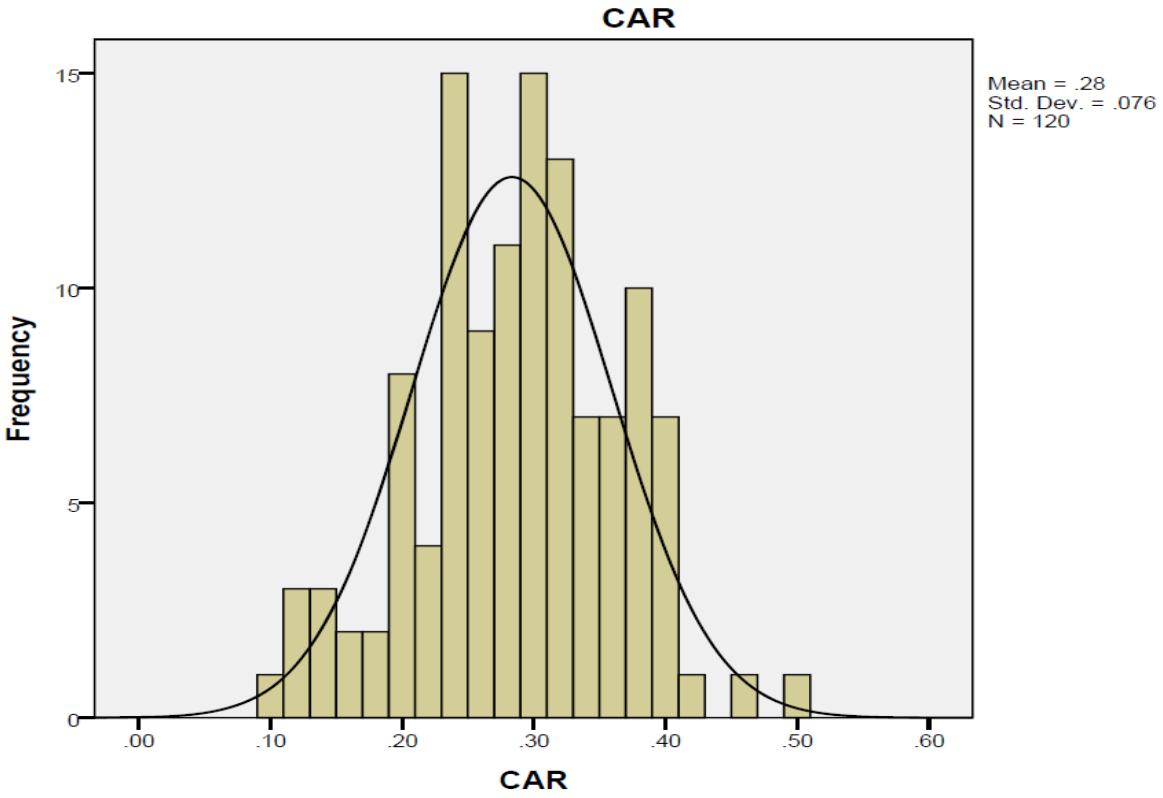


Figure 4.1 above shows that the result of the normality tests for all the observed data are normal as they do not pose any problem to the validity of the study results. It is also observed that the curve cut across almost all the histogram bars signifying that the observed data are normal. The results of the residuals are presented below:

Figure 4.2: Histogram of Test Residuals

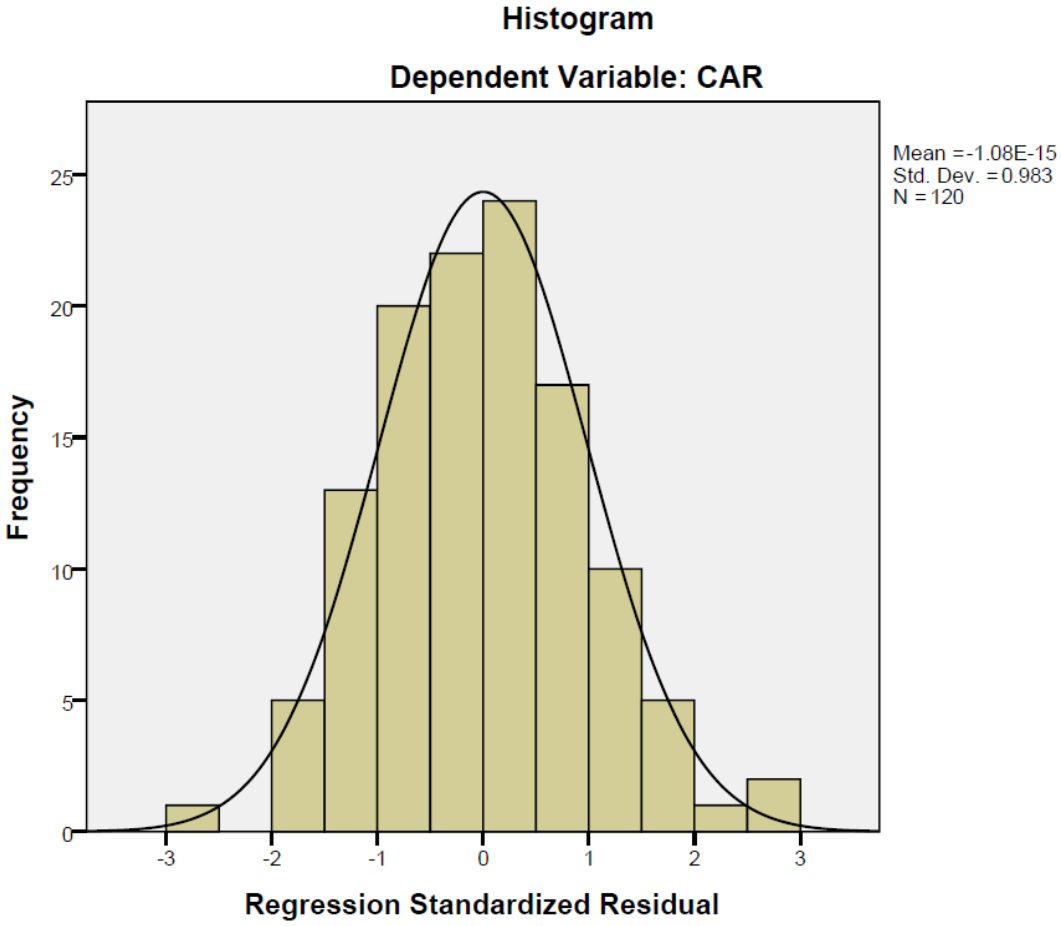


Figure 4.2 above shows that the result of the normality tests for all the residuals are normal as they also do not pose any problem to validity of the study results. The diagram shows that the residuals are perfectly and normally distributed. It is also observed that the curve cut across all the histogram bars ranging from negative to positive values signifying that the residuals are perfectly normal.

Figure 4.3: Observed and Expected Cumulative Probabilities

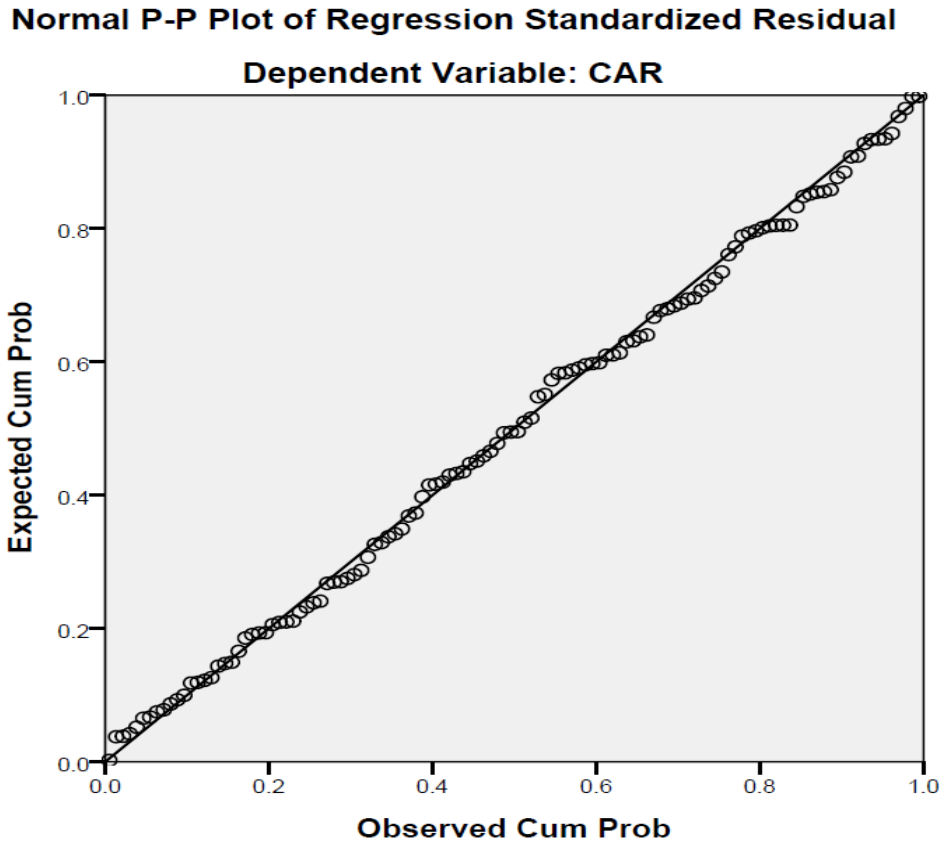


Figure 4.3 above shows that the standardized residuals are normally distributed because the fitted line in the normal probability plot in the regression for the determinants of capital adequacy ratio is a straight line which seems to fit the data reasonably well. This implies that the residuals are perfectly and normally distributed.

4.2.3.2 Test for Multicollinearity

This is to check whether there is a correlation between independent variables which will mislead the result of the study. The correlation matrix table in table 4.2 above presents the matrix of the linear relationships among the continuous independent variables. From observations, variables with high correlation above 0.60 are deposit asset ratio and risk-weighted asset ratio, asset quality ratio and risk-weighted asset

ratio, then asset quality ratio and deposit to asset ratio. Despite this result, the threat is not grievous. To formally substantiate the absence of multicollinearity between the independent variables, colinearity diagnostics are observed and presented. The values for tolerance and VIF are shown in Table 4.3 below.

Table 4.3: Multicollinearity Diagnostic Table

VARIABLES	COLLINEARITY STATISTICS	
	TOLERANCE	VIF
DAR	0.436	2.295
ROA	0.645	1.551
AQR	0.465	2.150
LDR	0.904	1.106

Source: Stata 11 & IBM SPSS Statistics 20

The tolerance value and the variance inflation factors (VIF) are two advanced measures of assessing multicollinearity between the independent variables. As noted by Gujarati (2004), if the variables have VIF above 10, and tolerance values above 1, then there is a strong indication of the existence of multicollinearity.Using Stata 11 IBM SPSS Statistics 20, the variance inflation factors were computed and found to be consistently smaller than ten. The tolerance values are also computed and found to be consistently smaller than one. The results of the above table therefore provide strong evidence indicating absence of multicollinearity (Neter, Kutner, Nachtsheim, and Wasserman, 1996, Casey and Anderson 1999 and Hassan, 2012). This shows the appropriateness of fitting the model of the study with the four independent variables.

