INFLUENCE OF BANK FINANCIAL SOUNDNESS ON THE OPERATIONAL EFFICIENCY OF DEPOSIT MONEY BANKS IN NIGERIA

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Influence of bank financial soundness on the operational efficiency of deposit money banks in Nigeria

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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This thesis has been submitted for examination with our approval as the University Supervisors

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DEDICATION

This doctoral thesis is dedicated firstly to my late parents Mogaji AbdulAzeez I. Olurode and Mrs M. Arike Olurode who taught me hard work, diligence, transparency and discipline when I did not know its value in life. Again, my priceless jewel, Mrs B. S. Lawal deserve dedication as regards her love, support and encouragement while the program lasted. Further dedication is due to my invaluable children; Dr Abimbola R; Eniola H.; Olamide A; Odunayo A. and lastly Oreoluwa AbdulAzeez. They are all wonderful partners in the course of this noble assignment. Mr O. A. Oladipo also deserve my commendation for his tutelage on me ("Ajumobi o kan taanu"). Lastly, the thesis is dedicated to my former lecturers: Mr S.O. Oyelami and Mr Yemi Akinlade of blessed memories, the duo who gave me the required academic impetus that served as springboard to achieve this academic excellence.

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ABBREVIATIONS AND ACRONYMS

ALM   Asset Liabilities Management

AQ   Asset Quality

BFS   Bank Financial Soundness

BIS   Bank for International Settlement

BL   Bank Liquidity

BOFIA   Banks and Other Financial Institutions Act

BS   Bank Size

CA   Capital Adequacy

CAMA   Companies and Allied Matters Act

CBN   Central Bank of Nigeria

DEA   Data Envelopment Analysis

DMBs   Deposit Money Banks

EFCC   Economic and Financial Crimes Commission

NDIC   Nigeria Deposit Insurance Corporation

NPLs   Non- Performing Loans

NSE   Nigeria Securities Exchange

OECD   Organization for Economic Cooperation and Development

OE   Operating Efficiency

PLs   Performing Loans

PR   Profitability

ROA   Return On Asset

SAP   Structural Adjustment Programme

SEC   Securities Exchange Commission

SFA   Stochastic Frontier Analysis

OPERATIONAL DEFINITION OF KEY TERMS

Asset Quality: Asset quality refers to the quality of loan portfolio of the bank as determined by the extent of the non-performing or delinquent loans available in its total loans. The lower the ratio, the better the bank efficient performance (Ongore et al., 2013).

Bank Financial Soundness: Financial Soundness (BFS) are aggregate measures of the current financial health and soundness of a financial institution in a country. The indicators are: asset quality, capital, earnings and profitability and bank liquidity (IMF, 2009; Ifeacho et al., 2014).

Bank Liquidity: Bank liquidity refers to the ability of financial institutions to make cash or other liquid assets (near money/ negotiable instruments/ treasury bills etc.) available on demand or as assets readily convertible to cash without loss to enhance banks' ability to satisfy depositors on demand. Its the level of liquid asset that a bank possesses at a time (Mohamed, 2015).

Banking Operation: This refers to the processes, procedures and methods engaged by the bank to establish contractual dealings with customers. It starts from account opening, authority/delegation to pay, mandate, termination /countermand of payment till closure of accounts (Doyle & Kelly, 1981).

Bank Size: Bank size represents how big or small a bank is, usually in terms of investment in assets, deposit or capital base. It is usually estimated as the total asset or deposits of the bank since the bigger the

size of the asset base ceteris paribus, the higher the profitability for the bank. It is used by this study as a moderating variable (Aminu, 2013).

Capital Adequacy: Capital adequacy refers to the actual amount of equity capital and other securities which a bank holds as reserves against risky assets and as a hedge against the probability of a bank failure. It is a measure of the financial strength of a financial institution expressed as equity capital divided by total asset or deposit liabilities (Esike & Oke, 2013).

Credit Risk: It is the possibility of losing outstanding loan partially due to credit events (default risk). It is by far the most significant risk faced by banks and the success of bank's business depends on its accurate measurement and efficient management to a greater extent than any other risk (Adeusi et al., 2014).

Deposit Money Banks: Deposit money bank as a generic name was adopted since 2001 by the Central Bank of Nigeria as bank that include Commercial bank, Merchant bank or Financial Intermediaries. They are legally authorized to perform commercial banking business in Nigeria as different from development banks (Ejoh, 2014).

Non-Performing Loans: This is the type of loans or credit otherwise called delinquent which have not been serviced or repaid as and when due by the customer brought about by poor credit risk management of the banks. There are three classifications of credit in the bank: (1) Standard; (2) Sub-standard and (3) Loss (Anyanwaokoro, 2008).

Operational Efficiency: Operational Efficiency is defined as the ratio between the input to run a business operation and the output gained from the business especially with the ability to deliver products and services cost effectively without sacrificing quality. Banking service as an intangible product is usually referred to as operation due to the fiduciary nature of the job, its processes and methods hence its adoption by this study (Odunga, 2016; Olarewaju, 2016).

Profitability: Profitability connotes a situation where the income generated exceed expenses incurred over a given period of time say a week, three months, or one year Income and expenses must however occur at the same period of time to arrive at matching concept (Aremu et al., 2013).

ABSRACT

This study investigates the influence of bank financial soundness on the operational efficiency of deposit money banks in Nigeria. Banking system across the globe remains a vital engine that drives the economic growth of any nation, hence the quest for them to be efficiently run. Efficiency can simply be defined as output over input delivered at the optimum operational level with quality. In finance literature, empirical studies have documented mixed findings on the effect of bank financial soundness of banks across the world as regards probable improved efficiency based on the state of financial health of the banking system. Thus the position of banking efficiency, asset and liability mismatch, liquidity level and agency cost remain unclear in the Nigerian banking system. This study is anchored on theories from efficiency, asset and liability management and agency principally. Quantitative research was employed with data collected from 15 deposit money banks, making a sample size of (70.1%) from 21 banks for 2007-2016 for 10 years. Balanced panel data sourced from audited annual financial reports of the banks and Central Bank of Nigeria (CBN) statistical bulletins were employed. Descriptive and inferential statistics were employed with the use of panel least regression model and appropriate model diagnostic tests carried out on the panel data. Findings from the study indicate that the null hypothesis, that there is no significant influence of bank financial soundness on the operational efficiency of banks was rejected and conclude that bank financial soundness has significant influence on the efficiency of the listed banks. Based on the results, there was no adequate evidence to accept the null hypothesis that bank financial soundness has no effect on operational efficiency with the hypothesized variables used by the study. Both negative and positive coefficient correlations were established in the findings. The study also confirmed the moderating effect of bank size of bank financial soundness on operational efficiency within the Nigerian banking industry. In addition, findings from the empirical evidence provided by the study indicate that banks must be operationally efficient so as to engender improved financial soundness and health for the entire banking system. Conclusively, the results from the study therefore upheld a priori theoretical expectation that bank financial soundness has significant effect statistically on operational efficiency. Consequently, bank financial soundness could reduce asset liabilities mismatch and potential agency cost from bank managers, improve credit risk exposure while enhancing operational efficiency and stakeholders' interest. The study therefore recommends that, banks need to improve on credit risk management so as to impact positively on the quality of assets (higher income) and reduce cost/expense on non-performing loans to enhance operational efficiency. Banks must review their resource allocation strategies especially on operational expense (overheads) to reduce personnel cost, review capital base of the banks in line with their operational capabilities and risk exposures. The need to maintain optimal liquidity position is equally paramount for the banks to ensure higher profitability. Bank regulators must evolve an inclusive approach in monitoring and supervision of banks periodically. Additionally, government should improve the socio-economic infrastructural facilities for banking efficiency to thrive in Nigeria. Notable constraints of this study are its short period of examination and the measuring metrics employed.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Globally, the issue of organizational or institutional efficiency has been a major concern both in the developed and developing economies of the world after witnessing poor bank performance. This may be as a result of excessive government regulations, competition, deregulation, consolidation, solvency risks, unfavorable business environment and globalization (ECB, 2010; Amer et al., 2011; Ifeacho et al., 2014; Adjei-Frimpong, 2013). According to Kariuki et al. (2016), the immediate reason that can be adduced to corporate failure can be inefficient or poor allocation of corporate resources. As a result of this process, there has been a clarion call and greater emphasis on the importance of improved efficiency in the banking sector worldwide (ECB, 2010).

It is usually emphasized that efficiency in business operation by corporate entities especially banks that perform the fiduciary role of financial intermediation cannot be underestimated (Ifeacho et al., 2014). Efficiency remain an important attribute of organizational performance because all inputs/resources are scarce and limited (time, money and raw materials), so it makes economic sense to try to conserve them while maintaining an acceptable level of output or level. Efficiency equally relates to reducing the amount of wasted inputs (weighted) that brings higher expected value or results (weighted) when programming is involved (Moradi-Motlagh et al., 2011). Operational efficiency can be defined as the ratio between the input to run a business operation and the output gained from the business. Its aim is to minimize redundancy and waste so that the reduced internal costs that result from operational efficiency will enable the firm to achieve higher profit margins or be more successful in highly competitive market like Nigeria (Olarewaju, 2016).

According to Mohammed et al. (2011), banking efficiency is important to the management science since it will enable bank to trace the sources of inefficiency and help to enhance survival in the highly competitive market where they operate and

subsequently the general economy to grow. However, myriad of factors are responsible for influencing operational efficiency of a corporate entity such as bank. The bank financial soundness determinants or indicators or attributes may be internal which are core-sets of bank-specific variables or indicators, industry or macro/externally imposed such as macro-economic factors within the economic system (Thao et al., 2015).

Empirical evidence indicates that the internal/controllable variables: (asset quality, adequacy of capital, earnings quality, liquidity, deposits and credit risk management) within the control of the bank has significant influence on the efficiency and performance of such entity (Ebenezer et al., 2017). Again, Ifeacho, et al. (2014), Adjei-Frimpong, (2013), and IMF, (2009) corroborated this empirical evidence specifically, that the core-sets of indicators responsible for bank's soundness or financial health are: Capital adequacy, Asset quality or credit risk, Earnings and Profitability, Bank liquidity and Sensitivity to market risk usually employed in monitoring the financial health of a country's financial industry, its corporate body or household sector. Alluding to the veracity of this statement, Amida and Andreas (2006) stated that the financial soundness (FS) is the aggregate measures of the current financial health and soundness of the financial institutions in a country and of their corporate and household counterparties.

This view was again supported by the study from Ani et al. (2012), stating that internal factors of bank size has significant negative effect to profitability while both asset quality and capital adequacy were positively correlated to profitability. The literature review supported that efficiency indicators and its measurement differ significantly among many economic environments, financial markets all over the world, resulting into mixed findings and divergent results (Mohd-zaini et al., 2010). Financial sector especially banking sector, in developing and emerging economies of the world is the corner stone or backbone for nations' economic growth and development hence efficient and competitive financial sectors help enhance and improve economic growth and development (Ifionu et al., 2016; Thao et al., 2015).

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According to Obafemi et al. (2013), financial sector could be a catalyst for economic growth and development if banks are efficiently managed. Banks' stock in trade and raw material is money and they are not charitable organizations. Akhtar, Ali, & Sadaqat, (2010), affirmed that the most important function of banks all over the world is the intermediation role through which bank channel financial resources from the surplus units to the deficit units for productive economic ventures available within the economy. Therefore, the major source of finance for lending as bank's income generation unit is customers' deposits which otherwise constitutes liabilities on the bank as balances (Nwite, 2014). Olarewaju (2016), however stated that banks generate significant proportion of their income through interest received on loans and it is principally sourced from customers' deposits.

From the foregoing, many central banks embarked on different financial reforms, financial liberalization and restructuring programs to foster banking efficiency and a better allocation of resources (Pancheva, 2012). According to Nuray (2015), factors that determine the profitability and efficiency of deposit banks in Turkey are predominantly the internal factors controlled by banks that reflect the soundness of the financial system and as such banks need to properly identify and examine relevant bank specific and macroeconomic factors for constant management to increase efficiency and profitability. The influence of some factors/ variables on bank efficiency are multifarious which needs proper monitoring and control after identifying them: asset quality and credit risk management, ownership concentration, bank size which impacts on risk taking incentives, and risk related practices and behaviors, capital adequacy level, liquidity and profitability remains a principal goal of any successful organizations especially deposit money banks (Casu et al., 2006).

Banks and financial institutions play a vital role and serve as both the intermediator and the critical engine of growth for the economy, hence they are highly preserved, regulated and monitored worldwide through various regulatory controls from Central banks (Ezezebor, 2010). Credit risk management is directly linked to assets of the bank, so the risk climate of banks must be better understood by the managers of financial institutions to succeed. Adeduntan (2018), reported that in the ordinary course of banking business, there will be one or two loans that will not go exactly as

deserved and that globally it is very difficult to see any bank in the world with zero non-performing loans in their credit portfolio. According to Popoola (2018), the two major risks that financial institutions are particularly confronted with are: credit and operational risks that leads to loss of revenue, assets and capital erosion, hence a robust risk management practice must be put in place by banks. This will automatically stem the tide of high level non-performing loans, high level of fraud and operational losses.

According to the European Central Bank (2010), European markets became increasingly integrated financially due to the forces of deregulation and technological change that increased competition among banks. Olarewaju and Obalade (2015) defined operational efficiency as tactical planning of an organization to maintain a safe balance between cost and productivity, a method that identifies the wasteful processes leading to loss of resources and organizational profits, and reducing costs to maximize the benefits of resources for providing better services to bank customers. Efficiency ratio or asset utilization generally measures the efficient use of the assets at banks' disposal while operating efficiency measures how efficiently firm's products or services have been produced, held and distributed and it remains most critical risks faced by Nigerian banks (Obafemi et al., 2013; Olarewaju, 2016). In banking practice, operational efficiency can ordinarily be referred to as the ratio of the output over the input where the outputs are the loans and advances and deposits (numerator) and the inputs are the labor, capital and funds or other operating expenses incurred by the bank (denominator).

According to Mihaiu et al. (2010), efficiency in banking operations can be distinguished between allocative efficiency that requires a cost/benefit ratio while technical efficiency relates to outputs on the frontier production curve. Allocative efficiency is the extent to which resources are being allocated to the use with the higher expected value, while a firm is technically efficient if it produces a given set of outputs using the smallest possible amount of inputs (Falkena et al., 2004; Olarewaju, 2016). The efficient and effective use of resources is a key objective of any banker and the long term viability of commercial banks operating in an increasingly competitive environment that depends in part on how efficiently and

competitively they are being run (Adjei-Frimpong, 2013; Amer et al., 2011). Efficient allocation of financial resources makes bank's performance an important objective due to the indispensable and intangible nature of banking operation in the financial intermediation process and development of any country (Abata, 2014; Ifeacho, 2014).

Banks play a pivotal and intermediary role in the economy channeling funds from units in surplus to units in deficit for productive economic ventures of the economy; hence they need to be efficient (Auta et al., 2010). Mihaiu et al. (2010) documented that efficiency indicate a level of performance that describes a process that uses the lowest amount of inputs (resources) to create the greatest amount of outputs (market value or monetary outcome). Efficiency relates to the use of all inputs (resources) in producing any given output which may include personal time and energy. Efficiency is a measurable concept that can be measured by indicator of cost to income in banking operations (Adjei-Frimpong, 2013). It is equally a concept that determines the ratio of output to total input with an overall aim of minimizing waste of resources such as physical materials, energy, money and time and maximizing revenue so as to achieve the desired output which will eventually result to superior profitability for the firm (Obafemi et al., 2013).

Efficiency indicators are observable factors that seem to determine/assess the level of efficiency in an organization (Obafemi et al., 2013). At best, they are performance indicator approximations with experiences drawn from advanced world as against the LDCs owning to the level of both money and capital market developments. Amer et al. (2011) argued that when financial institutions become more efficient and competitive, this leads to a better allocation of individual and institution savings to more productive investments that improve economic growth. Outputs could be loans and advances or total balance of deposits, while inputs include labor, capital and other operating costs. Allocative efficiency as commonly used in banking sector means the efficient and effective use of bank resources as key objective of every banker and as the primary tool or weapon to use in achieving the overall goal of the firm /bank (Olarewaju, 2016).

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1.1.1 Global Perspective of Banks' Operating Efficiency

Globally, research and studies on the operating or bank efficiency and financial soundness of the banks have been conducted extensively especially on banking industry development (Thao et al., 2015; Jaouadi et al., 2014). In Switzerland, a study was carried out to investigate the effectiveness and efficiency of banks by Jaouadi et al. (2014), where it was econometrically established that the Swiss banks are acting with efficiency, thereby consolidating the reputation of the Swiss banking sector.

In India, Mohapatra et al. (2015), reported that the overall operational efficiency of public sector banks is not satisfactory as compared to other sector banks especially foreign banks. According to (Thao et al., 2015; Jaouadi et al., 2014; Amida & Andreas, 2006), financial soundness variables which could be banking industry and, or bank specific, are the aggregate measures of the current financial health and soundness of the financial institutions in a country, and of their corporate and household counterparties. Based on this, financial soundness provides guidance on the concepts, definitions, sources and techniques for providing, compiling and disseminating information about the current soundness of the aggregate financial subsector.

Similarly, Ifeacho, (2014), Owoputi et al. (2014) and Ebenezer et al. (2017) documented that the bank financial soundness variables are asset quality, capital adequacy, earnings and profitability and liquidity risks that influences banking performance. The global financial and economic crisis such as reduced credit portfolios, low asset quality and returns and higher liquidity risks, which put the banking sector to test in countries all over the world with the negative impact of the crisis transferred to real economy, and hence onto the commercial portfolios of banks were responsible for this (Pancheva, 2012). There was need to improve bank efficiency in Bulgaria through some financial reforms so that banks will be able to play their role of motivators for the business and "restart" the economy of Bulgaria (Pancheva, 2012). Hence, financial reforms are constantly needed in every financial system across the globe.

As documented by Ogllvie (2009), the increase in revenue on average and the largest reduction in expenses among US banks for 2000-2006 showed commitment to continuous efficiency improvement by focusing on cost and revenue consistently. Efficiency of financial institutions have gained momentum especially in developed countries as against the less developed countries under different operating environment and the characteristics of banks on banking efficiency for all the Asian banks of China, Taiwan, South Korea, Hong Kong, Malaysia, Thailand, Singapore and Philippines were different (Shyu et al., 2014). This further buttresses the fact that continuous current researches are being conducted on banking efficiency worldwide.

Similarly, Cucinelli (2015), found for the Italian banking system, a negative impact of credit risk on bank lending behavior as regards credit risk measures for non-performing loans and loan loss provision ratio (asset quality indicator) in the Italian banking sector. However in Brazil, Staub et al. (2009) posit that state owned banks are significantly more cost efficient than foreign private domestic and private with foreign participation banks. The study concluded that, in Brazil for the period 2000-2002, economic inefficiency (technical efficiency) as against the allocative inefficiency was mostly practiced by banks. Studies that have affirmed that bank financial soundness impacts on efficiency abounds over the world (Staub et al., 2009; Tho & Thuy, 2015; Akhter et al., 2017; Moradi-Motlagh et al., 2011; Sheedy et al., 2015).

Again in the US, Haan and Poghosyan (2011) examined the influence of bank earnings volatility on bank size and the degree of concentration in the banking sector. Based on the quarterly reports analyzed, it was found that bank size reduces return on volatility and that larger banks located in concentrated markets have higher volatility. In different economic setting, Liao (2009) investigated the dynamics of efficiency change in Taiwan. The results confirmed that foreign banks are not more efficient than the domestic banks but their productivity growth better than the domestic banks. Based on the foregoing, the global mixed and divergent empirical findings on operational efficiency of financial institutions with particular reference to Deposit Money Banks (commercial banks) have resulted into several empirical assertions, hence controversial.

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1.1.2 Africa Perspective of Banks' Operating Efficiency

The issue of operating efficiency by commercial banks in developed economies differs significantly from developing economies of the world (Moradi-Motlagh et al., 2011). Consenting to this Ncube (2009), documented that the South African banks were being pressurized to review operational efficiency of banks for competitiveness locally and globally. According to Amer et al. (2011), there are four (4) largest economies in Africa; South Africa, Algeria, Egypt and Nigeria based on the financial services they provide since they are service oriented economies, yet they are consistently implementing difficult and crucial financial reforms to meet global best practices.

Amer *et al.* (2011), corroborated that these 4 countries could be regarded as foremost in terms of banks' efficiency and competitiveness with the aim of catching up with developed countries in spite of myriads of problem confronting them especially infrastructural, managerial and technological innovations required for efficient financial institutions (Amer et al., 2011; ECB, 2010; Adjei-Frimpong, 2013). In view of this, many African countries appear to have embarked on various measures aimed at strengthening and broadening their financial system with the sole objective of enhancing banks' operating efficiency (Amer et al., 2011). Studies on operating efficiency of banks have provided confounding evidence in Africa from Nigeria, South Africa, Ghana, Kenya, Tunisia and Egypt among others. They however have mixed findings due to lots of socio economic variables confronting each of these countries (Ncube, 2009).

Most banks in Africa record operating efficiency gains on profitability by achieving efficiency gains in cost reduction (Amer *et al.,* 2011). Furthermore, it was observed that there is link between banks relative competitive position and operating efficiency through examining the financial prof1ile of the highly versus the lowly competitive banks in Egypt. The results show that, in the highly competitive banks with internal factors such as asset quality, capital adequacy, credit risk and liquidity of banks accounting for higher efficiency performance (Amer et al., 2011). The significance of competitiveness and efficiency of financial sector in African

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countries mainly the largest four economies i.e. South Africa, Algeria, Egypt and Nigeria was carried out and stated that these economies are service oriented (Amer et al., 2011).

Studies further stressed on the importance of doing extensive research on different African countries especially those four (4) countries mentioned above, since they are the largest economies in Africa implementing difficult and crucial financial reforms. This then provided an inspiration for the relevance of the present study. The Nigerian banking sector (one of the four) constitutes a significant portion of the entire financial system of Africa servicing the economy with huge intermediating funds to achieve economic growth and development both for Nigeria and the continent. Ezezobor (2010), confirm that financial intermediation in banking business act as the pivot to modern economy all over the world. An efficient banking sector, therefore, should be able to absorb any negative shocks from within and outside to enhance financial system stability (IMF, 2013 & 2014).