4.2.3.3 Test for Autocorrelation

Auto correlation causes the standard errors of the coefficient to be smaller than they suppose to be and higher R^2. This will mislead the interpretation of impact or effect

and fitness of the model used in the study (Hassan, 2012). Durbin-Watson statistics has been adopted in this study to test for the presence or otherwise of autocorrelation and is popularly denoted by *d*. Gujarati (2004) observed that if there is no serial correlation (of the first-order), d is expected to be about 2. Therefore, as a rule of thumb, if d is found to be 2 in an application, one may assume that there is no first-order autocorrelation, either positive or negative. Thus, as observed in Appendix 5, the Durbin-Watson statistics *d* from the regression result is 1.561 which is about 2. This signifies the absence of serial correlation of the variables of the study and the appropriateness of the model.

4.2.3.4 Test for Heteroskedasticity

This test is conducted to check whether the variability of error terms is constant or not. The presence of heteroskedasticity signifies that the variation of the residuals or error term is not constant which would affect inferences in respect of beta coefficient, coefficient of determination (R^2) and F-statistic of the study. To test the existence of heteroskedasticity, the present study adopted the Breusch-Pagan/Cook Wiesberg and Breusch-Pagan/Cook Wiesberg (F-statistic) tests for the presence of heteroskedasticity using Stata 11. The Null hypothesis assumes that the variance of the residuals is constant. If the probability value is significant at 5%, then there is substantial evidence to reject the null hypothesis, indicating the presence of Heteroskedasticity. Therefore, by running the test for heteroskedasticity using stata 11, the result of the Breusch-Pagan/Cook Wiesberg shows that the F-statistic is 3.20 with a probability value of 0.0761 which is well above 5%. Since the probability value is greater than 5%, this signifies that the F-statistic of 3.20 is not significant at 5%. This means that heteroskedasticity is not present in the regression result. Despite

the absence of heteroskedasicity at 5% significance level (details of which are contained in appendix F), fixed and random effects multiple regression analysis was carried out to lend further credence to the results, interpretations, conclusion and recommendations on this study of the impacts of micro-prudential indices on capital adequacy ratio in the Nigerian deposit money banks.

4.2.3.4 Hausman Specification Test

To decide whether to adopt the fixed effects model (FEM) or the random effects model (REM), Hausman specification test was carried out to select the preferred model. It basically tests whether the unique errors (term error) are correlated with the regressors (Hassan, 2012). The result of the test reveals that the Ch2 value of 0.35 has a probability of 0.9863 and as such, it is not significant at the 5% level. As such, the result of the random effects model was adopted for the study. A comparison of the multiple regression results of the OLS model and REM in tables 4.4 and 4.6 reveals that they are the same. Therefore the study adopted the result of the OLS.

4.2.4. Presentation and Analysis of Regression Results

This section presents the regression result of the dependent variable (CAR) and the independent variables of the study (DAR, ROA, AQR and LDR). It follows with analysis of the association between dependent variable and each independent variable, individually and cumulatively. Three multiple regression analyses have been carried out using OLS, FEM and REM after which the Hausman Specification test was carried out. The summary of the three regression results obtained from the model of the study: $\mathbf{CAR_{it} = \beta_0 + \beta_1 DAR_{it} + \beta_2 ROA_{it} + \beta_3 AQR_{it} + \beta_4 LDR_{it} + \varepsilon_{it}}$ are presented in tables 4.4, 4.5 and 4.6 below.

Table 4.4: Stata 11 Regression Results for Ordinary Least Square (OLS) Model

STATISTICS / VARIABLES	BETA COEFFICIENTS	t-VALUES	SIGNIFICANCE
DAR	0.1815	4.28	0.000
ROA	0.9299	1.96	0.052
AQR	-0.2702	-3.61	0.000
LDR	0.0060	0.23	0.817
R^2	**0.5799**		
ADJUSTED R^2	**0.5653**		
F-STATISTIC	**39.680**		
SIGNIFICANCE	**0.0000**		

Source: Author's Computation using Stata 11, 2016.

Table 4.5: Stata 11 Regression Results for Fixed Effects Model (FEM)

STATISTICS / VARIABLES	BETA COEFFICIENTS	t-VALUES	SIGNIFICANCE
DAR	0.1850	4.21	0.000
ROA	0.8782	1.77	0.079
AQR	-0.2762	-3.50	0.001
LDR	0.0031	0.09	0.929
R^2 Within	**0.5975**		
R^2 Between	**0.0011**		
R^2 Overall	**0.5798**		
F-STATISTIC	**38.59**		
SIGNIFICANCE	**0.0000**		

Source: Author's Computation using Stata 11, 2016.

Table 4.6: Stata 11 Regression Results for Random Effects Model (REM)

STATISTICS / VARIABLES	BETA COEFFICIENTS	t-VALUES	SIGNIFICANCE
DAR	0.1815	4.28	0.000
ROA	0.9299	1.96	0.050
AQR	-0.2702	-3.61	0.000
LDR	0.0060	0.23	0.817
R^2 Within	**0.5974**		
R^2 Between	**0.0007**		
R^2 Overall	**0.5799**		
Wald Ch2	**158.72**		
SIGNIFICANCE	**0.0000**		

Source: Author's Computation using Stata 11, 2016.

Since the Hausman specification test carried out reveals that the result of the random effects model, which is the same with the result of the OLS, should be adopted, the study therefore reverts to the OLS. As such, the ensuing interpretations are based on the results of the OLS models. The model is therefore estimated as follows:

$$\mathbf{CAR_{it} = 0.17 + 0.18DAR_{it} + 0.93ROA_{it} - 0.27AQR_{it} + 0.01LDR_{it} + \varepsilon_{it}}$$

Table 4.4 shows that all but one of the coefficients of the independent variables is positive. This corroborates the correlation matrix result which shows positive correlation between capital adequacy ratio and three independent variables (deposit asset ratio, returns on assets and loans to deposits ratio). The correlation coefficient between capital adequacy ratio and asset quality ratio is observed to be negative. In the above result, asset quality ratio has negative relationship with capital adequacy ratio in line with the correlation coefficient matrix. Furthermore, three of the coefficients of the model are significant at 1% and 10% while only one (loans to deposits ratio) shows a positive but not significant relationship.

From table 4.4 and the model specification, it can be seen that a unit increase in the proportion of deposits to total assets of deposit money banks, which is represented by DAR, would result to about 19% increase in capital adequacy ratio, provided other factors remain the same. The coefficient of DAR is found to be approximately 0.18. The result is significant at 1%. Profitability plays a very key role in determining the level of capital adequacy ratio as shown in the model estimate of the study. A unit increase in returns on asset which is the measurement index for profitability in the model would result to about 93% increase in capital adequacy ratio of Nigerian

Deposit Money Banks, when other variables are held constant. This result is significant at 10%. Furthermore, on the coefficients of the independent variables, asset quality ratio shows a significant negative relationship with capital adequacy ratio at 1% with a model coefficient of -0.27 indicating that poor asset quality aggravates capital adequacy ratio erosion. Specifically, the regression results of the study signifies that a unit increase in asset quality ratio which is a measure for non-performing loan ratio, would lead to about 27% decrease in capital adequacy ratio of banks, when other factors are held constant. Also, loans to deposits ratio which is a measure of the proportion of total deposits granted to customers as loans and advances shows positive but not significant relationship with capital adequacy ratio with a coefficient of about 1% and t-value of 0.23. Although the result is not significant, this does not mean it is not important and does not have policy implication. The result has revealed a possible direction of relationship between capital adequacy ratio and proportion of deposits granted as loans and advances. This means that every unit increase in the proportion of loans to deposits would result to about 1% increase in capital adequacy.

The cumulative correlation coefficient between the dependent variable (Capital Adequacy ratio) and all the independent variables is about +0.76 indicating that the relationship between capital adequacy ratios (CAR), deposits to assets ratio (DAR), return on assets (ROA), asset quality ratio (AQR) and loans to deposits ratio (LDR) is 76%. The correlation coefficient is positive, very strong and statistically significant. This implies that for any change in the independent variables, capital adequacy ratio would be directly and significantly affected.

The cumulative R^2 of the study which is the multiple coefficient of determination gives the proportion or percentage of the total variation in the dependent variable explained by the explanatory variables jointly. The regression result shows that R^2 is approximately 0.58. This signifies that 58% of total variation in capital adequacy ratio is caused by deposits to assets ratio, return on assets, asset quality ratio and loans to deposits ratio. In other words 58% of change in capital adequacy ratio is caused by change in the independent variables of the study in the same direction. Also, the high value of R^2 implies that the estimated model has high forecasting power, since only about 40% of the variations in capital adequacy ratio (CAR) were left unaccounted for by the model, hence captured by the error term in the model. This indicates that the model is fit and the explanatory variables are properly selected, combined and used (Hassan, 2012).

The Adjusted R^2 for the model is 58%. Since the adjusted R^2 is very close to the coefficient of determination, this further proves that the mode is fit and the explanatory variables are properly selected, combined and used.

4.3 Test of Hypotheses

In order to accept or reject the hypotheses of the study the hypotheses have to be tested by analyzing the beta coefficients, t-values and level of significance of the study variables. This section presents the result of the test of hypothesis carried out for the study. Four hypotheses have been developed and tested using the regression result from Stata 11. The four hypotheses for the study are stated below:

H_{01}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Deposits to Assets Ratio (DAR)

H_{02}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Returns on Assets (ROA)

H_{03}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Asset Quality Ratio (AQR)

H_{04}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Loans to Deposits Ratio (LDR)

All the hypotheses are stated in the null form and clearly provide the basis for analysis of the nature and degree of relationship between the dependent variable and the independent variables and the impact of the independent variables on the dependent variable.

The regression result used for the test of hypotheses of the study was extracted from the OLS/REM analysis results of table 4.4 and 4.6 and is presented below:

Table 4.7: Result used for Test of Hypotheses

STATISTICS / **VARIABLES**	**BETA COEFFICIENTS**	**t-VALUES**	**SIGNIFICANCE**
DAR	0.1815048	4.28	0.000
ROA	0.9299077	1.96	0.052
AQR	-0.2702379	-3.61	0.000
LDR	0.0060142	0.23	0.817

Source: Author's Computation using Stata 11, 2016.

Table 4.5 shows that the coefficients of three of the independent variables (deposit asset ratio, returns on assets and loans to deposits ratio) are positive. However, the t-

values of two of the variables (deposits to assets ratio and assets quality ratio) are significant at 1% while one of the variables (returns on assets) is significant at 5%. The coefficient of one of the independent variables (loans to deposits ratio) was not significant at any of the acceptable levels of significance. Asset quality ratio shows negative relationship with negative beta coefficient and t-value that are significant at 1% and it is the only independent variable of the study with a negative but significant coefficient. The results for each hypothesis are presented in the following sections.

4.3.1 Hypothesis 1

H_{01}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Deposits to Assets Ratio (DAR)

Deposits are key drivers of success in any deposit money bank. Deposit is a necessity if banks would fulfill their role of channeling funds from the surplus sectors to the deficit sectors of the economy. Thus with increase in deposit, bank performance in terms of profitability, asset base and capital strength, is expected to rise. This position is in tandem with the result of the regression analysis used for the test of hypothesis which shows a positive beta coefficient of about 18% and a positive t-value of 4.28, both of which are significant at 1%. Thus, based on the regression result, hypothesis 1, which states that there is no significant relationship between capital adequacy ratio and deposit to asset ratio is rejected. This result also provides strong evidence that depositors would ordinarily prefer banks with high and increasing capital adequacy ratio and banks would want to maintain high capital adequacy position, not only to meet regulatory requirements, but also to attract and retain depositors. Another possible explanation for this result is the fact that when deposit money banks continue to increase their level of deposit taking which has no regulatory limit, the tendency is

for them to be more liquid and as such reinvest their excess liquid assets in profitable securities and ventures. This increase in returns would therefore have positive impact on profitability and capital adequacy ratio, since profitability is one of the elements in tier 1 capital.