Furthermore, Njoroge (2016) investigated the determinants of profitability of Kenyan commercial banks by employing internal factors of bank size, capital adequacy, liquidity, credit risk and operational efficiency on bank's profitability in Kenya. It was documented that the relation between bank size, operational efficiency and bank profitability are negatively insignificant but a negative significant relationship reported between capital adequacy, credit risk and banks' profitability. However, from South Africa, Marozva (2015), indicated that there is a lot of literature that leads to the fact that liquidity crunch was the main cause of 2009/10 global financial crisis. Again, it was reported that capital adequacy increases profitability of commercial banks in Kenya while poor asset quality increases credit risk with adverse effects on the banks profitability at the same time (Njoroge, 2016). There is the need therefore, to examine the influence of operational efficiency issues from emerging economies in Africa and Nigeria thus making this bold academic exercise imperative.

1.1.3 Nigeria Perspective of Banks' Operating Efficiency

Available empirical studies in Nigeria reported divergent results as to banking efficiency (Eriki et al., 2015). Operational efficiency in the Nigerian banking sub-sector still remain a problem and require further investigation especially as regards bank financial soundness influencing operational efficiency of banks. Ani et al. (2012) reported that the financial soundness indicators for bank are the internal factors of bank size, asset quality, capital adequacy as used in the model of the study. Size has significant negative relationship to profitability and asset quality show a positive relationship with profitability while capital adequacy shows a positive correlation.

Olarewaju *et al.* (2016), indicated that capital adequacy is important since it directly influences the amount of funds available for loans disbursement which invariably affects the risk appetite, efficiency and stability of banks. In the view of Obafemi et al. (2013), regulatory bodies like NDIC and SEC must complement the efforts of the CBN to achieve sound macroeconomic objectives for Nigeria. For instance, as a principal component of asset quality, non- performing loans (NPLs) adversely affects the availability of credits to economic agents in all sectors of the economy. Poor asset quality hampers financial intermediation and economic activities thereby making an issue to tackle in Nigeria (Umoren et al., 2016; Olarewaju, 2016).

The historical evolution of the regulation of banking business is necessary. It can be categorized into 5 phases as stated by Goldface- Irokalibe (2010): Firstly, was the Free Banking Era (1892-1952) that was characterized by 245 legally recognized banks by the Act of 1952 with the complete monopoly of foreign banks totaling 185. However, majority of them collapsed due to poor management, poor risk assessment, corruption and lack of regulatory laws to control banking business during the period. Secondly, was the Pre-Central Banking Era (1952-1959) of regulation and control of banking business in Nigeria, which came through the 1952 banking ordinance. This heralded the establishment of indigenous banks in 1933, 1945, 1947 as well as Merchant Bank in 1952 which eventually collapsed in 1960.

Thirdly, was the era of practical banking regulation (1959-1985) that witnessed the establishment of many banking and specialized institutions such as the Central Bank of Nigeria in 1959, Nigerian Agricultural and Cooperative Bank in 1973, Federal Mortgage Bank of Nigeria in 1977 among others. The fourth era brought deregulation regime (1986-1998). The Concept of deregulation of the financial system came in with the introduction of the Structural Adjustment Programme (SAP) in 1986. Again, the establishment of the Nigerian Deposit Insurance Corporation (NDIC) in 1988, among other principal institutions came to strengthen the fast growing Nigerian financial system (Goldface- Irokalibe, 2010).

Lastly, the democratic dispensation era was ushered in from 1999-2018. It has been characterized by the influx of Foreign Direct Investment, improved external relations and policies that had positive impact on the Nigerian financial system, for instance, concept of consolidation brought the capital base of banks from N2b to N25b which reduced the number of banks from 89 to 25 in December, 2006. The period also witnessed the strengthening and empowerment of the financial system through the Capital Market, Housing Fund Developments, the establishment of Bank of Industry and the Asset Management Company of Nigeria as well as the introduction of electronic banking system in Nigeria in 2003. Legally, a bank can be defined as any person or group of persons who carries on banking business as financial institution, commercial bank or any other financial institution can be located in banking act 1969 S.41(1). Another milestone for banking legislation was recorded in 1991 through the Banks and Other Financial Institutions act number 24 (1991) as amended in 2004, (Goldface- Irokalibe, 2010).

This is attributable to the government efforts to make and improve banking efficiency through regulations. All these legal and regulatory controls were made by the government in order to ensure sanity, transparency and accountability within the financial system which translates to bank financial soundness for the banking system in Nigeria. For instance, Abata (2014) investigated financial soundness and stability with a result indicating that asset quality enhances efficiency in banks. Eriki et al. (2015) also confirmed that cost inputs and outputs must be controlled to ensure financial soundness in Nigeria.

Corroborating these empirical findings in Nigeria, the CBN (2017) reported that, credit risk increased as the industry-wide non-performing loans (NPLs) ratio rose from 12.8% to 15.02% as at June, 2017, reflecting a 2.22% points to increased credit risk compared to 1.1% in the preceding period. The increase was accounted for by the continued low level of oil prices and government revenue. CBN (2017) further stated the credit risk management system of the banks was further enhanced with the adoption of the strategy of a bank verification number (BVN) for every individual while taxpayer identification number (TIN) made for corporate entity as a unique identifier to capture all loans and borrowers of lending institutions irrespective of amount. The CBN has concluded plans/ framework for the establishment of private asset restructuring companies to acquire non-performing loans from banks and financial institutions (CBN, 2017). It was evident in 2008-2009 when the CBN bailed out some delinquent banks due to poor corporate governance mechanism resulting into huge toxic assets due to high non-performing loans resulting in low income for the banks (Lamido, 2009; Umar, 2015). In the light of the above mixed and confounding findings, this study aims at examining further the bank financial soundness influence on the operational efficiency of deposit money banks (DMBs) in Nigeria.

1.2 Statement of Problem

Competition has brought challenges of financial reforms to reposition banks and to remain relevant globally, for dynamic service delivery and operational efficiency (Adjei-Frimpong, 2013). Nigeria has recorded serious banking challenges of banking failure in 1993/94, recapitalization of banks (2004/2005), bail-out scheme (2008/2009), credit risk/liquidity crisis and corporate governance issues (2011). All these challenges are attributable to inefficient banking operation and poor allocation of corporate resources by the banks (Adeyemi & Fagbemi, 2010; Obafemi et al., 2013). There exist mixed and inconsistency in empirical findings as regards improved quality in methods, cost and principles of operational/banking efficiency worldwide (Mensi et al., 2011; Mihaiu et al., 2010; Ncube, 2009).

The concept of operational efficiency which is the main research problem of the study is crucial for bank survival as service organization offering intangible products to the public with overhead constituting the most significant cost (Olarewaju, 2016). This call for improved service change from the banks so as to have efficient bank financial soundness tailored towards standards, principles, measurement, sound intermediation roles (Fiordelisi et al., 2010). Jaouadi et al. (2014), documented that Swiss banks are allocating financial resources with efficiency while Apata (20114), confirmed that asset quality significantly influences efficient performance. Mohapatra et al. (2015) contrarily documented that Indian public banks are less efficient to other banks. Prior studies have established that large and small size banks greatly influence operational efficiency all over the world, hence the need to expand empirical examination especially from developing economies of the world (Moradi-Motlagh et al., 2011; Haan et al., 2011; Adjei-Frimpong, 2013; Shyu et al., 2014) For instance, Eriki et al. (2015), documented that bank size are positively and significantly related to banking efficiency.

Furthermore, there is lack of clarity and unanimous empirical evidence in the literature as to the influence of bank financial soundness on efficiency for banks for both developed and developing nations from studies by (Umoren et al., 2016; Pancheva, 2012; Obafemi et al., 2013; Owoputi et al., 2014; Amer et al., 2011 Adeusi et al., 2013; Ifionu et al., 2016)). For instance, Ncube (2009) and Owoputi et al. (2014) documented that operational efficiency is not clear and remains a puzzle, controversy or unresolved problem of sample units and measurement, different data sets and environment, not well established in the finance literature especially in Africa. As a result, this study focused on bank-specific or internal factors which empirical studies have previously confirmed its significant impact on efficiency (Thao & Thuy, 2015; Ifeacho, 2014; Ongore & Kusa, 2013; Ebenezer et al., 2017; Owoputi et al., 2014). For instance, Ongore and Kusa (2013) adopted bank-specific variables in the study in Kenya.

In an attempt to unravel the influence of bank financial soundness and operational efficiency, Ifeacho et al. (2014) also adopted the use of core bank specific variables in their studies for Kenya and South Africa while Ebenezer et al. (2017) concentrated

on Nigeria. Pancheva (2012) documented that the entire multitude of problems, solutions and conflicting results need further examination of operational efficiency as a complex performance indicator. Efficiency in the banking sector have been inconclusive with mixed results and that the source of banking efficiency (inefficiency) differ among countries and is still a subject of controversy (Obafemi et al., 2013, Owoputi et al., 2014). Olarewaju (2016) documented that the impact of the various financial reforms on bank efficiency has been widely studied with approximately 95% focus on industrialized countries.

Against this background, this empirical quest for examining the problems surrounding efficiency bank financial soundness necessitated this study as clearly indicated in the broad and specific objectives one, two, three and four of this study. Consequently, there is the empirical need to examine the influence of bank financial soundness and to what extent does it affect operational efficiency in Nigeria. This knowledge vacuum and research gap are the motivating factors to further explore and investigate operational efficiency especially in Nigeria where relevant studies remain inadequate.

1.3 Objectives of the study

To provide direction for this study, there are two objective statements. They are: general and specific objectives.

1.3.1 General objective:

The broad objective of the study is to examine the influence of bank financial soundness on operational efficiency of deposit money banks in Nigeria.

1.3.2 Specific objectives:

The study intends to be guided by the following specific objectives:

1. To determine the influence of asset quality on the operational efficiency of deposit money banks in Nigeria.

2. To assess the influence of capital adequacy on the operational efficiency of Deposit money banks in Nigeria.

3. To evaluate the influence of profitability on the operational efficiency of deposit money banks in Nigeria

4. To investigate the influence of bank liquidity on the operational efficiency of deposit money banks in Nigeria.

5. To determine the moderating effect of bank size on the influence of bank financial soundness on the operational efficiency of deposit money banks in Nigeria.

1.4 Research Hypotheses

The following hypotheses are tested as stated in their null form:

H_{01}: Asset quality has no significant influence on the operational efficiency of deposit money banks in Nigeria.

H_{02} Capital adequacy has no significant influence on the operational efficiency of deposit money banks in Nigeria.

H_{03}: Profitability has no significant influence on the operational efficiency of deposit money banks in Nigeria.

H_{04}: Bank liquidity has no significant influence on the operational efficiency of deposit money banks in Nigeria.

H_{05}: Bank size has no significant moderating effect on the influence of bank financial soundness on the operational efficiency of deposit money banks in Nigeria.

1.5 Significance of the Study

The drive and motivation for this research work can be drawn from the dearth and limited studies available in this research field especially in Nigeria. The study is structured to unveil possible improved (otherwise) benefits of operational efficiency

in the Nigerian banking industry. Extant literature have corroborated the significant influence (otherwise) of financial intermediation role of banks, hence the need for them to be efficient in operation (Jaouadi et al. 2014).

As regards the study's theoretical contribution, the study is likely to be of immense importance to the following stakeholders: investors in terms of the information symmetry from agency theory that may enhance efficiency between the bank and investors relating to investment needs. It's likely to reduce the agency cost and other operational costs which usually affect efficient banking operation. The study has added value as regards the theoretical exposition of the agency and stakeholders theories in terms of improved banker customer relationship.

This is evident from the banks need to have sound asset quality/credit risk management by the banks so as to avoid mismatch. Customer satisfaction will be enhanced greatly through efficient service delivery, thus leading to bank financial soundness. Banks and bankers are likely to benefit greatly from this research in terms of the theoretical, conceptual and empirical analysis which the study has delved into, that have concisely captured the value of efficiency for banks. For instance, the theory of asset liabilities management will enhance how to avoid mismatch and reduce risks of liquidity and interest rates on credit/portfolio to impact positively on investments of investors.

Nevertheless, the general economy is likely to benefit as regards the expansion of efficiency literature after revealing possible influence of bank financial soundness indicators on operational efficiency for the Nigerian banking system. The value added as provided by this study is likely to impact on prospective future researchers who can jumpstart their research based on the study's empirical results and serve as reference point to them.

In a nutshell, the study is expected to fill identified gaps in the literature as well as provide impetus for future research. It is also expected to expand the knowledge horizon, awareness and understanding of operational efficiency literature of financial institutions in Nigeria. Overall, the study apart from adding value to the existing

body of knowledge, it is likely to expand the literature on efficiency as well as enrich the corporate finance theory immensely.

1.6 Scope of the Study

The study focuses on bank financial soundness in the Nigerian banking sector and how it has influenced operational efficiency of deposit money banks in Nigeria. This study gave special and specific focus to concept of efficiency with a view to examining how to improve or enhance its practice in the Nigerian banking industry. The study population comprised of 15 deposit money banks that are actually engaged in financial intermediation process whose operational efficiency impacts (otherwise) on the economic development of the country. The study's period is 10 years from 2007 to 2016. The scope of this study covered the bank-specific attributes of asset quality, capital fund, liquidity provisioning, and bank size whose operational and professional roles in banking business cannot be quantified.

They are special attributes that impact on the operational efficiency level of banks, generally. Its extension covers, bank financial soundness and the standard of the financial intermediation practice engaged by the banks to serve the economy efficiently. This study drew its theoretical foundation from scale efficiency, asset and liability management, agency and stakeholders. The theories were found relevant in view of the practice of economies of scale, reduction in asset liability mismatch, reduction in information asymmetry and stakeholders' interest in banks. In a nutshell, this study focuses on the multiple (otherwise) factors that could impede efficient banking operation as well as its contextual constraints.

1.7 Limitations of the study

This study was constrained by multiple factors ranging from theoretical, methodological and empirical. However, practical and intellectual efforts were made to overcome them to avoid any significant or material negative consequences being recorded for the study. Firstly, the theoretical relevance of operational efficiency and financial soundness posed difficulty in the corporate finance theory except, some that were scantly provided by prior studies. The literature was even mixed with financial

management discipline. However, studies from Ryan (2013) and Saksonova (2013) provided insights into asset liabilities management practice of banks.

Secondly, concept of efficiency examination in terms of methodology, meaning, sources, approaches to measure, sample units, hypothesis formulation, were part of the constraints encountered by the study. Aside these constraints, the applicability of these methods of measurement empirically contributed to the constrictions faced by this study. However, prior studies from Houghes and Mester (2012) solved the problem of different approaches of measurement to investigate banking efficiency provided solution to this limitation. Additionally, Fiordelisi et al. (2010) also found the impact of bank risk among large sample of commercial banks in European Union. Likewise, Sheedy et al. (2015) documented the study on risk management policies of the bank gave solution to unearth some of the limitations encountered. Suffice it to say that certain precautions must be exercised on the general interpretation and articulation of the outcome(s) of this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Based on the theoretical, empirical and conceptual review of bank financial soundness and efficiency in banking operation, this chapter presents a critical appraisal and evaluation of the theories relating to these concepts. The chapter engages other related review of the conceptual framework, critical appraisal of the empirical literature based on the research objectives outlined in chapter one, critique of existing relevant literature of the study, identification of the research gap raised from the study with the summary of the chapter.

2.2 Theoretical Framework

Fundamentally, the theoretical direction and interpretations of a study, should form the bases of any empirical research, hence empirical study should emanate from theory (Kothari, 2001). Banking efficiency has many descriptive theories in finance literature that tries to interpret association between bank financial soundness on efficiency of banks empirically (Mihaiu et al., 2010; Haan et al., 2011; Abata, 2014). Banking efficiency could be viewed in line with the submission of Saunders et al. (2009), who documented that a pragmatic science is both theoretically and methodologically rigorous and relevant. Consequently, the framework of theories linking the influence of bank financial soundness and operational efficiency of deposit money banks in Nigeria are; asset liabilities management theory, scale efficiency theory, efficiency structure hypothesis, agency and stakeholders' theory which were technically drawn from corporate finance theory background.

The theoretical approach of these theories, form the bases of the assumptions that operational efficiency need informational symmetry between the managers and the principal, likewise the stakeholders of the business. This is necessary to reduce agency cost, adverse selection, moral hazard and other operational costs through adequate flow of information which may enhance efficiency. Undoubtedly, banking

operation require optimal utilization of bank resources (assets) and matching them with financial obligation (liabilities), hence information management become important strategically, across the bank (Sangmi et al., 2010). Therefore, the influence of bank financial soundness on the operational efficiency of banks remains vital not only to the regulators who are part of the stakeholders of the business but all of them. The related theories identified by this study were principally drawn based on the study's general and specific objectives as stated in chapter one.

2.2.1 Asset Liabilities Management Theory

Ronald (2013) of the Research Foundation of Chartered Financial Analysts (CFA) Institute, reported that the evolution and history of asset liability management is littered with false starts. It dates back to the historical period from roughly 1875, when the corporate pension was established in the US (CFA, 2013). According to Ronald (2013), the most prolific author on Asset Liability Management (ALM) is Martin Leibowitz who authored many books and papers for 40 years on it. The evolution started with the idea of dedication which means matching of a stream of cash flow (assets) to a stream of cash flow (liability), such that each cash inflow was dedicated to paying a particular outflow of cash (Ronald, 2013).

Dedication model made the earliest form of financial/insurance/pension fund related asset/liability management that assumes 100% bond portfolio being held to maturity. By 2000-2003, the practice of ALM by major financial institutions had gained ground but was still referred to as liability-driven investing (LDI) by some pension fund house. This was later developed to Immunization model that focused on idea of minimizing the volatility emanating from asset duration mismatch. According to CFA Institute, by 2005, Fabozzi published an asset/liability optimization strategy which was later transformed into Asset-Liability Management structure. This theory engages the firms' attention on how to adopt policies and strategies to identify, control and manage risks in order to have financial soundness for the bank.

From a different version, Asset Liability Modelling is a neoclassical model of banking firm which was developed by Klein (1971) and Monti (1972) as branch of microeconomics of banking. It states that the asset side of the balance sheet of the

bank consist of central bank reserves, loans, bonds, market traded assets and interbank loans while the liability side include deposits, equity and other regulatory reserves. Saksonova (2011), reported that, Asset Liabilities Management (ALM) theory is a systematic approach or process that attempts to provide a degree of protection to risks, regarding asset/ liability mismatch and consist of a framework to define, measure, monitor, modify and manage risks of liquidity and interest rate usually faced by banks and other financial institutions. Specifically, ALM is concerned with the explicit managerial functions relating to risk management of: liquidity, capital management, funding and cost of funds, and managing the bank's security portfolio (Casu et al., 2006).

According to Sudanarao (2017), ALM is a risk management technique designed to earn an adequate return while maintaining a comfortable surplus of assets beyond liabilities e.g. loans exceeding deposits of the bank. It takes into account interest rates, earnings power and degree of willingness to take on debt and otherwise called Surplus- management. Its financial management process involves, risk identification (parameters), risk measurement, risk management and framing of risk policies and its tolerance levels for any bank. ALM is a management process concerned with an attempt to match assets and liabilities as regards the maturity and interest rate sensitivity so as to minimize interest rate and liquidity risks that usually accompany assets (Anjichi, 2014).

Through dynamic balance sheet management, ALM involves the process of decision-making to control risks of existence, stability and growth of a system by controlling risks brought by changes in interest rates, exchange rates, credit risk, contingency risk, and the liquidity position of the bank. Brick (2012) indicated that ALM is forward looking process involving continuous management of assets and liabilities to measure, monitor and control the effects of interest rates, liquidity, asset values and regulatory capital as they changes. There are 3 processes in ALM, all of which are information based: Firstly, is the ALM information system. Secondly, is the Management Information System and lastly, is the information availability, efficiency, accuracy, adequacy and expediency (Sudanarao, 2017). This is the pillar of ALM since information must flow across the large network of branches of the

bank and maintain adequate system to collect information regarding the daily operations from the branches as regards liquidity requirement which is germane to banking business. Sangmi et al. (2010) posited that an appropriate strategy of liability and asset management should be designed by banks where appropriate mixture of liquid and non-liquid asset is maintained since liquidity remains the blood and life wire of banks as blood to humans.

It can therefore be said that information asymmetry must not occur between the head office and the branches for ALM to succeed so that its influence on the operational efficiency of the bank can be felt. According to Lina et al. (2013) in a properly integrated banking function, the ALM desk will have a system to cover all aspects of a bank's operations hence it is considered a strategic discipline but not a tactical one. Operationally, an ALM risk is the risk of having a negative impact on a bank's future earnings and on the market value of its equity due to changes in interest rates. Some of the various types of risk associated with ALM are liquidity, foreign exchange/ currency, political, interest rate risks among others (Sudanarao, 2017). They are risks associated with either insufficient liquid asset, loss in forex assets and liabilities, foreign exchange fluctuations/volatility among others.

ALM structure must be carefully managed and preventive steps taken to mitigate the problems associated with it so as not to cause serious damage to the bank as regards its liquidity, profitability and solvency, all of which anchors operational efficiency of banks. According to Saksonova (2011), it is the task of every Commercial bank to determine the optimal asset portfolio depending on the profitability of various asset classes and chosen constraints such as liquidity, mandatory reserve requirements, capital adequacy, common sense constraints etc. Again, he argued that the financial crisis of 2008 had underscored prior asset and risk management models inadequate for proper investigation of two most important factors of the cost of resources and risks associated with assets (Saksonova, 2011). It was also argued that the risk taking behavior of bank managers often leads to poor loan quality resulting in ALM mismatch which may automatically affect operational efficiency (Sudanarao, 2017).

The theory is found to be relevant to the study based on the fact that for banks to achieve operational efficiency, they must strive to carefully manage their asset and liability structure well so as to avoid mismatch. As a strategic option plan, the entire branches of the bank must be involved especially as it relates to liquidity and interest rate risks management information of the bank either through the Asset Liability Management Committee. Although, it must be borne in mind by bank managers that there is no complete or best model in place for asset and liability structure bearing in mind that there are multitude of models (Saksonova, 2011). It therefore beholds on the banks to perform these key functions efficiently, prudently and profitably as economic agents that promotes growth and ensuring financial system stability. Thompson (1981), warned that the model of immunization were vulnerable to interest rate risks which is an aspect of ALM.

According to Sudanarao (2017), problems associated with ALM are the issue of slow pace of computerization especially by Nigerian banks and absence of total deregulation policies for banks on interest rates for term deposits, credit portfolio (floating rate) which affects pricing these assets, based on prime lending rate. Again, it is limited in practice to develop easily an optimal asset- liability model for the bank since no one model capture the daily risk and liquidity requirements of banking operations.