4.3.2 Hypothesis 2

H_{02}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Returns on Assets (ROA).

Consistent with expectation, the regression result shows positive relationship between capital adequacy ratio and returns on assets. Returns on assets (ROA) which is the measure of profitability is found to be significantly associated with the capital adequacy ratio of Nigerian deposit money banks at 10% level of significance. Holding other factors constant, the result reveals that a unit increase in profitability (ROA) would result to about 93% increase in capital adequacy ratio. Of the four independent variables, profitability (returns on asset) has the highest coefficient. This further gives credence to the significance of profitability in the determination of capital adequacy ratio. Since the result for hypothesis 2 does not provide evidence for its acceptance, the hypothesis is rejected therefore showing that the study has provided empirical evidence that capital adequacy ratio and returns on assets are positively and significantly related. A good risk management culture in a bank would reduce the possibility of losses, increase profitability and enhance its capital base. Thus earnings, represented by “E” which is one of the elements of the popular banking acronym CAMEL has significant and positive impact on capital adequacy ratio with about 90% impact on capital adequacy ratio with every unit change in returns on assets.

4.3.3 Hypothesis 3

H_{03}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Asset Quality Ratio (AQR)

Asset quality ratio (AQR) which is a measure of the extent to which the credit facilities of banks are performing, is the only independent variable in the model with negative beta coefficient and t-value. The result, as obtained on other variables of the study, is also expected. The result reveals that the beta value of AQR is -0.27 and the t-value is -2.64 and they are significant at 1%. This shows that for every unit increase in asset quality ratio, capital adequacy ratio reduces by about 27%. Based on this result, the third hypothesis which states that there is no significant relationship between capital adequacy ratio (CAR) and asset quality (AQR) is rejected. Asset quality ratio is used for determining, measuring and estimating credit risk and as such, the capital base of any bank. Asset quality ratio is also referred to as non-performing loans ratio. When non-performing loans increase as a result of poor performance of loans and advances granted to customers by banks, the tendency is that earnings which is a component of tier 1 capital would be reduced through increase in loan loss provisions or impairment of loans and advances using the incurred loss model. This would also lead to erosion of capital and reduction in capital adequacy ratio. Thus, asset quality ratio is one of the key indicators of efficiency in the management of highly risky assets (loans and advances) of banks the world over.

4.3.4 Hypothesis 4

H_{04}: There is no significant relationship between Capital Adequacy Ratio (CAR) and Loans to Deposits Ratio (LDR)

Although the correlation result of the study in table 4.2 reveals about 25% level of relationship between capital adequacy ratio and loans to deposits ratio, which is also significant at 1%, the regression result shown in table 4.5 on the other hand reveals that capital adequacy ratio is not significantly related to loans to deposits ratio with a very small beta coefficient of less than 1% (about 0.006) and t-value of approximately 0.23 both of which are not significant at the 5% or 10% level. The result therefore provides the basis for failing to reject the null hypothesis which states that there is no significant relationship between capital adequacy ratio and loans to deposits ratio. This result was not expected from the on-set of the study as loans and advances expose banks to varying types and degrees of financial and business risks (operating risk, credit risk, market risk, foreign exchange risk and liquidity risk). Thus loans and advances play a key role in capital adequacy level maintenance by deposit money banks and capital adequacy regulation by regulatory authorities. However, that the results fail to provide evidence for rejecting the null hypothesis does not mean that what has been revealed so far do not have possible policy implication. The result of the analysis at least has revealed that their exist positive relationship between capital adequacy ratio and loans to deposits ratio which is consistent with a priori expectations.

Table 4.8: Summary of Hypotheses Testing

Independent Variable	Expected Sign	Reported Sign	Significant or not Significant	Remarks
Test of Hypothesis One				
Deposits to Assets Ratio (DAR)	+	+	Significant @ 1%	Hypothesis one rejected
Test of Hypothesis Two				
Return on Assets (ROA)	+	+	Significant @ 10%	Hypothesis two rejected
Test of Hypothesis Three				
Asset Quality Ratio (AQR)	-	-	Significant @ 1%	Hypothesis three rejected
Test of Hypothesis Four				
Loans to Deposits Ratio (LDR)	+	+	Not Significant @ 10%	Hypothesis four not rejected

Source: Result of the study (2016)

In synopsis, three hypotheses for the study have been rejected (hypotheses 1 to 3) and the results of the hypotheses were expected by the researcher. However, only one hypothesis was not rejected (hypothesis 4). With the exception of one of the independent variables (asset quality ratio), all other independent variables showed positive relationship with the dependent variable.

4.3 Discussion of Findings

In this section, major findings from the results of the study are presented and discussed. For clarity of presentation and ease of understanding, the discussions of the findings have been divided into four sections with each section focused on one independent variable and the dependent variable.

4.4.1 Capital Adequacy Ratio and Bank Deposits

The study hypothesized the absence of relationship between capital adequacy ratio and deposit assets ratio in the Nigerian deposit money banks. However, as expected, the regression results reveal positive and significant relationship between capital adequacy ratio and deposit to assets ratio in the Nigerian deposit money banks. Banks operations depend largely on the quantity of deposits within their disposal. Higher deposits afford banks the opportunity to increase the scale of their operation, profitability and capital base. The recent rise in marketing and public relations activities of Nigerian banks are among others, geared towards increasing their levels of deposits and their market share in the money market with the intention of earning higher return. In order to attract these deposits from the surplus sectors of the economy, existing and potential depositors need to have reasonable assurance that their monies are safe with the banks. As such, banks strive to display a more robust capital adequacy position that would provide reasonable assurance to the depositors.

Furthermore, higher deposits in banks means higher capacity to increase their scale of operation in terms lending to individuals, loan syndicates, project financing, foreign trade and foreign exchange transactions, branch networks, banking innovations and deployment of contemporary information and communication technology systems. This improved scale of operations through increase in the share of deposits can improve the profit level of banks which in turn can increase the quantity of capital in form of higher capital base and increase the quality of capital through higher capital adequacy ratio.

Some researchers in consonance with the result of this study also observed positive and significant relationship between capital adequacy ratio and deposit to assets ratio. Al-sabbagh (2004), who empirically examined the determinants of capital adequacy ratio in Jordanian Banks, observed in relation to deposit asset ratio that the ratio is the most important variable on which the Basel accord depends, to guarantee depositors' rights. He observed that after bank's regulations and the application of Basel's standards between 1995-2001, capital adequacy ratio (CAR) was positively and significantly affected by size of banks' deposits. Williams (2011), in line with Al-Sabbagh (2002) also observed that increase in deposit liabilities may increase capital adequacy ratio via increase in money supply.

Bokhari and Ali (2006) in line with Al-Sabbagh (2002) also observed that funds deposited by banks' customers is a major factor that contributes in determining their capital adequacy ratio (CAR). Deposits are cheap source of finance as compare to the external sources of finance, such as bonds, loans from business angels and through syndications (Kleff & Weber, 2003). Hence the decrease in deposits trends will affect the increase in the cost of the borrowing through external sources. Increase in the cost of alternative borrowing will reduced profit margin of the banks as more funds will be required to compensate the shortfall in profitability. Decrease in profitability would ultimately result to decrease in the quantity of capital and capital adequacy ratio.

4.4.2 Capital Adequacy Ratio and Profitability

In addition to other important findings in this study on the determinants of capital adequacy ratios in the Nigerian Deposit Money Banks (DMB), the study as regards profitability and its impact on capital adequacy ratio has established the fact that

capital adequacy ratio is highly influenced by changes in profitability level of banks in Nigeria. As observed in chapter two of this study, profitability plays a very prominent role in determining owners' equity (shareholders' funds) and the overall capital base for banks. In the same light, the Basel model for calculating capital adequacy ratio recognizes and includes various components of total bank profits such as capital and revenue reserves, special reserves and retained earnings. Thus profitability is one of the components of the numerator (qualifying capital) in the Basel capital adequacy computation model.

As such, a higher profitability, holding equity and risk-weighted assets constant, would translate to higher capital adequacy ratio. In consonance with the Basel model the result of the study reveals that returns on assets (ROA) which is the measure of profitability is significantly associated with the capital adequacy ratio of Nigerian deposit money banks at 5% level of significant. Holding other factors constant, the result reveals that a unit increase in profitability (ROA) would result to about 95% increase in capital adequacy ratio. The highest coefficient for the independent variables is observed in the proxy for profitability, which is ROA. This further gives credence to the significance of profitability in the determination of capital adequacy ratio.

Therefore, it can be deduced from this study that profitability is the most important factor that determines the quantity and quality of bank capital. Quantity of bank capital can be obtained from the balance sheet capital figure reported by banks while quality of capital can be determined by computing the capital adequacy ratio in conformity with the extant Basel accord. As profit increases, the total figure for

capital also increases. However, increase in quantity of bank capital does not necessarily translate to increase in the quality of bank capital. To further improve the measure of the extent of quality of bank capital, Basel 3 was introduced as an on-going project with a number of improvements on Basel 2. Some of these improvements are: increase in Tier 1 capital from 2% to 4.5%, increase in total capital adequacy ratio form 8% to 10.5%, Tier 2 capital becomes contingent loss absorbing capital and capital conservation buffer of 2.5%.

Furthermore, with an average ROA of about 2% from the twelve sampled banks used in the study, it can be deduced that assets of Nigerian banks yield positive returns which are not only healthy for the going-concern status of the banks, but also their capital adequacy position at any point in time. Although the study observed that the average return on assets of the banks is low, the results of the analysis also show that banks have the potential to improve on the observed trend. This new trend is sustainable given the present asset base of most of the sampled banks which are well above a trillion naira and other details in their statements of financial positions, statements of profit or loss and other comprehensive income, statements of changes in equity and statements of cash flows such as: interest income, interest expense, net interest income and fee and commission income and expenses.

Thus the healthy financial performance of Nigerian banks as revealed by their ROA significantly impacts their financial position and capital adequacy ratio. Similar researches that support this finding include that of Staikouras and Wood (2003) who claimed that there exists a positive link between a greater equity and profitability among EU banks. Abreu and Mendes (2001) in line with the finding of this study also

trace a positive impact of equity level on profitability. Goddard et al. (2004) supports all these findings of positive relationship between capital/asset ratio and bank's earnings with similar conclusion in his study. Al-Sabbagh (2000), Mekhlafi (2004) and Makhamrerh (2000) also observed that the capital adequacy ratio had a high positive correlation with returns on assets of banks during the period of their study. A positive relation between capital adequacy ratio and profitability was further suggested by Kosmidou, (2008); Demirguc-Kunt and Huizinga, (1999); Ben (2003); Kosmidou and Pasiouras, (2005); Valverde and Fernandez, (2007); Brock and Suarez, (2000); Demirguç-Kunt, Laeven and Levine, (2004) and Saunders and Schumacher (2000), Pasiouras and Kosmidou (2007), Staikouras and Wood (2003), Abreu and Mendes (2001) and Goddard et al. (2004).