2.2.2 Scale Efficiency Theory

According to Koopmans (1951), scale efficiency originated as productive efficiency which was later developed by Debrew (1951) and Farrell (1957). It is a concept in microeconomics called economies of scale where cost advantages are obtained by enterprises due to size, output, or scale of operation, with cost per unit output decreasing when increasing scale of fixed costs are spread out over more outputs. Scale efficiency has been developed by Farrell (1957) in three ways but was later applied through a model in linear programming framework by Charnes, Cooper and Rhodes (1978) using most restrictive technology having constant return to scale (CRS), which was later known as Data Envelopment Analysis (DEA). It works with an assumption that all firms are operating at an optimal scale.

The Pareto-Koopmans concept of efficiency (Pareto, 1909; Koopmans, 1951) as cited by Cooper *et al.* (2007:45) says that "A DMU (decision making unit) is fully efficient if and only if it is not possible to improve any input or output without worsening some other input or output". The theory assumes that internal efficiencies influence profitability and higher investment returns for the bank. Efficiency explains how the minimum levels of inputs are transformed into the optimum number of outputs (Magali & Pastory, 2013). The theory specifically is on the prudent management of the firms' bank financial resources with the aim of achieving higher economies of scale that improves the financial soundness of the bank through sound banking efficiency. Onuonga (2014) concur that larger banks will be able to outperform their competitors with lower costs leading to higher profitability due to scale efficiency practice by them or some other cost advantage practices.

Odunga et al. (2013) equally confirm that maximum operational efficiency in the short run is achieved at a level of output where all economies of scale available are being employed in an efficient manner. According to Balk (2001), the meaning of optimal determines the meaning of efficiency as what is optimal currently may not be the same, the other time. A firm needs to organize its operational processes in terms of both technical and economic efficiency, that is, to maximize output of factors in the production cycle (Celli, 2013). Broadly speaking, economies of scale happens when increasing outputs lead to a less than proportional increase in overall costs i.e. output costs per unit decreases (Celli, 2013). Suffice it to say that banks need to maximize output through its lending activities (high interest rate) and minimize its operating cost through its deposit taking ability (market share and branch network) with lower interest payment to depositors, all subject to regulatory requirements. For instance, large banks can comfortably practice scale efficiency through the influence of bank financial soundness.

Thus, efficiency of firms in the market can lead to increased market share and size where better production and management techniques are displayed. Scale economies consists of potential reductions of average costs associated with higher levels of productivity, which is measured by the quantity of output produced in a time. It means when higher volumes of output are produced, it may results in cost reduction

per unit of that particular output at same input price. According to Oyedokun et al. (2011), bank sell homogeneous product hence efficiency should be their watchdog in operation. Ifeacho and Ngalawa (2014) emphasized that due to the intangible nature of banking products and services, it becomes somehow difficult to measure effectively the efficiency of banks.

Emerging from this theoretical foundation of scale efficiency, it is relevantly of great value to this study, that banks should learn how to balance their allocative efficiency with real operational efficiency when working on total budgets for the bank with a view to achieving superior profitability. Influence of bank financial soundness can be achieved through the application of scale efficiency and proper cost control measures, and when managers allocate resources of the bank optimally to ensure that operational efficiency remains the goal of the bank.

Some of its limitations are passing the optimum design point where costs per additional unit begin to increase e.g. exceeding the nearby raw material supply or critical computer component /accessories to be imported into the country in some cases and where the energy is less utilized efficiently or where it records a defect rate. The theory works with an assumption that all firms are operating at an optimal scale and it may be highly quantitative in nature (Farell, 1957). This theoretical base is applicable to the bank in terms of addressing the operational efficiency of banks when bank financial soundness is required as a strategic option to take by the bank.

2.2.3 Efficiency Structure Hypothesis

An exhaustive review of the theoretical and empirical literature revealed that Domsetz (1973), Peltzman (1977), Brozen (1982) and Simirlok (1977) appear to be the earliest works on efficiency structure hypothesis (Mensi et al., 2011). The efficiency structure hypothesis came to replace the traditional structure–conduct-performance (SCP) which treats the relation between the structure and performance through firms' behavior (Mensi et al., 2011). The hypothesis believe that the larger the firm, the more efficient it is since market concentration is not a random event. The efficiency structure model stipulates that efficient firms try to capture a market share while expecting higher economic returns due to elevated concentration (Mensi,

& Zouari, 2011). It postulates that firms or banks with superior resource management or production technologies have lower costs hence they enjoy higher profitability. According to Athanasoglou et al. (2006), two distinct approaches are captured in the ES hypothesis: the X-efficiency and Scale-efficiency approaches. The X-efficiency approach states that more efficient firms are more profitable because of the lower costs to be incurred by them operationally. Anjichi (2014) states that X-efficient firms tends to gain larger market shares, which may promote higher market level and concentration but without any causal relationship of concentration to profitability.

The scale efficiency approach on the other hand, emphasizes economies of scale as against differences in resource planning and allocation and production technology. It postulates that larger firms can obtain lower unit cost and higher profits that can enable them acquire market shares through economies of scale (Athanasoglou, 2006). Mensi et al. (2011) corroborated it that large firms earn higher returns due to their efficiency, and that market share remains an indicator of an implicit measure of efficiency. This may again manifest in higher market concentration resulting into superior profitability and efficiency. Njoroge (2016) indicated that efficiency theory presupposes better management and scale efficiency results with higher concentration in terms of business units (assets) leading to greater and higher profits. Odunga et al. (2013), however indicated that operational efficiency in the short run is achieved at a level of output where all economies of scale available are being employed in an efficient manner.

Obamuyi (2013) opine that efficiency theory assumes that the internal efficiencies of a firm influences its profitability level while Odunga (2013) basically believed that the theory is based on the premise that firms/banks attain higher profitability if they operate efficiently than their competitors in the industry with lower operating costs strategically and operationally. Olweny et al. (2011) summarized its findings of the theoretical relevance of efficiency structure (ES) hypothesis that the hypothesis maintains that banks earn high profits when they are more efficient in their operational activities than others in the industry. The efficiency structure hypothesis generally assumes that profitability is influenced by the efficiencies achieved through

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internal factors present in the firm. Mensi and Zouari (2011), summarized that the efficiency structure paradigm suggests that market structure is determined by the efficiency of the operating firms. The hypothesis is limited by the quantity and quality of the resources available in the firm (asset, capital, strategic options) as well the strategic focus and policies of the firm in terms of its management.

The relevance of this hypothesis to this research rests on the postulation of the theory that efficiency structure brings higher economic returns, better competition and economies of scale for large firms leading to higher efficiency and profitability due to market share power in the industry. The hypothesis will satisfactorily address the general objective and the third objective of this study due to its theoretical implication to efficiency and bank profitability.

2.2.4 Agency Theory

Agency theory has been reported differently in the literature and historically dating back to 1960s and early 1970s when economists explored risk-sharing problems that arises when cooperating parties have different attitudes towards risk especially among individuals and groups (Williamson, 1979). The origin of Agency theory could be traced to Ross (1973) on economic theory of Agency while Mitnick (2006) concentrated on institutional theory aspect of Agency. Jensen and Meckling (1976) equally remains one of the proponents of this agency. The theory was further developed by Grossman *et al*. (1980), by justifying it on the basis of government goals of safety and protection. However, a separate theory of agency did not come up until early 1970s when Ross (1973) and Mitnick (1973), both presented independently agency theory .Agency as a theory is used to describe and explain the relationships especially between the principal (owners) and the agents (managers) of businesses. Suffice it to say that it provides a means of coping with emerging business challenges.

Jensen and Meckling (1976), defined agency theory as a contractual agreement under which one or more persons (principal) engage another (agent) person to perform certain service(s) on their behalf including delegation of some decision making authority to the agent. Agency theory therefore provides the means to address

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relationship between two or more contractual and/ or implied parties which may erupt problems. Some of the problems include adverse selection, moral hazard and agency costs. This is however different from the position of Williamson (1985). Reduction in cost and revenue efficiencies increases bank's future risks, thus supporting the moral hazard hypothesis that can affect the asset quality of the bank (Fiordelisi et al., 2010). Jensen and Meckling (1976) further explored and identified the sources of agency cost from two sources majorly. Mitnick (1973), states that agency problem are in three ways as principal's problem, agents problem and policing/monitoring mechanisms and incentives.

Bank financial soundness requires qualitative information for cost control from the managers and principal before optimal efficiency could be attained. This can lead to agency costs as explored and investigated by Jensen and Meckling (1976). Fama and Jensen (1983) corroborated this assertion through separation of ownership and control and managers personal incentives such as cash that must be optimally controlled. According to Jensen and Meckling (1976), managers are seen as honorable wealth builders on whose shareholders' information must be obeyed. On the other hand, due to the shareholder's perceived limited liability to control the management in practice, the agency conflict is exacerbated.

The desires and goals of the principal and agent usually conflicts and it may be difficult or expensive for the principal to verify agents' actions or operations as well as problem of risk preferences (Jensen & Meckling, 1976). Agency costs are inevitable within an organization whenever the principals are not completely in charge; the costs usually are spent on providing both material and moral incentives for agents to properly execute their duties or functions. This will in return, promote the interests of both parties through improved relationship that enhances operational efficiency (Liao, 2009). Agency problem arise due to inefficiencies in resource allocation which is limited in supply and incomplete information (Mitnick, 1973).

Agency problem can be minimized through contract designing so as to be competitive in line with market dictates. This measure may go a long way at optimizing the resources of the firm especially to achieve cost/operational efficiency

(Jensen & Meckling, 1976).The two are related to asymmetric information (such as adverse selection regarded as hidden information and moral hazard referred to as hidden action). According to Mitnick (1973), adverse selection occurs where asymmetric information exist before the transaction (contract) leading to inefficient allocation of resources while moral hazard describes an agency problem which exists after a transaction is executed, from where inefficient resource allocation would have been made. Delves and Patrick (2010) explored the principal's problem as helping to motivate agent to act in a manner that achieves principal's goals but the agents decisions, either to act in the principal's interest, his own interest, or compromise between the two when they do not coincide. Williamson (1985) stressed heavily on one of the elements of agency theory as opportunism.

This theory is found to be relevant to the study in that it has addressed the need to have quality information amongst the parties to have bank financial soundness that can be influenced through operational efficiency. Additionally, the theory has helped to unravel the need to maximize bank resources (assets and capital) with a view to reducing operational costs (interest expenditures) to achieve higher efficiency. According to Mihaiu et al. (2010), the economic crisis worldwide has compelled governments and banks to streamline processes in terms of revenue (assets and capital) and redistributing them (loans and advances) on principle of performance efficiency.

Jaouadi et al. (2014) concurred that the Swiss banking sector soundness improved greatly through higher operational efficiency of the system, thereby consolidating the reputation already accorded its banking system worldwide. According to Lartey et al. (2013), the relationship between liquidity and profitability of the bank must be efficiently managed to bring about financial soundness, otherwise both liquidity level and profitability will decline. Contrarily, Liao (2009), established that less efficient banks have higher incentive to use new technology in order to improve their efficiency in the Taiwanese banking industry. According to Umar (2015), the theory's major aim is that government agencies must be present to supervise and check the excesses of financial institutions for the financial system to have financial soundness that can influence operational efficiency. The theory focusses on the

problems of hidden actions and information (information asymmetry) from both parties but usually from the agents to the principal (Umar, 2015). Agreeably, agency theory is based on the incompleteness of contract and the separation of ownership (shareholders) and the control (management).Though the resulting problems were already mentioned by Adam Smith in the 18th century (Williamson, 1979).

According to Jensen (2004), a well-designed pay packages can mitigate the agency problems between managers and shareholders. Mohammad et al. (2011) documented differently that, agency theory primarily focusses on conflict between directors and owners but not between majority and minority shareholders which pose a major problem to the applicability of the theory in developing countries (Malaysia, Nigeria, Kenya). Fernando et al. (2015), argued that high risk taking behavior or risk preferences of bank managers often leads to poor loan quality, hence shareholders must exert appropriate monitoring on managers action, implement suitable control devices to minimize possible agency conflicts. Adequate information and good monitoring mechanism to control expenses by both parties in the system must be evolved so that asymmetric information does not arise. Thus, this theory provides the bases for the general and specific objectives of this study.

2.2.5 Stakeholders Theory

Richard Edward Freeman's (1984) was reported to have developed the stakeholders' theory which is an expansion of agency theory that seeks to have fiduciary relationship between the managers and stakeholders who have a claim on the firm. According to Freeman, Harrison, Wicks and Pamar (2010), Stakeholders theory was developed to solve the inherent problems of value creation and trade issues, ethics of capitalism. It was also developed to address the issue of the managerial mindset and moral problems that usually ensue in governing corporate entities as it affects the interest of its stakeholders. In another way, the conceptualization of the theory came from Friedman and Miles (2002). The theory viewed companies as an organizational entity through which diverse individuals accomplishes multiple, but incongruent purposes by providing structures and explanation (Donaldson & Preston, 1995).

A stakeholders' approach help to define and shape our understanding of how good management practice really is and it is based on general relationships existing between stakeholders who both comprise the system or are affected by the business activities and socially sustainable companies (Freeman et al., 2010). The theory provides support for agency theory which could not capture all market related stakeholders' interests such as business investors, portfolio managers, stock brokers, financial analysts who operationally needs quality information for economic decisions on investments. It has also influenced new generation of scholars, researchers and managers (Freeman et al., 2010). Extant literature have used the stakeholders' theory to explain diverse needs of different individual's information requirements both within and outside their respective institutions through quality financial information hence the relevance of the theory to this study (Obafemi et al., 2013).

Additionally, Stakeholders' theory is found to be supportive of agency theory since the provision of information to all stakeholders makes the hallmark of these theories so that efficient management of information across the spectrum of the system is assured and no information asymmetry (Jensen & Meckling, 1976). Due to serious information asymmetry, the entire financial system can spring imbalances, bubbles and shocks that requires stakeholders to resolve responsibly in other to immediately stabilize the system. Brenner and Cochran (1991), argued about the applicability and application of the theory as regards sustainable management policies with three challenges of managing stakeholder's relationships: interest, creating mutual sustainability and empowering stakeholders for nature and sustainable development.

According to Friedman and Miles (2006), mangers are to manage the organization for the benefit of the stakeholders, ensuring that their rights are taken care of and those that participate in decision making processes. The theory attempts to provide approaches for the management of finance through cost optimization and proffering strategies or methods to promote principal-agent relationship and the shared interests of the stakeholders of the business. Mitchel, Agle and Wood (1997), developed a framework about the bonding relationship that should exist between corporate entities and all stakeholders whose interests must be considered in making the entity

(bank) sound financially and efficient. According to Brenner and Cochran (1991), stakeholder theory of the firm offers two useful purposes which are to explain how organizations operate and to help predict organization behavior.

Based on this, the theory seeks to explain how organization should be run with the purpose of promoting the interests of the stakeholders: customers, suppliers, investors, financial analysts, portfolio managers, bank regulators, governments, employees and others which agency theory failed to consider. One of the major criticisms of the theory is that it undermines principles on which market economy operates through the application of political concept of social contract to the corporation (Mansell, 2013). The assumption of the theory that the interest of various stakeholders can be conceded or unprejudiced against one another has attracted criticism from Blattberg (2004). It is equally limited as to the issue of information dissemination and the need to avoid asymmetric information. Other central critics are Milton Freeman, Oliver Williamson, Blattberg (2004) and Donaldson et al. (1995) who stated that the theory is confusing in structure and purpose.

To this end, the theoretical relevance of the theory to this study is premised on the need to identify the various stakeholders' responsibilities and interests towards ensuring and enhancing operational efficiency for the organizations which they own or operate. All the stakeholders must be informed by the managers of the activities of the firm so as to enlist their support towards the efficiency and growth of the firm. The theory has specifically addressed specific objectives two and three of this study by emphasizing that adequate provision of minimum capital base and superior profitability from, and to the investors of the bank.

Table 2.1: Summary and comparisons of Operational Efficiency theories

Bases	Asset Liability Management Theory (ALM)	Scale Efficiency Theory (SET)	Efficiency Structure Hypothesis (ES)	Agency Theory (AT)	Stakeholders Theory (ST)
Focus	Shareholders and Managers	Managers	Managers	Self interest	Stakeholders
Objective	Maximize Productivity	Optimize operation cost	Increased operational efficiency	Minimize Agency Conflict	Maximize Productivity
Desire attitude towards operating efficiency	High	High	High	Low	High

From the five theories in Table 2.1, the attitude that each theories desired from its practitioners are not the same on operating efficiency. For instance, under Agency, it is low while under Stakeholders, Asset and liability management, Scale efficiency theories and Efficiency structure hypothesis are high. Equally, they pursue different objectives with two theories for productivity, stability and growth while the other three pursue costs/optimization/efficiency objectives. Lastly, the overall goal of these relevant theories to this study rests on information provision to all stakeholders (information symmetry) and the systematic but optimum resource allocation policies (cost reduction), and operational strategies to be pursued by the agents/managers of the firm for the overall operational efficiency, that is tailored towards corporate growth and profitability.

2.3 Conceptual Framework

Conceptual framework is a network of interlinked concepts that provides a comprehensive understanding of a phenomenon (Jabareen, 2009). According to Kombo and Tromp (2006), a concept is an abstract or general idea inferred or derived from specific instances. Emerging from the literature review, the conceptual framework for this study is drawn essentially from the research specific objectives showing the interrelationship between bank financial soundness and operational efficiency of deposit money banks in Nigeria and a moderator.

2.1 Conceptual framework
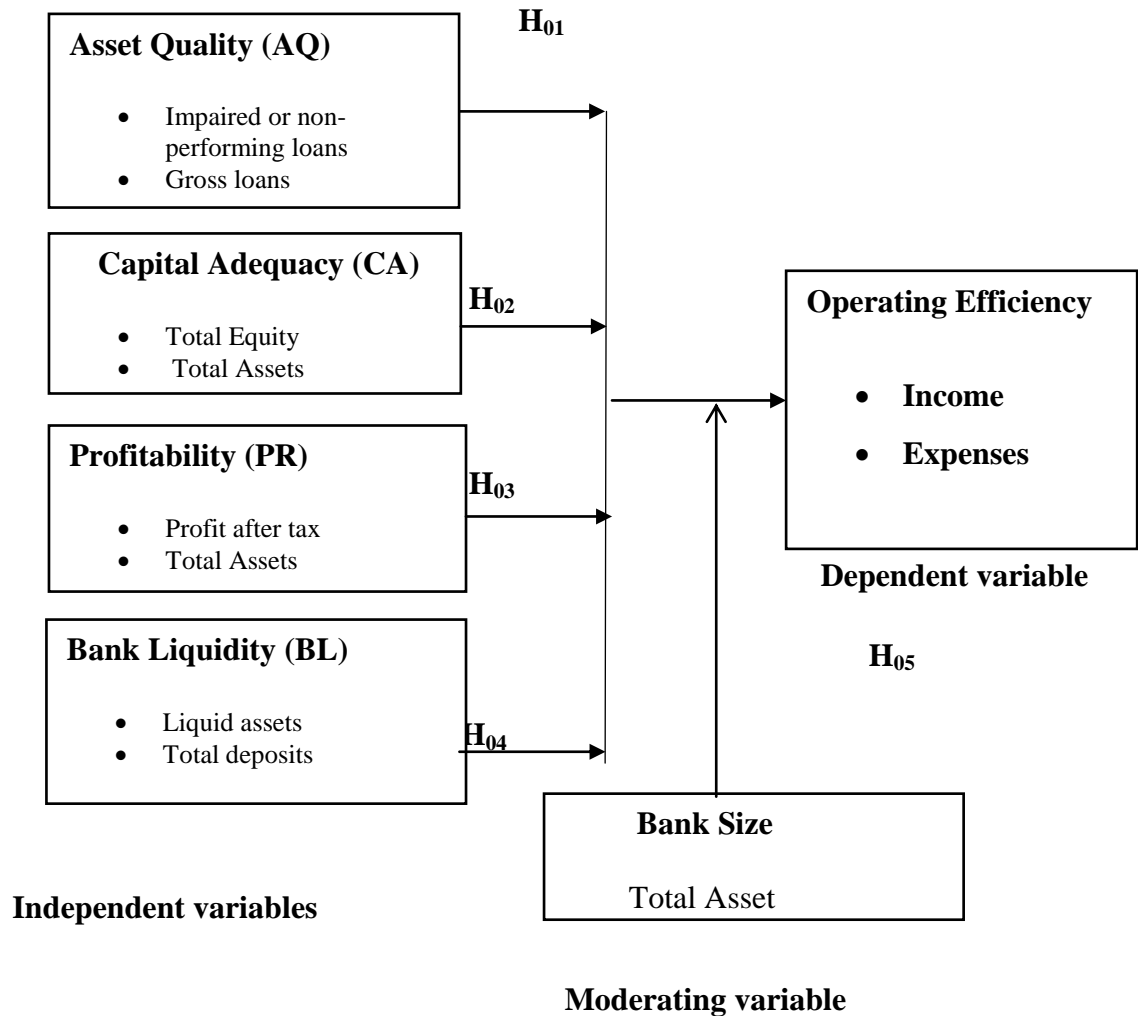
Figure 2.1: Conceptual Framework

The identified explanatory variables of bank financial soundness are: asset quality which has the measurement of the ratio of delinquent or non- performing loans to gross loans; capital adequacy is measured by the ratio of equity fund to deposit liabilities; profitability measured by return on assets; bank liquidity is measured by the ratio of liquid assets to total assets while bank size considered as the moderating variable is measured by the total asset of the banks. The moderating effect of bank size can be felt in terms of the largeness or otherwise of (total assets, deposit or market share) which may influence the strength or intensity of the efficiency for banking operations generally.