However, Olaleka and Adeyinka (2013) who conducted an empirical research on the relationship between capital adequacy ratios of banks and their profitability observed and concluded contrary to the finding of this study that there is no significant relationship between capital adequacy and profitability in domestic banks in Nigeria. This may be as a result of the last bank recapitalization to twenty-five billion naira in 2005 after which some of these banks still declared huge losses in 2009 according to their published financial statement. Also, some of the capital that was raised on the stock exchange by some of these banks was fictitious (Sanusi, 2010).

4.4.3 Capital Adequacy Ratio and Assets Quality

One of the important questions that this study seeks to answer is whether change in asset quality ratio, otherwise referred to as ratio of non-performing loans to gross loans, significant affects the level of bank capital adequacy ratio. The study reveals a

significant negative relationship between capital adequacy ratio and asset quality in the Nigerian deposit Money Banks. The Central Bank of Nigeria in recognition of the effect of non-performing loans on the operation of commercial banks has deliberate policies to curtail the negative effects of non-performing loans on banks in the country. Some of these policies are enshrined in its Prudential Guidelines of 2005 for the operations of commercial banks.

Non-performing loan does not only affect bank profitability, but also capital base and capital adequacy ratio. A high and growing non-performing loan to total loan ratio tends to reduce profitability ratio over time. Since high profitability is needed for a healthy capital adequacy ratio, lower profit results to lower capital adequacy ratio. This explains the result of the analysis of the study which was used to test the hypothesis. The study hypothesized the absence of significant relationship between Capital Adequacy Ratio (CAR) and Asset Quality Ratio (AQR). However, the result of the analysis reveals a presence of strong negative relationship between capital adequacy ratio and asset quality in the Nigerian deposit money banks. The result was expected. Asset quality being the only independent variable in the study with a negative coefficient represented by the beta value of AQR is -0.208 and the t-value is -2.64 which are significant at 1%, shows that for every unit increase in asset quality ratio, capital adequacy ratio reduces by about 21%.

The reason behind this is not far-fetched. Poor asset quality which is detected by high and increasing ratio of non-performing loans to total loans and poor results of age analysis of debtors tend to erode the quantity and quality of capital. In line with this position, some of the literatures reviewed revealed similar findings. Blose (2001)

found that provision for loan losses caused a decline in capital adequacy ratio. Hassan (1992) and ChoI (2000) also argued a negative relationship between capital adequacy ratio and asset quality ratio. Furthermore, Al-Sabbagh (2000) hypothesised a negative and significant relationship between capital adequacy ratio and ratio of total loan loss provision to total loan. He argued that loan loss provision otherwise called asset quality ratio is used in his model to determine the impact of new provisions for possible loan losses and loans written-off on bank's capital level. Overall he observed that there exists a negative and significant relationship between capital adequacy ratio and asset quality which he called loan provision ratio (LPR). Debarsh and Sukanya (2011) in consonance with the result of this study emphasized that the reduction of non-performing asset is necessary to improve profitability of banks and comply with the capital adequacy norms as per the Basel Accord.

Despite the efforts of the central bank of Nigeria in ameliorating the effects of non-performing loans on the operations of banks in the country through the establishment of AMCON, the incidence of non-performing loans is still a challenge in the Nigerian banking sector. With an average value of about 15% from the sampled banks for the study, the figure is quite high. Although the figure is high, it is lower than the reported non-performing loan ratio for Nigerian banks by the World Bank in 2000 which stood at about 23%. The figure dropped to about 17% in 2010 according to the World Bank, while the Central Bank of Nigeria reported an alarmingly high figure of 35% for the same year. However, the ratio of non-performing loans (NPLs) for the Nigerian banks in 2013 as reported by the CBN, dropped further to an interestingly low figure of 4% as a result of the purchase of over ₦4.7 trillion NPLs in the industry by the Asset

Management Corporation of Nigeria (AMCON) (Thisday, 2013). This was also attributed to the reforms and clean-up in the industry by the CBN.

Furthermore, the CBN made a move to tackle the rising incidence of poor asset quality ratio in the banking industry by requesting all banks and discount houses, with effect from May, 2015 to:

i) Give the delinquent debtors three months of grace to turn their accounts from non-performing to performing status;
ii) Publish the list of delinquent debtors that remain non-performing in at least three national daily newspapers quarterly (The delinquent debtors are those whose accounts have been classified lost and include the persons, entities, directors, subsidiaries and other related parties). The list must be sent to the CBN as soon as the publication is made. In compliance with the above some banks have already sent notices to non-performing debtors informing them about their intention to publish their names.

Thus, with the current efforts of the CBN and AMCON as described in this study, it is obvious that non-performing loans are debilitating to capital strength of deposit money banks, not only in Nigeria, as revealed by this study, but the entire global economy as revealed by similar studies in other climes.

4.4.4 Capital Adequacy Ratio and Loans to Deposits Ratio

One of the traditional functions of deposit money banks the world over is the mobilization of deposits from the surplus sectors of the economy and channeling same

to the deficit sectors of the economy through loans and advances. In performing this function, banks create highly risky assets on the face of their balance sheet and are compensated for taking these risks through interest income which is created on the face of the income statement. The Central Bank of Nigeria modulates the interest rate through its monetary policy rate which changes at regular intervals. This study is not primarily focused on the returns created by these risky assets rather it is focused on the impact of the risky asset on capital adequacy ratio.

Loans to deposits ratio is one of the key ratios in the banking industry that portray the liquidity of bank assets tied to loans and advances. According to Makri, Tsagkanos and Bellas (2014), loans to deposits ratio (LDR) examines bank liquidity by measuring the funds that a bank has utilized into loans from the collected deposits. It demonstrates the association between loans and deposits. Besides, it provides a measure of income source and also measures the liquidity of bank assets tied to loan. As a result of the role of this bank specific indicator in the financial strength of banks, it has been included in the study in order to determine specifically to what extent and in what direction it impacts capital adequacy ratio of banks as one of the items in the Prudential Guideline of 2010.

Based on the results of the correlation matrix, capital adequacy ratio is positively and significantly related to loans to deposits ratio meaning that the two variables move in the same direction. As one increases, the other also increases in the same direction but not necessarily in the same proportion. However, the study is not only concerned about relationship but also impact of the independent variables on the dependent variable. To assess the level of impact, the regression analysis results need to be

interpreted. Thus, based on the regression result, a positive but not significant relationship was observed between capital adequacy ratio and loans to deposit ratio and as a result, hypothesis 4 which stated that "there is no significant relationship between capital adequacy ratio and loans to deposits ratio" was not rejected. This result is contrary to Aspal and Nazneen (2014) who observed positive and significant relationship between capital adequacy ratio and loans for Indian private sector banks. This may be due to the peculiarity of the Indian financial system in terms of its level development compared to that of Nigeria. Williams (2011) whose study was conducted in the Nigerian banking industry obtained the same result with that obtained from this study in that the relationship between capital adequacy ratio and total loans was found to be positive but not significant.

Although the result is not significant, this does not necessarily mean that they cannot be useful. At the minimum, the results of the analysis have shown direction of the relationship and this can form the basis for further research. With an overall positive impact of about +1% on capital adequacy ratio, for every unit increase in loans to deposits ratio, the study provides a basis to support the a priori position stated above which is 'higher loans would normally increase interest income, equity and overall capital adequacy position'.

This may not be unconnected with the fact that when banks increase the level of their loans and advances, they tend to increase interest income which would lead to better operational results in terms of increased profitability and capital adequacy ratio level. Since profitability is a key component in tier 1 one capital, a higher profitability would result to higher capital adequacy ratio when other factors are held constant

such as deductions from qualifying capital and the denominator of the capital adequacy ratio formula (total risk-weighted assets).

4.5 Policy Implications of the Findings

The study has several theoretical, practical and regulatory implications for both deposit money banks and policy makers in the banking industry. These implications represent the contributions of the study which are expected to benefit the existing body of knowledge within accounting, finance and banking research, regulators and providers of banking services.

The findings of the study have important policy implications for the Central bank of Nigeria (CBN), which is the apex bank and the main regulator of the banking industry since they reveal significant level of relationship between capital adequacy ratio and various measures of bank performances in terms of profit generation, portfolio riskiness, deposit accumulation and asset quality. The study reveals that adequate capital is very important in a bank as it serves as cushion against losses not covered by current earnings. It has also become a confidence booster to depositors, public and the regulatory authorities. Specifically, the findings as regards the observed pattern of relationship between capital adequacy ratio and returns on assets, which is the proxy for profitability, suggest the need on the part of the apex bank to make deliberate policies that would enhance the profit generating capacity of the banks in order to boost their capital adequacy position. Profitability should be one of the considerations of the key considerations in fixing the monetary policy rate by the CBN. On the part of deposit money banks, the study has revealed the degree to which profitability affects capital adequacy ratio as well as the direction of relationship between the two

variables. The knowledge of the degree and direction of relationship would serve as a guide to banks in their strategic and operational plans on profit maximization and their overall financial performance, financial position and cash flow.

As the study observed, the Nigerian economy is an emerging market with diverse opportunities as a growing economy especially in agriculture, solid minerals, human capital, oil and gas and the financial services sector. If properly harnessed, these enormous endowments would launch the country into the league of the most developed nations of the world. Thus, banks should take advantage of these diverse opportunities in the Nigerian economy by improve on their lending policy and ensuring that they invest more in priority areas of the economy. The result of the analysis reveals a positive and significant relationship between capital adequacy ratio and deposit to asset ratio which means higher deposit to asset ratio would result to increase in capital adequacy ratio. In order to sustain this trend, banks should identify the key drivers of the economy and increase their lending to them as this would result to more income for the borrowers, more deposits and improved asset quality position on the part of banks, and better welfare for the nation at large.

The results and findings of this study can also have implications for depositors, shareholders and users of financial statements. In particular, depositors and investors would be guided while taking decision on whether or not to keep their funds with any bank. However, this would be possible if the apex regulatory authority improves on its disclosure standards for banks and ensures strict compliance with the standards. Furthermore financial statement users would be aware of the various components that make up a bank's capital adequacy ratio and the factors affecting its behaviour when

they rely on financial statements to help them make decisions. Having known the importance of capital adequacy ratio in the life and strength of a bank, users of financial statements would be able to estimate from the study the effects of rising incidence of non-performing loans on the capital adequacy ratio and the going concern position of banks.

4.6 Summary

This chapter focused on the presentation of data, analysis of data and interpretation of the results. The chapter began with the presentation and interpretation of the descriptive statistics to show and explain the pattern and normality of the study variables. The overall results of the descriptive statistics revealed that the average capital adequacy ratio of Nigerian banks is higher than the regulatory minimum level. The chapter also presented the correlation matrix table which shows the degree of correlation or linear relationship between the dependent variable which is capital adequacy ratio and the independent variables which are deposits to assets ratio, returns on assets, loans to deposits ratio and asset quality ratio. The correlation table also shows the degree of relationship among the independent variables. The multiple regression result of the study was presented using OLS/REM and thereafter the result was analyzed and discussed along with the policy implication of the study. Various tests were conducted on the data some of which are; normality test, which revealed that the data was normality distributed; test for autocorrelation, which showed that there was absence of autocorrelation; heterokesdasticity test, which revealed that the variation of the residuals or error terms is constant; and the multicollinearity test which revealed absence of multicollinearity. These tests were necessary so as to avoid drawing conclusions on spurious results. The multiple regression result also reveals

that the model of the study is fit and that there exist significant relation between capital adequacy ratio and all the independent variables of the study. Of the four independent variables, two of the variables namely deposit to assets ratio and returns on assets were found to be positively and significantly related to capital adequacy ratio while only one variable namely, asset quality ratio was found to be negatively and significantly related to capital adequacy ratio. One independent variable namely, loans to deposits ratio was found to be positively but not significantly related to capital adequacy ratio. The index for profitability which is return on assets was found to be the most important determinant of capital adequacy ratio, having recorded the highest coefficient in the multiple regression result.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Capital adequacy ratio is an important measure of safety and soundness for deposit money banks and serves as a buffer or cushion for absorbing losses. In recognition of the importance of the concept, the study has attempted to empirically investigate the various determinants of capital adequacy ratio in the Nigerian deposit money banks. Although capital adequacy ratios at deposit money banks (commercial banks) have increased since the risk-based standards were introduced in Nigeria, the question that the study has attempted to answer is: what degree of these increases were a response specifically to changes in micro-prudential indices such as customer deposits, banking profitability, asset quality, loan and risk portfolios. In line with this problem, four hypothesis all stated in the null form were proposed and tested based on the results of the multiple regression analysis. The developed multiple regression model for the study estimates the relationship and effect of four independent variables (deposit to asset ratio, return on asset, asset quality ratio and loans to deposits ratio) on one dependent variable- capital adequacy ratio by means of least square technique.

Relevant literatures have been reviewed from both within and outside Nigeria in order to serve as guide to the findings as well as the basis for the conclusion and recommendations of the study. The findings and conclusion are based on the balanced panel data collected for the ten-year period 2005-2014 from a sample of twelve quoted deposit money banks on the Nigerian Stock Exchange. The results of the study reveal that all but one of the explanatory variables are significant in explaining the behaviour of capital adequacy ratios of the sampled banks. Two of the explanatory

variables (deposits to assets ratio and return on assets) were found to be positively and significantly related to capital adequacy ratio, while only one variable (asset quality ratio) was found to be negatively and significantly related to capital adequacy ratio. One of the independent variables, namely loans to deposits ratio was found to be positively but not significantly related to capital adequacy ratio. Thus, all but one of the independent variables has been found to be significantly related to capital adequacy ratio and as a result, the study rejected three hypotheses and fails to reject one.

The study found out that Nigerian banks maintain an average capital adequacy ratio that is higher than the regulatory floor as contained in the Basel accord thus revealing that Nigerian deposit money banks are strong in terms of capital adequacy ratio and are to a reasonable extent compliant with both the Prudential Guideline of the Central Bank of Nigeria (CBN) and the Basel Accord. As the country is currently on Basel II, the study reveals that the banking sector is ripe enough for Basel III and so as efforts are being made by the regulatory authorities to further strengthen the system and ensure greater safety of depositors' funds, they should consider adopting Basel III. Also to further lend credence to the fact that Nigerian banks comply with the Prudential Guidelines, the study observed that the average loans to deposits ratio for the sampled banks is less than the regulatory maximum limit as enshrined in the Prudential Guidelines of 2010.

The study observed high non-performing loans ratio in the banking sector despite efforts by the regulatory authorities to ameliorate the incidence. Asset quality ratio was found to be negatively and significantly related to capital adequacy ratio, thus

being one of the banking indices that erode capital adequacy ratio. The proxy for profitable (returns on assets) has the highest coefficient showing that of the four variables, profitability plays the most significant role in determining the capital adequacy ratio of deposit money banks. In addition to compulsory insurance required to be carried out by banks to secure depositors' funds, banks also use capital adequacy ratio level as a means to increasing depositors' confidence. This they achieve by ensuring higher capital adequacy ratio as deposit to assets ratio increase over time. This position is supported by the findings of the study as positive and significant relationship was observed between capital adequacy ratio and deposits to assets ratio.

Overall, these results contribute to accounting and finance literature by providing empirical evidence on the relationship between capital adequacy ratio and key micro-prudential indices in the Nigerian deposit money banks. In addition, the results could also serve as reference material for regulatory authorities especially the Central Bank of Nigeria, when formulating policies on minimum capital requirement, risk management, review and amendment of the Prudential Guidelines and general compliance with extant Basel Accords. Deposit money banks would also be guided by the findings of the study in their financing and investment decisions especially as it relates to capital and risk management.

Finally, the results have provided accounting practitioners, researchers and regulators of the banking industry with valuable insight into the matrixes, mechanics and dynamics of the micro-prudential determinants of capital adequacy ratio in the Nigerian deposit money banks.

5.2 Conclusion

The study has been carried out with the intention to ascertain the effectiveness of various micro-prudential determinants of capital adequacy ratio in leading its behaviour and their relational impacting power on its measure for deposit money banks. This research study has employed panel data of selected twelve deposit money banks from 2005-2014 for the independent and dependent variables. The descriptive statistical analysis has been carried out to measure individual powers of each micro-prudential determinant of Capital Adequacy ratio. Thus, based on these discussions and analysis in the preceding chapters, the study concludes as follows:

Generally three of the four independent variables of the study namely: deposits to assets ratio, return on assets ratio and assets quality ratio are significantly related to capital adequacy ratio, which is the only dependent variable of the study. A change in the combination of the four variables would result to about 60% change in capital adequacy ratio. Also, changes in loan portfolio as a result of increase or decrease in the quantum of loans grated to customers does not significantly impact capital adequacy ratio position.

The capital adequacy ratio of Nigerian banks is well above the regulatory average of 8% in Basel II and 10.5% in Basel III. It is therefore not an exaggeration if from the average observed capital adequacy ratio of about 28% from the sample of the study, it is concluded that Nigerian deposit money banks are adequately capitalised both in terms of the quantity and quality of capital.

Profitability plays the most significant role in determining the level of a banks' capital adequacy ratio and is positively and significantly related to capital adequacy ratio. However, the study also concludes that profitability is low in the Nigerian banking industry as the high quantity of capital adequacy is not largely determined by profitability but by fresh issues in the capital market as well as mergers which was a direct result of the twenty-five billion naira consolidation policy which became effective 31st December, 2005.

The study found that capital adequacy ratio is positively and significantly related to deposit to asset ratio. It is therefore concluded that banks maintain high capital adequacy ratio positions as they seek to increase their deposit takings from the banking population so as to further guarantee the safety and security of depositors' funds while also maintaining and increasing their market share in the banking industry.

Asset quality ratio negatively and significantly impacts capital adequacy ratio as increase in non-performing loans ratio results to decrease in capital adequacy ratio. The study observed that the reason behind the negative relationship is premised on the fact that, when other factors remain the same, increase in non-performing loan ratio results to increase in loan loss provision, which in turn would result to a reduction in profitability and subsequently, the capital adequacy ratios of banks.

Finally, the overall conclusion of the study is that capital adequacy ratio is largely determined by banks deposit level, profitability and asset quality and that while

deposits level and profitability are positively related to capital adequacy ratio, asset quality ratio is negatively related to capital adequacy ratio.

5.3 Recommendations

The recommendations of this study are divided into broad parts: recommendations for Deposit money banks and the regulatory authorities. The first section presents the recommendations for operational improvement and capital management in deposit money banks while the second section contains recommendations for policy improvement on the part of the regulatory authorities.

The following recommendations are for deposit money banks:

(i) Since the study reveals that profitability is the major and most important determinant of capital adequacy ratio and profitability is also a major variable in the Basel accord capital adequacy computation model, Nigerian deposit money banks should increase their reserves accounts in order to enhance their capital adequacy position and the overall safety and soundness of the entire banking system through better operational results and more prudent management of their available resources.

(ii) Nigerian deposit money banks should adopt a more detailed disclosure policy for the quantity and quality of their capital by disclosing details of current and comparative figures for capital adequacy ratio and elements of computations in their annual reports for both Tier 1 and Tier 2 capitals and their classifications, besides risky assets and their weights.

(iii) Banks should also have an internal asset quality ratio targets which should be lower than the regulatory ratio and then make efforts towards ensuring its realisation at any point in time.

(iv) Banks should also ensure strict compliance with regulatory requirements bothering on capital adequacy ratio, asset quality ratio, risk management and loans administration.

The following recommendations are for the regulatory authorities:

(i) Since the result shows that profitability is the most important determinant of capital adequacy ratio, and the literature reviewed also support the fact that profitability is the best measure of performance, the apex regulatory financial institution should consider making deliberate policies on certain profitability ratios especially returns on assets in order to further guarantee the safety of depositors funds and the overall interests of various stakeholders in the banking industry.

(ii) Since deposit to asset ratio is positively related to capital adequacy ratio, the apex regulatory financial institution should establish adequate capital limit for any given amount of deposits with banks at regular intervals, rather maintaining a single rate for a long period of time. Thus, it should be that banks, who intend to increase their market share by attracting more depositors and deposits, should ensure that they attain the commensurate level of capital adequacy ratio as stipulated by the apex bank.

(iii) The regulatory authorities should further require commercial banks to stress test their performance with a view to recognising potential future losses and provisioning for them. The outcome of this exercise would be a leaner profit

that could translate into lower dividend if any, but ultimately resulting into stronger capital bases for the banks, less taxes, reduced strain on the banks' resources and capital appreciation for the shareholders. The ability of the banks to withstand future shocks and economic downturns would be greatly enhanced and bank failures could be drastically reduced.

(iv) Finally, the regulatory authority should ensure that annual reports of banks include the rules, policies and basis on which capital adequacy ratios and risk-weighted assets measurement are based, which will lead to raising banking and finance awareness that will enhance banks competitive positions with local, regional and international banks.

5.5 Suggestion for Further Research

The study focused only on four micro-prudential determinants of capital adequacy ratio using micro data from individual selected banks. This suggests the urgent need and high importance of conducting more research to include other micro data for independent variables not included in this study such as leverage ratio, market risks, credit risks, liquidity ratio, as well as working on measuring capital to deposits ratio or capital to debts ratio along with variables of the current study.

The study also did not consider the impact of macroeconomic variables and macro-prudential indices such as monetary policy rate (MPR), inflation rate (INFR), interest rate (INTR), Gross Domestic Product (GDP), Per Capital Income (PCI), Annual National Budget (ANB), Regulatory Capital Adequacy Ratio (RCAR), exchange rate (EXR) and capital market indices on capital adequacy ratio. Finally, the same research can be replicated for another domain in the financial sector other than deposit money banks such as insurance companies.