Prior studies made use of various ratios and methods in evaluating the efficient performance of banks worldwide. For instance, Pancheva (2012) and Olarewaju et al. (2015) used ratio analysis while Obafemi et al. (2013) used data envelopment analysis. Shyu et al. (2014) and Ncube (2009), however adopted the use of two-stage approach and stochastic frontier analysis in their study. Even the use of ordinary least square have been employed by prior studies as efficient (Ezike et al., 2013; Nwite, 2014). According to Amer et al. (2011), there are two broad approaches to measure Operating Efficiency (OE): income/expense approach is the ratio of interest income plus non- interest income plus securities gains (or losses) over interest expense plus non- interest expense plus provisions for loan losses and taxes. In contrast, Pancheva (2012) state that operating efficiency is measured by operating cost/ income approach (ratio of non-interest costs excluding bad loans and cost of doubtful exposures) and the sum of the interest and non-interest incomes. The study is conceptualized as shown in figure 2.2

2.4 Review of Empirical Literature

The focus of this section is to present empirical findings of the prior extant studies on banks' operating efficiency with a view to identifying the influence of bank financial soundness on operational efficiency of the deposit money banks. The section intends to showcase the strengths, weaknesses and relevant literature gap in the existing empirical research on operational efficiency of deposit money banks. Generally, extant theoretical and empirical studies have been conducted on the influence of

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bank financial soundness on the efficiency level of financial institutions worldwide with little empirical evidence from Africa and emerging economies of the world: (Ronald, 2013; Ryan, 2013; Moradi-Motlagh et al., 2011; Liao, 2009; Thao et al., 2015). The following subsections further present empirical studies of scholars in relation to the overall and specific objectives of this study in that order. Precisely, the following subsections concisely present prior empirical studies, as related to each specific objectives of this study are hereby presented:

2.4.1 Asset Quality and Banks' Operational Efficiency

Asset quality has been empirically examined by many studies in the literature in order to know its relevance and influence on operational efficiency of banks (Sheedy et al., 2015; Abata, 2014; Mohd-zaini et al., 2010; Kariuki et al., 2016; Umoren et al., 2016). Asset quality relates to the timely manner with which borrowers are meeting their contractual obligations in terms of repayment of both principal and interest (Alhassan et al., 2014). Asset quality remains a fundamental issue as regards achieving efficiency in banking operation hence bankers always monitor and control the level of non-performing credits (loan and advances) adequately. The two principal elements therein are Performing and Non-Performing Loans (PL & NPLs) that constitutes the credit portfolio of the bank. Component of asset quality called non- performing assets that constitute a major part of asset quality for banks have been identified as a significant source of banking failure and its relationship with intermediation efficiency remain unclear (Kariuki, Muturi, & Ngugi, 2016). Ratio of non-performing loans provision to gross loans, proxy for asset quality is in conformity with prior studies use in the literature (Kiyota, 2011; Sufian, 2009). However, Kariuki et al. (2016) cautions that higher levels of non-performing assets indicate lower asset quality.

Abata (2014), investigated asset quality and bank performance of commercial banks in Nigeria. The study investigates the impact of consolidation phenomenon on the financial soundness of banks in the Nigerian financial service industry. The study examines financial soundness and stability of Nigerian banks due to industry's experience of severe loan problems and unexpected losses recorded by banks.

Secondary data employed and drawn from six (6) largest banks listed on the Nigerian Stock Exchange (NSE), based on market capitalization from 1999 to 2013. Financial ratio analysis was used as a measure of bank performance and asset quality. The analytical tool employed was Pearson's' correlation coefficients as well as regression model. Findings from the study reveal that asset quality had a statistically significant relationship and influence on bank performance and efficiency. No doubt, the study has documented the significance of asset quality in its work but fails to establish the specification effects used for its panel data as well as the type of regression model as bases for its submission.

To further examine the influence of asset quality as an explanatory variable on operational efficiency, Kariuki et al. (2016), investigated the relationship between asset quality and financial intermediation efficiency of deposit taking and saving and credit co-operative societies SACCOs (DTSs) in Kenya. The study examines 103 out of the 135 licensed by the regulator at the close of 2013 due to availability of data covering 2011-2014. Data envelopment analysis was employed to generate efficiency scores the first stage, thereafter bias corrected efficiency scores were later generated for regression purposes. The control variables used by the study were firm size, profitability and diversification. Various diagnostic tests conducted on the panel data using fixed effect estimation model as its specification basis. Both descriptive and regression analysis were employed by the study. Findings from the study reveal that asset quality has a statistical significance with intermediation efficiency since the study show a positive relationship. This result was confirmed by a negative correlation coefficients of -0.3441 and R square of (0.4304) and (0.4203) for both models 1 & 2 respectively. The implication of this is the positive relationship between the two variables predicts that an increase in asset quality measured by non-performing loans to gross loans would result in an improvement in overall efficiency of the firm. Despite the fact that the study demonstrates robust findings with its results, it however, fails to logically address the theoretical foundation which would have guided the study to arrive at its conclusion.

In a bid to justify the critical importance of having a good mix of non-performing loans to total loans (asset quality metrics) within the credit portfolio of commercial

banks, Mohd-zaini et al. (2010), investigated the relationship between non-performing loans and bank efficiency in Malaysia and Singapore. The study's second objective was to find out whether there are significant differences in bank efficiency between Malaysian and Singaporean commercial banks. Data collected from the annual reports of banks and IBCA Bank scope from 1995-2000. Both descriptive and Tobit simultaneous equation regression model was employed by the study. The study employed bank's cost efficiency estimated by stochastic frontier method while second Tobit analysis was used to investigate the relationship between non-performing loans and bank efficiency. Findings show that average cost efficiency score of full sample is 87.68% indicating wastage of 12.32% of inputs mix. This indicates that the cost efficiency score negatively affects bank efficiency. It was also discovered that, there is no significant differences in the cost efficiency level between commercial banks in Singapore and Malaysia, although Singaporean banks exhibit a higher average score than the Malaysian banks. Additionally it was documented by the study that, the Tobit regression results clearly show that high non-performing loans reduce cost efficiency and vice versa. This finding is in consonance with studies from (Umoren et al., 2016; Kolapo et al., 2012). In Africa and Nigeria in particular, there are increasing trend in Non-Performing Loans (NPLs) which is a component of asset quality that's adversely affecting availability of credits to economic agents in all sectors of the Nigerian economy, thus affecting financial intermediation and economic activities/growth (Kolapo et al. (2012). The study documented that, the concept of efficiency is controversial and mixed with empirical evidence especially based on studies from different heterogeneous banking industry background.

2.4.2 Capital Adequacy and Banks' Operational Efficiency

Capital adequacy for banks is of major concern for bank regulators worldwide (Ezike & Oke, 2013). Bank for International Settlements (BIS) established a framework for measuring capital adequacy for banks in the group of ten (G10) industrialized nations otherwise referred to as Basle Capital Accord on Capital Adequacy Standard (Basle Committee, 1999 & 2001). It is widely accepted by bank regulators worldwide and Nigeria's case is no exception. The Central Bank of Nigeria in December 2005

adopted the Basle Capital Accord as part of her financial reforms tagged Recapitalization policy for banks and increase the minimum capital base of banks from N2b to N25b (Soludo, 2004).

In a bid to evaluate empirically, the influence of capital adequacy for banking operation in Nigeria, Olarewaju and Akande (2015), investigated the determinants of capital adequacy in the Nigerian banking sector. The study was to find out whether capital in banks directly influences the amount of funds available for loans disbursement which invariably affects the risk appetite, efficiency and stability of banks. The study specifically, focused on the determinants of capital adequacy for 6 listed deposit money banks for the period from 2005 to 2014. Data collected from the annual reports of the sampled banks and Nigeria Stock Exchange. Ratio analysis, descriptive and inferential statistical analysis were employed through fixed effect panel regression model. The descriptive analysis showed that the mean, and median values are within the minimum values and standard deviation show that the expected growth rate development for each of the identified determinants of capital adequacy. The study employed panel data using cross-sectional specific fixed effect estimations. It was documented by the study that a direct relationship exists among equity to total asset, return on asset and size. However, an inverse linear relationship exists among return on asset, credit ratio, depreciation and liquidity, although they were statistically significant in determining the level of capital adequacy for the sampled banks.

Sheedy et al. (2015), in Sydney, proposed a multilevel framework for investigating risk climate for shared perception among employees to related practices and behaviors to its incomes, antecedents and validate a new measure. The study focused on the risk behavior and appetite of bank managers as it affects asset quality of banks. The methodology employed was to draw on published case studies, and industry literature review. This was supported with interviews with subject matter experts totaling 10544 employees across three different banks from different countries. On line survey method was employed to explore for both individual and business unit level simultaneously. Findings from the study, indicate that four unique factors of risk climate that were invariant across three organizations, two countries

and two levels of analysis for individual and business unit were discovered by the study. The study was to meet the regulatory requirement of financial institutions so as to guide, strengthen or change the risk climate.

In a finding related to capital adequacy standards evaluation, Ezike and Oke (2013) investigated the impact of the adoption of the capital adequacy standards on the performance of Nigerian banks. Bank for International Settlement (BIS) established a general framework for measuring capital adequacy for banks in the group of ten (G10) industrialized nations of the world as a guide. It is otherwise called the Basle accord on capital adequacy standard and accepted globally by bank regulators. It was implemented in Nigeria in December, 2005. The study period was from 2003 to 2007 (5years). Data collected from the financial statements and reports of the sampled banks. The study used 6 banks that comprise of old and new generation banks to evaluate the effect of capital adequacy on the banks. The methodology employed by the study was the ordinary least squares technique. It was found out from the study that capital adequacy exert major influence on bank performance.

The study also documented that the impact of the Nigerian monetary authority on new capital requirement was found to be complemented with the adoption of the new standards. The influence of bank financial soundness based on capital adequacy requirement and the need to maintain regulatory capital was shown by the findings from this study. Efficiency can only be improved when adequacy of capital is assured to maintain operational capabilities on ground. Admittedly, the study has achieved its objective; it could be argued logically that the sample used was so short for generalization and representativeness of the Nigerian financial system. Again, the basis of the classification of the banks was not disclosed by the study as advocated by prior studies that it is logical to disclose such in a study (Ejoh et al., 2014).

Ayanwaokoro (2008), equally emphasized the issue of prudential guidelines and calculation of weighted risk assets in line with international standards equally affect bank capital. For instance, provisions against the capital should be done in the following categories: risk free asset and minimum risk assets (0%), normal risk

assets (2%), substandard (10%), doubtful (50%), lost (100%) and specialized/ fixed assets and other assets (50 & 100%).

2.4.3 Profitability and Banks' Operational Efficiency

In the literature, there are sizeable number of empirical studies on earnings and profitability on commercial banking business across the globe: (Alrafadi et al., 2014; Shyu et al., 2014; Ani et al., 2012; Opoku 2016; Hallunovi et al., 2016; Ejoh et al., 2014).

Ncube (2009) evaluated the efficiency of the banking sector in South Africa with the objective of analyzing the cost and profit efficiency of banks in South Africa. The study established that prior studies have always been employing cost to income approach in measuring efficiency in South Africa. The study opined that the approach does not provide an insight on real profit efficiency and very simplistic approach. The study employed the stochastic frontier model to determine both cost and profit efficiency of four (4) large and four (4) small, South African based banks. The results from the study shoe that South African banks have significantly improved their cost efficiencies between 2000 and 2005 period of study. The efficiency gains on profitability over the same period were not significant and no superior bank in terms of gains on cost reduction and profitability. Also a weak positive correlation was found to exist between cost and profit efficient bank and most profit efficient ones. However, as regard to bank size, cost efficiency declined with increasing size. This finding was in consonance with Aremu et al. (2013).