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APPENDICES

APPENDIX A: RESULT OF DESCRIPTIVE STATISTICS USING STATA 11

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   11.2   Copyright 1985-2009 StataCorp LP
  Statistics/Data Analysis             StataCorp
                                       4905 Lakeway Drive
     Special Edition                   College Station, Texas 77845 USA
                                       800-STATA-PC        http://www.stata.com
                                       979-696-4600        stata@stata.com
                                       979-696-4601 (fax)

Single-user Stata perpetual license:
       Serial number:  40110540776
         Licensed to:  Economics
                       University of East Anglia

Notes:
      1.  (/m# option or -set memory-) 50.00 MB allocated to data
      2.  (/v# option or -set maxvar-) 5000 maximum variables

. *(7 variables, 120 observations pasted into data editor)

. summarize  car dar roa aqr ldr

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
         car |       120       .2835    .0760766        .1         .49
         dar |       120    .7241667    .1644169       .26         .9
         roa |       120    .0235833    .0120779         0         .05
         aqr |       120    .1450833    .0901259       .02         .36
         ldr |       120      .6155    .1861636       .14        1.24
```

APPENDIX B: CORRELATION MATRIX RESULT USING STATA 11 AND IBM SPSS 20

```
. cor  car dar roa aqr ldr
(obs=120)

             |      car      dar      roa      aqr      ldr
-------------+---------------------------------------------
         car |   1.0000
         dar |   0.7080   1.0000
         roa |   0.5432   0.5662   1.0000
         aqr |  -0.6820  -0.7114  -0.5333   1.0000
         ldr |   0.2458   0.2972   0.1840  -0.2727   1.0000
```

```
CORRELATIONS
  /VARIABLES=CAR DAR ROA AQR LDR
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet0]

Correlations

		CAR	DAR	ROA	AQR	LDR
CAR	Pearson Correlation	1	.708**	.543**	-.682**	.246**
	Sig. (2-tailed)		.000	.000	.000	.007
	N	120	120	120	120	120
DAR	Pearson Correlation	.708**	1	.566**	-.711**	.297**
	Sig. (2-tailed)	.000		.000	.000	.001
	N	120	120	120	120	120
ROA	Pearson Correlation	.543**	.566**	1	-.533**	.184*
	Sig. (2-tailed)	.000	.000		.000	.044
	N	120	120	120	120	120
AQR	Pearson Correlation	-.682**	-.711**	-.533**	1	-.273**
	Sig. (2-tailed)	.000	.000	.000		.003
	N	120	120	120	120	120
LDR	Pearson Correlation	.246**	.297**	.184*	-.273**	1
	Sig. (2-tailed)	.007	.001	.044	.003	
	N	120	120	120	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX C: NORMALITY TESTS RESULTS USING IBM SPSS STATISTICS 20

```
[DataSet0]
```

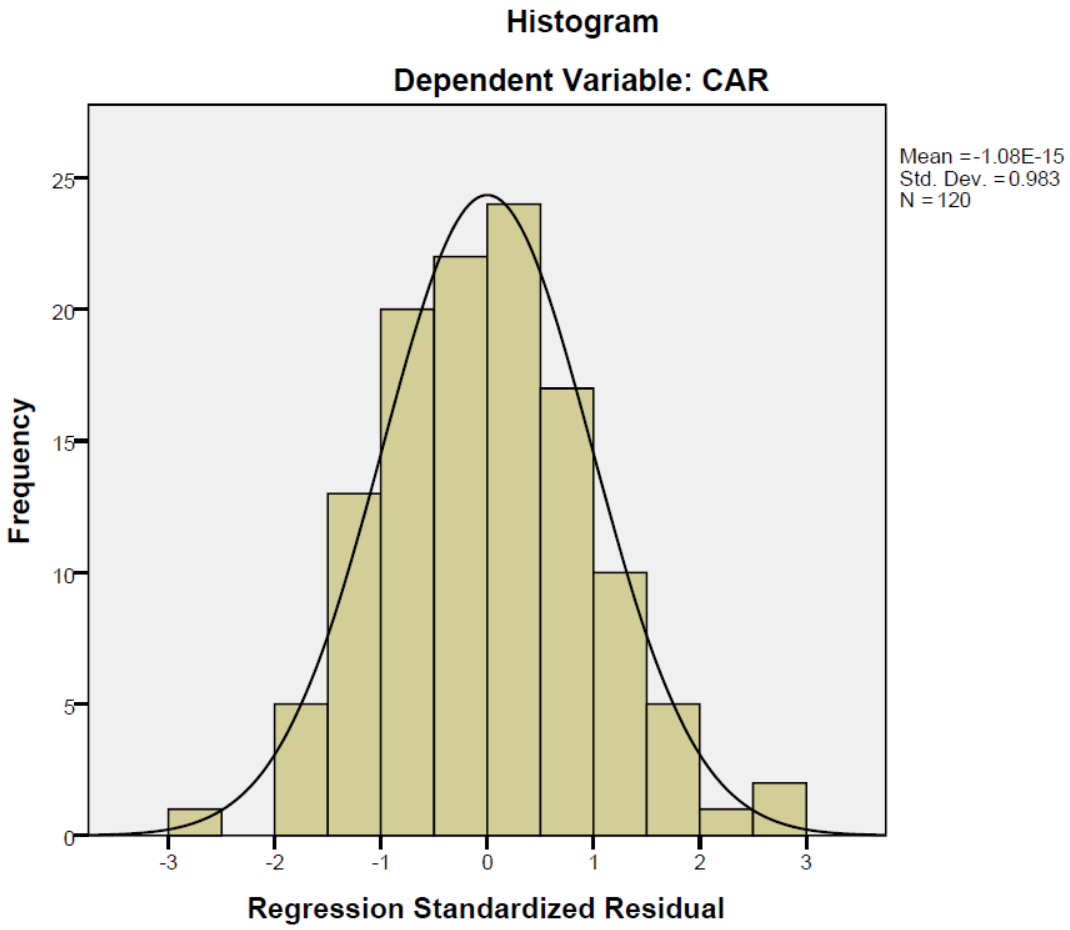
```
FREQUENCIES VARIABLES=CAR DAR ROA AQR LDR
  /STATISTICS=STDDEV MINIMUM MAXIMUM SEMEAN MEAN SKEWNESS SESKEW KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.
```

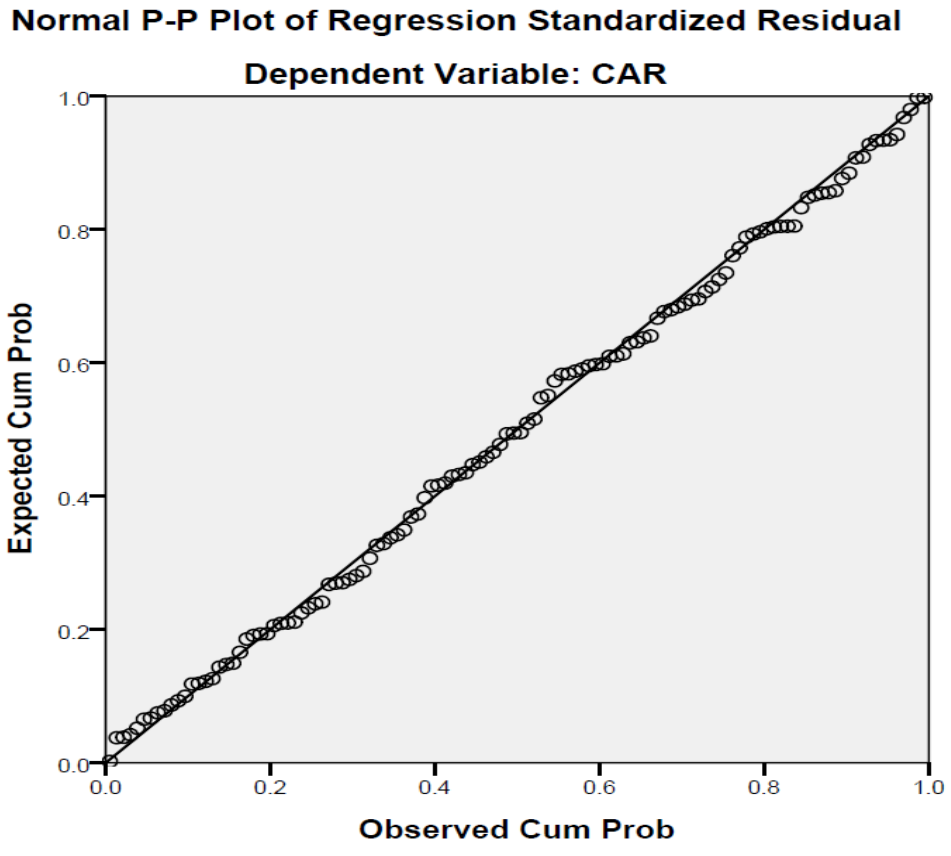
Frequencies

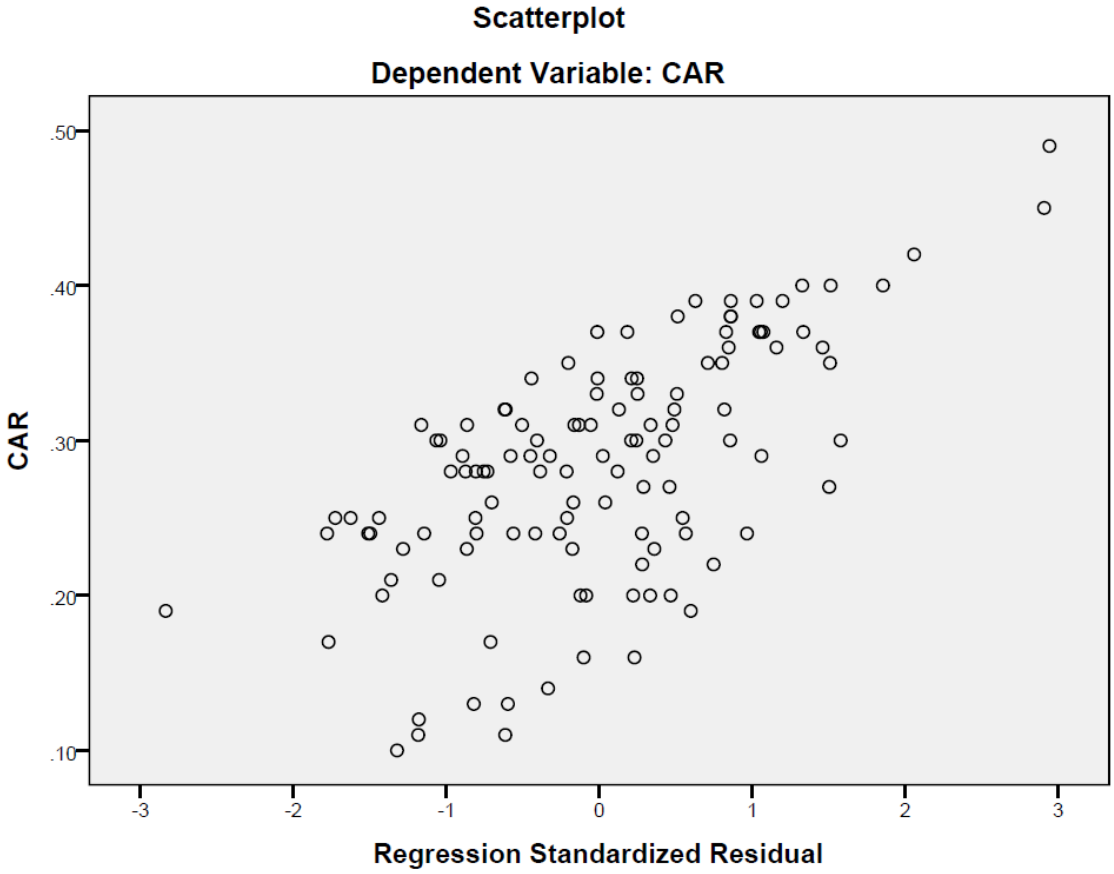
```
[DataSet0]
```

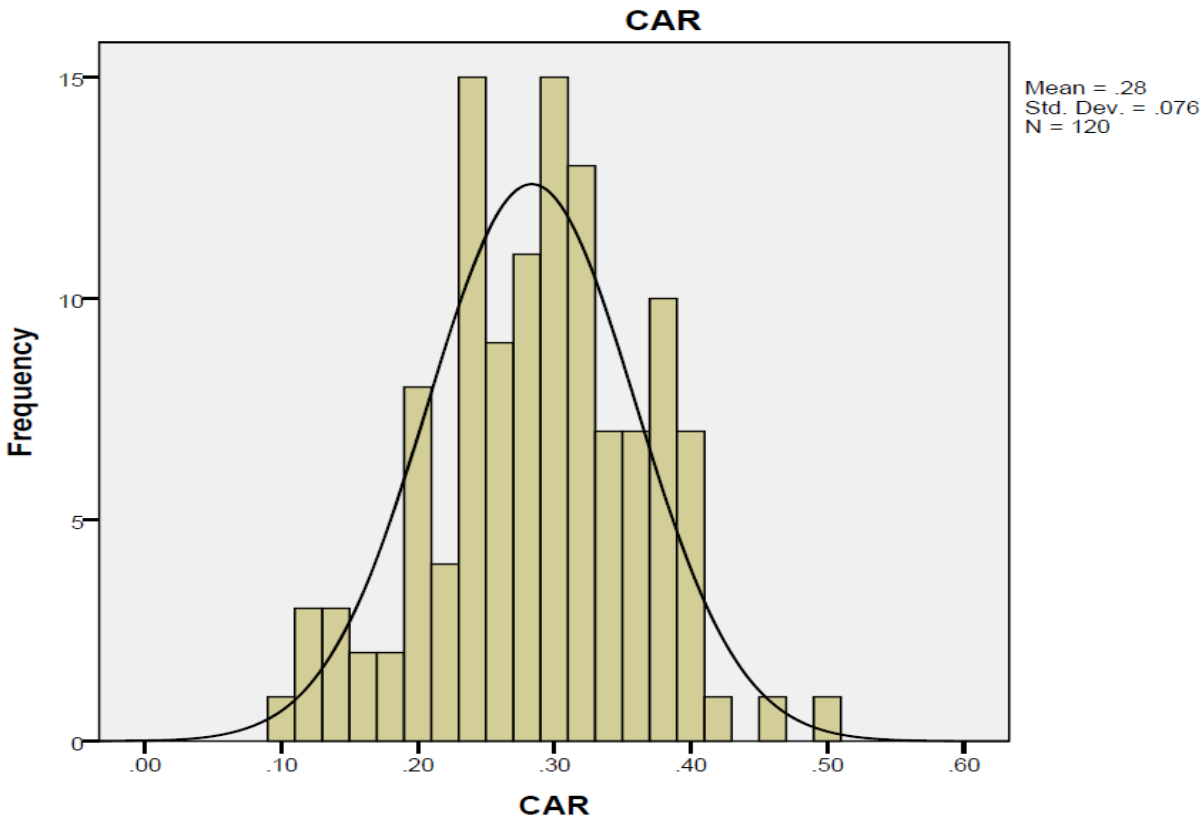
Statistics

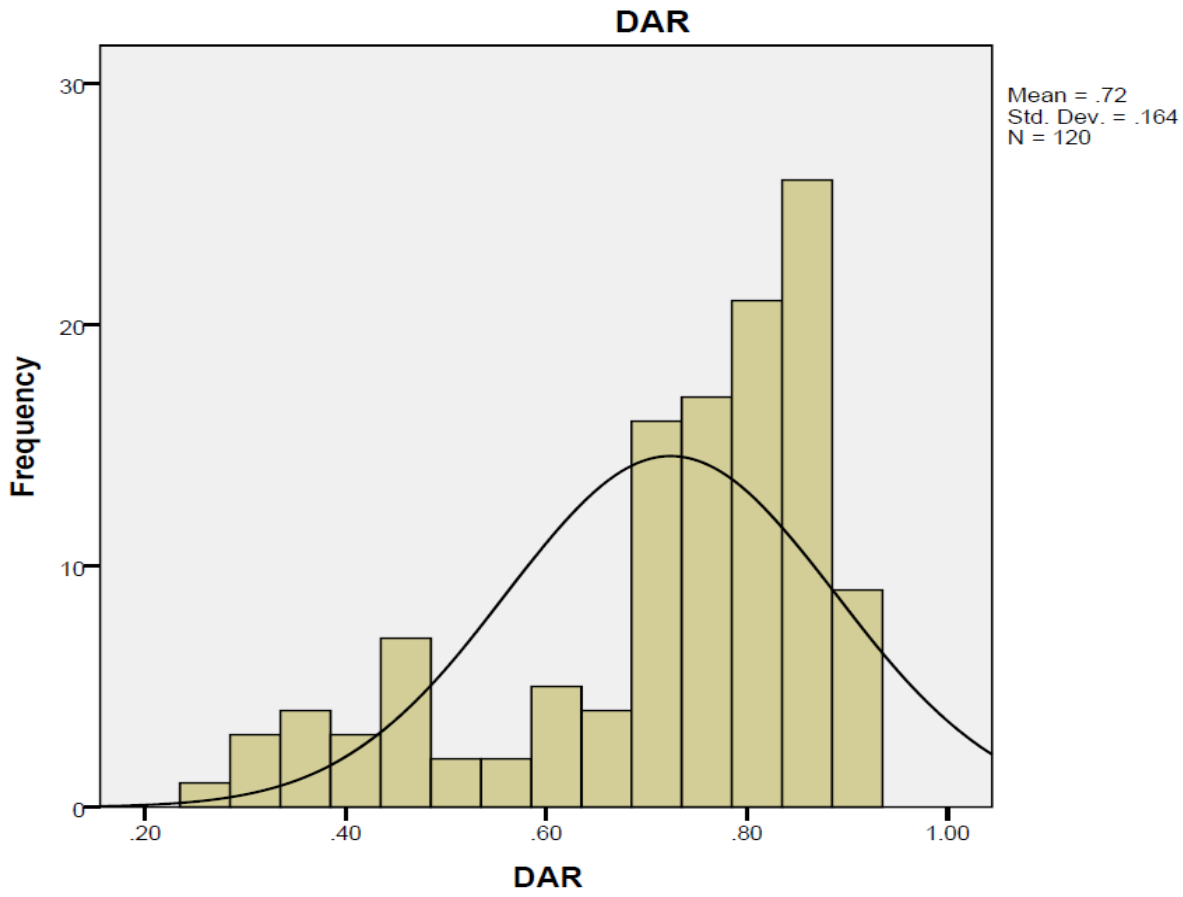
		CAR	DAR	ROA	AQR	LDR
N	Valid	120	120	120	120	120
	Missing	0	0	0	0	0
Mean		.2835	.7242	.0236	.1451	.6155
Std. Error of Mean		.00694	.01501	.00110	.00823	.01699
Std. Deviation		.07608	.16442	.01208	.09013	.18616
Skewness		-.182	-1.208	-.083	.379	.387
Std. Error of Skewness		.221	.221	.221	.221	.221
Kurtosis		-.040	.451	-.362	-1.083	.915
Std. Error of Kurtosis		.438	.438	.438	.438	.438
Minimum		.10	.26	.00	.02	.14
Maximum		.49	.90	.05	.36	1.24

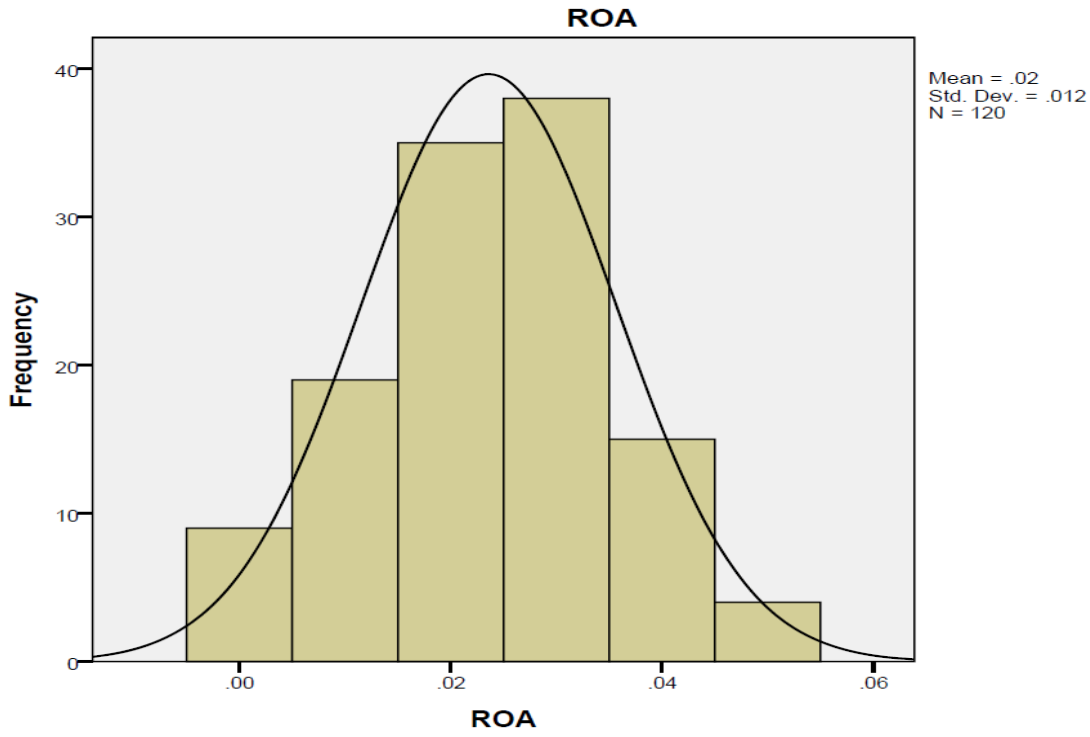

Histogram
Dependent Variable: CAR
Mean =-1.08E-15
Std. Dev. =0.983
N =120
Frequency
Regression Standardized Residual

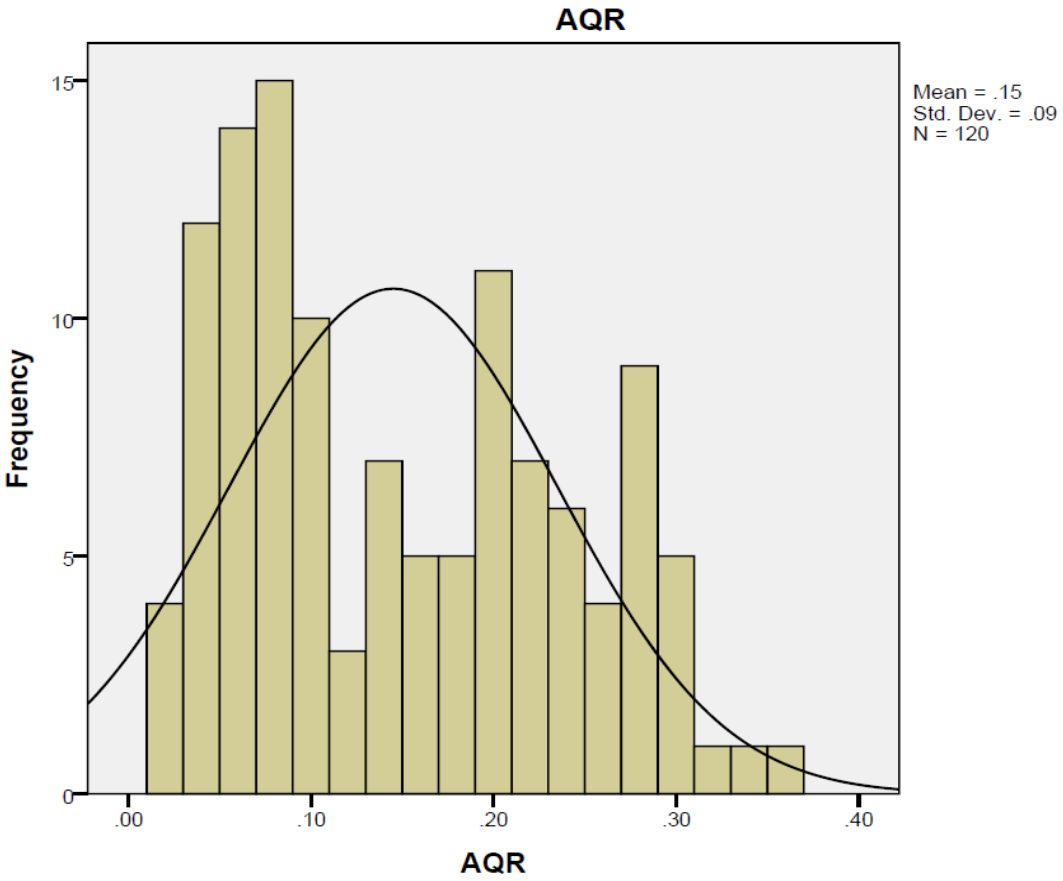

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: CAR
Expected Cum Prob
Observed Cum Prob

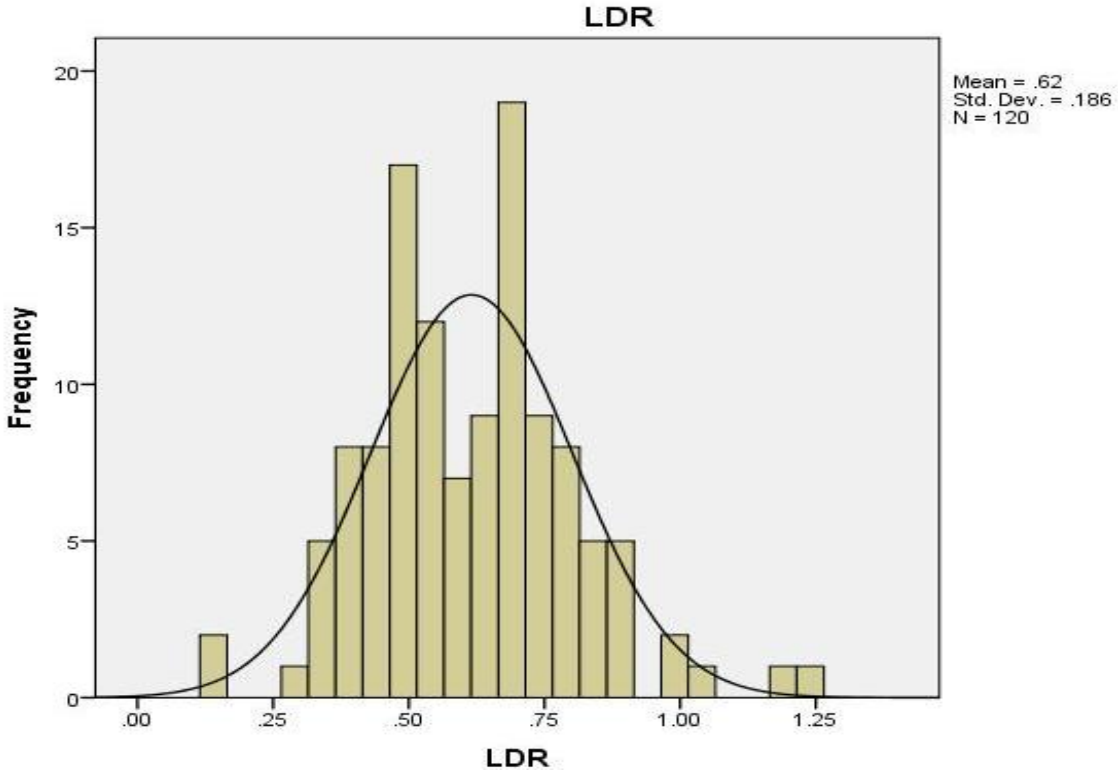

Scatterplot
Dependent Variable: CAR
CAR
.50
.40
.30
.20
.10
-3
-2
-1
0
1
2
3
Regression Standardized Residual


CAR
Frequency
15
10
5
0
.00
.10
.20
.30
.40
.50
.60
CAR
Mean = .28
Std. Dev. = .076
N = 120


DAR
Mean = .72
Std. Dev. = .164
N = 120
Frequency
30
20
10
0
.20
.40
.60
.80
1.00
DAR


ROA
Mean = .02
Std. Dev. = .012
N = 120
Frequency
40
30
20
10
0
.00
.02
.04
.06
ROA


AQR
Mean = .15
Std. Dev. = .09
N = 120
Frequency
15
10
5
0
.00
.10
.20
.30
.40
AQR


LDR
Mean = .62
Std. Dev. = .186
N = 120
Frequency
20
15
10
5
0
.00
.25
.50
.75
1.00
1.25
LDR

APPENDIX D: MULTICOLLINEARITY TEST USING IBM SPSS STATISTICS 20

Regression

[DataSet0]

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	LDR, ROA, AQR, DAR[b]	.	Enter

a. Dependent Variable: CAR

b. All requested variables entered.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	DAR	.436	2.295
	ROA	.645	1.551
	AQR	.465	2.150
	LDR	.904	1.106

a. Dependent Variable: CAR

APPENDIX E: REGRESSION RESULT USING IBM SPSS STATISTICS 20 FOR AUTOCORRELATION TEST

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT CAR
  /METHOD=ENTER DAR ROA AQR LDR
  /RESIDUALS DURBIN.
```

Regression

[DataSet0]

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	LDR, ROA, AQR, DAR[b]	.	Enter

a. Dependent Variable: CAR

b. All requested variables entered.

Model Summary[b]

Model	Durbin-Watson
1	1.561[a]

a. Predictors: (Constant), LDR, ROA, AQR, DAR

b. Dependent Variable: CAR

APPENDIX F: REGRESSION RESULTS AND TEST FOR THE PRESENCE OF HETEROSKEDASTICITY

```
. regress  car dar roa aqr ldr
```

Source	SS	df	MS		
Model	.39937157	4	.099842893	Number of obs	= 120
Residual	.289358439	115	.00251616	F(4, 115)	= 39.68
				Prob > F	= 0.0000
Total	.688730009	119	.005787647	R-squared	= 0.5799
				Adj R-squared	= 0.5653
				Root MSE	= .05016

car	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dar	.1815048	.04237	4.28	0.000	.097578	.2654316
roa	.9299077	.4740892	1.96	0.052	-.0091718	1.868987
aqr	-.2702379	.0748155	-3.61	0.000	-.4184331	-.1220427
ldr	.0060142	.0259775	0.23	0.817	-.0454421	.0574706
_cons	.1656352	.0395918	4.18	0.000	.0872116	.2440589

```
. estat hettest, fstat

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of car

         F(1 , 118)   =     3.20
         Prob > F     =   0.0761
```

APPENDIX G: RESULT OF FIXED EFFECTS MODEL USING STATA 11

```
. xtset id year, yearly
       panel variable:  id (strongly balanced)
        time variable:  years, 2005 to 2014
                delta:  1 year

. xtreg  car dar roa aqr ldr, fe

Fixed-effects (within) regression               Number of obs      =       120
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.5975                         Obs per group: min =        10
       between = 0.0011                                        avg =      10.0
       overall = 0.5798                                        max =        10

                                                F(4,104)           =     38.59
corr(u_i, Xb)  = -0.0319                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         car |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         dar |   .1849677   .0439626     4.21   0.000     .0977882    .2721472
         roa |   .8782327   .4955899     1.77   0.079    -.1045407    1.861006
         aqr |  -.2761817   .0788654    -3.50   0.001    -.4325748   -.1197886
         ldr |   .0030783   .0343121     0.09   0.929    -.0649639    .0711206
       _cons |   .1670156   .0424072     3.94   0.000     .0829205    .2511106
-------------+----------------------------------------------------------------
     sigma_u |  .01295554
     sigma_e |  .05104535
         rho |  .06051835   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(11, 104) =     0.64                 Prob > F = 0.7898

. est store fe
```

APPENDIX H: RESULT OF RANDOM EFFECTS MODEL USING STATA 11

```
. xtreg  car dar roa aqr ldr, re

Random-effects GLS regression                   Number of obs      =       120
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.5974                         Obs per group: min =        10
       between = 0.0007                                        avg =      10.0
       overall = 0.5799                                        max =        10

                                                Wald chi2(4)       =    158.72
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         car |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         dar |   .1815048     .04237     4.28   0.000     .0984611    .2645484
         roa |   .9299077   .4740892     1.96   0.050     .0007099    1.859106
         aqr |  -.2702379   .0748155    -3.61   0.000    -.4168737   -.1236021
         ldr |   .0060142   .0259775     0.23   0.817    -.0449006    .0569291
       _cons |   .1656352   .0395918     4.18   0.000     .0880368    .2432336
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .05104535
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store re
```

APPENDIX I: RESULT OF HAUSMAN SPECIFICATION TEST USING STATA 11

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re          Difference          S.E.
-------------+------------------------------------------------------------
         dar |    .1849677     .1815048        .0034629        .0117259
         roa |    .8782327     .9299077       -.051675         .144391
         aqr |   -.2761817    -.2702379       -.0059438        .0249477
         ldr |    .0030783     .0060142       -.0029359        .0224164
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.35
                Prob>chi2 =      0.9863
```

APPENDIX J: LIST OF DEPOSIT MONEY BANKS AND SAMPLE SELECTED FOR THE STUDY

S/N	BANKS	STATUS IN NSE	REMARKS
1	Access Bank Plc	Listed in NSE	Selected
2	Diamond Bank Plc	Listed in NSE	Selected
3	Eco Bank Nigeria Plc	Listed in NSE	Selected
4	Fidelity Bank Plc	Listed in NSE	Selected
5	First Bank of Nigeria Plc	Listed in NSE	Selected
6	First City Monument Bank Plc	Listed in NSE	Selected
7	Guarantee Trust Bank Plc	Listed in NSE	Selected
8	Skye Bank Plc	Listed in NSE	Selected
9	Sterling Bank Plc	Listed in NSE	Selected
10	Stanbic IBTC Bank Limited	Listed in NSE	Selected
11	United Bank for Africa Plc	Listed in NSE	Selected
12	Zenith Bank Plc	Listed in NSE	Selected
13	Wema Bank Plc	Listed in NSE	Not Selected
14	Unity Bank Plc	Listed in NSE	Not Selected
15	Union Bank of Nigeria Plc	Listed in NSE	Not Selected
16	Citi Bank Nigeria Limited	Not Listed in NSE	Not Selected
17	Enterprise Bank	Not Listed in NSE	Not Selected
18	Heritage Banking Company Limited	Not Listed in NSE	Not Selected
19	Key Stone Bank	Not Listed in NSE	Not Selected
20	Main Street Bank	Not Listed in NSE	Not Selected
21	Standard Chartered Bank Nigeria Limited	Not Listed in NSE	Not Selected

Source: CBN Website & NSE Fact book, 2014