In a similar attempt to unravel the influence of profitability on operational efficiency as an explanatory variable, Adeusi et al. (2014), investigated the determinants of commercial banks profitability using panel evidence from Nigeria. The study examines the factors that influence the profitability level of commercial banks in Nigeria. The study employed panel data sourced from the individual banks from 2000-2013. The panel data comprised of the time series and cross sectional data on the 14 sampled banks. Profit was proxy for return on asset and as a function of some internal and external determinants like capital adequacy ratio, asset quality, liquidity ratio, inflation and economic growth. To establish that no heteroscedasticity, both

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fixed effect and random effect models were employed by the study. The findings reveal that asset quality and economic growth are determinants of commercial banks profitability as they were found to be statistically significant on profitability. However, asset quality was highly significant in all the models indicating that credit risk is a major determinant of commercial bank's profitability. According to the existing literature, ROA as a measure of profitability was expected to have positive relationship with efficiency since profitable bank are assumed to be more efficient (Alrafadi et al., 2014; Srairi, 2010; Arora, 2014; Sufian, 2009; Othman et al., 2014; Amer et al., 2011).

Using different perspective as a basis of comparison in another economy, Nuray (2015), examined the effect of internal factors under the control of deposit banks and external factors beyond the control of banks on profitability in Turkey. The study employed panel data for the period from 2000-2014. The study employed the multilinear regression model as well as correlation coefficients. Findings indicate that there is high correlation between the asset profitability and equity profitability of the 33 sampled banks. It was also documented by the study that micro variable are more effective in the determination of a bank's performance when compared to the macroeconomic variables. Liquidity is determined as a macro variable has a negative effect on equity profitability. The study suggest that bank regulators and managers must develop policies on the internal and external factors that determines profitability performance which will automatically leads to efficiency in the financial system.

In a different perspective, Ebenezer et al. (2017), examined the bank-specific and macroeconomic determinants of banks profitability in Nigeria. The study employed secondary data from the annual audited financial reports of sixteen (16) selected banks over a period from 2010 to 2015, making 6 years study. The total observations for the study were 96. Balanced panel data collected from banks websites and National Bureau of Statistics. The analysis was conducted through panel regression models. Two models were entered, each measuring different specification effect models for fixed and random effect estimation. The study employed descriptive analysis and inferential statistics to buttress the results. Findings of the study show

that, capital adequacy and liquidity have a positive and significant effect on bank profitability while efficiency ratio has a negative and significant effect on bank profitability. The study also documents that, GDP growth have a positive and significant influence on profitability as well. In the overall, the study reported that, major factors that determine bank profitability are capital adequacy, liquidity, and efficiency and GDP growth rate in Nigeria.

2.4.4 Bank Liquidity and Banks' Operational efficiency.

Bank liquidity remain a key factor in the day to day running of bank all over the world, hence necessitating the need for its various empirical attention. In an empirical quest to showcase the influence and relevance of bank financial soundness as regards the operating efficiency of banks in Ethiopia, Berihun-Engida (2015), investigated the determinants of bank liquidity and their impact on profitability. The study drew its empirical evidence from eight (8) commercial banks in Ethiopia. Secondary data was collected and used for the period under review from 2002/2003 to 2013/2014. Panel regression analysis was employed to analyze the panel data collected for the study. The result indicate that bank size and loan growth had negative and statistically significant impact on banks liquidity measured by liquid asset to total asset while the impact of bank liquidity on commercial banks profitability was non-linear. The study further advocate that commercial banks in Ethiopia should conduct research on liquidity issues as a principal predicting factor and identify their optimal level of liquid asset holdings by weighting marginal costs and marginal benefits of holding the asset.

Emerging from a study to showcase the influence of bank liquidity on banking efficiency, Mohamed (2015), examined the determinants of bank liquidity for the Tunisian economy. The purpose of the study was to show the importance of liquidity for the bank and the Tunisian banking system. The study employed sample of 18 banks in Tunisia for 2000 to 2010 period. Two measures of bank liquidity were used: liquid assets to total assets; total loan to total deposits. Method of static panel and panel dynamic was employed to analyze the model out results. Both descriptive and correlation coefficients used to analyze the data. Three models were used after

establishing the estimation effect with two models using fixed while the other used random effect estimation. The study found that financial performance proxy by capital / total assets, operating costs/ total assets, growth rate of GDP, inflation rate and delayed liquidity have significant impact on bank liquidity. The study further confirmed that bank size, total loans / total assets, total deposits/ total assets does not have significant impact on bank liquidity. This indicates that bank liquidity has impact on the performance and efficiency of banks having been found significant statistically.

In a different empirical study to unearth the influence of bank financial soundness on efficiency of banks and the employment of liquidity as an explanatory variable, Akhter and Roy (2017), evaluated the factors affecting the efficient performance of non-bank financial institutions in Bangladesh. The study identified liquidity, credit risk, efficiency, and profitability as the factors affecting banks' soundness. Secondary data collected from the financial statements of non-bank financial institutions for the period 2010 to 2015. The research methodology employed was descriptive and financial ratio analysis. Linear regression, ANOVA, F-statistic were employed to test the hypotheses at 5% level of significance. The result indicates that, partial net interest margin and return on asset have significant effect on loan deposit ratio. Non-performing loan was found to have a negative effect of loan to deposit ratio. The amount of influence variables of NIM, NPM, ROA, ROE, and NPL to the dependent variable of loan deposit ratio (LDR) is 87.45% while 12.55% remaining could not be captured by the study. The study tested its data to determine whether the assumptions of Classical Linear Regression Model was fulfilled such as normality, multicollinearity, and autocorrelation.

Consistent with prior studies, ratio of liquid asset to total deposit as adopted by this study was used as an indicator of liquidity position of banks by these studies: (Moore, 2010; Pacelli and Mazzarelli, 2015; Kariuki et al., 2016). In addition, the CBN (2017) also reinstated that the liquidity ratio for the banking industry as at June was 45.63% overshooting the prudential minimum limit by 15.62% meaning that the banks maintained fair liquid risk position. The liquidity position was accounted for, by the performance of the banks to holding government securities as against lending

to private sector. The report however indicated stable liquidity risk rating for the year.

2.4.5 Bank Size and Bank's Operational Efficiency

The size of any organization remains an important factor to consider in business operations especially as regards how large or small a banking institution is in the industry. Size according to Askarany and Smith (2008) remains one of the indisputable controversial factors in the diffusion literature in gauging its influence or intensity among firms. Firm size used as bank size in this study can be defined by annual sales, total assets, total revenue, net worth of firms and number of employees (Askarany et al., 2008). The larger a bank is, the better the influence size can exert in the industry and make enormous impact on the interest of its stakeholders (Adebiyi, 2016). Bank size as employed by this study is to demonstrate its moderating influence and effect on the operational efficiency of any banking institution especially with a view to controlling and managing the cost/expense and income/revenue in practice. Natural logarithm of total asset was used by this study as a proxy of bank size to capture the possible cost advantages associated with size (economies of scale) and expected to take positive sign (Kariuki et al., 2016; Hallunovi & Kume, 2016).

In a bid to evaluate the effect of bank size to determine whether small sized or large sized banks influence the efficiency of banks in Australia, the study of Moradi-Motlagh et al. (2011) could be considered. The study concentrated on investigating the influence of efficiency, effectiveness and risk in the Australian banking industry for the period from 2000-2010 using 6 banks as sample. It employed a three-stage DEA technique to measure sources of profitability which are risk, efficiency and effectiveness. The study made use of DuPont financial ratio analysis method to determine inputs and outputs variables of the DEA model. The variable of profitability was decomposed for its clear understanding result into three components. Findings indicate that, the effectiveness of the large sized banks is greater than the small sized banks. Contrarily, the small sized banks are able to achieve higher efficiency scores. It was also revealed by the study that, some banks

gain their profits due to taking higher risk rather than others which might not take for a sustainable longer term. The result clearly shows that bank size (large or small) have significant effect on the efficiency and effectiveness of the soundness of such bank in terms of its total assets. This empirical evidence has been supported by studies from Njoroge, (2016) and Onuonga, (2014).

In a similar research conducted to investigate the effect of bank size and market concentration on bank's earnings volatility in the United States, Haan and Poghosyan (2011), examined whether bank earnings volatility depends on bank size and the degree of concentration in the banking sector. The study employed quarterly data from non- investment banks in the United States for the period, Q1 2004 and Q2 2009 respectively. The study employed Sensitivity analysis with Sharp ratio and Z score to determine the effect of volatility. The study also employed controlling variables of leverage, quality management and diversification. Findings reveal that, bank size reduces return volatility while a negative impact of bank size on bank earnings volatility decreases in absolute terms with market concentration. It was also revealed by the study that, larger banks located in concentrated markets have higher volatility especially during the recent financial crisis in the US.

In a different empirical attempt in another economy, Eriki and Osifo (2015) investigated the determinants of performance efficiency in the Nigerian banking industry. Data were collected from secondary source of the CBN for the study for 19 selected banks for the year 2009. Three performance efficiency measures of constant returns to scale (CRS), variable returns to scale (VRS) and scale efficiency models used by employing the data envelopment analysis (DEA) approach. The entire estimation process was done by DEA frontier software. The findings reveal that, bank size and bank age are positively related to bank performance efficiency, while board independence and ownership structure are negatively related to bank performance in Nigeria. The result implies that, strong and efficient resource management were lacking in the employment of cost inputs and outputs of the banks.

2.4.6 Bank Financial Soundness and Operational Efficiency

 Staub, Silva and Tabak (2009), investigated the evolution of bank efficiency in Brazil. Specifically, the study evaluated cost, technical and allocative efficiency for Brazilian banks for the period from 2000 to 2007 making (7 years) study. Data Envelopment Analysis was used to compute the efficiency scores. It was found out from the study that, there was low level of cost efficiency compared to banks in Europe and US. Reasons adduced by the study were the high macroeconomic volatility in Brazil's economy. It was also documented by the study that state owned banks are significantly more cost efficient than other banks either foreign or local. Although, no evidence of differences in economic (cost) efficiency due to type of activity and bank size. The study provides an insight and guide for bank financial soundness monitoring for bank regulators and managers.

In another study to ascertain the operating efficiency level of Taiwanese banks, Liao (2009), attempted to estimate the efficiency of both domestic and foreign banks with a view to gauging the dynamics of efficiency change in Taiwan. The study employed 4 estimation methods of regression models of pooled OLS, fixed-modelling (FM), random-effect modelling (RM) and Tobit censored regression employed at the same time, covering 2002-2004. Findings indicate that, domestic banks' returns to scale are decreasing and that an oversize phenomenon exists in Taiwan. It was also reported that foreign banks are not more efficient than domestic ones, but they have better productivity growth than domestic banks (SE, 0.9029; 0.9062, for the two models). This finding implies that less efficient banks have a higher incentive to use new technology to improve their efficiency in Taiwan.

Similarly, in Vietnam, banking industry and bank efficiency was the focus of the study conducted by Thao and Thuy (2015). The study evaluated the relationship between bank efficiency and banking development. The study employed both banking industry and bank specific indicators to investigate bank efficiency and bank development for 27 banks in the country. The study employed stochastic frontier analysis (SFA) approach for a large sample of commercial banks in Vietnam. The period of the study was 2000 to 2013. Findings indicate that there are positive

linkages of the bank efficiency and banking industry development. Interestingly, the findings support prior empirical evidence, that bank specific and macroeconomic indicators influence bank efficiency significantly (Adjei-Frimpong, 2014; Ifeacho & Ngalawa, 2014).

2.5 Critique of Empirical Studies

The critique and critical review of the extant empirical studies in terms of objectives, variables, methodology, conclusions and research gap revealed a lot of related methodology issues, demanding further research. Based on this, this subsection presents the issues for further research and investigation as highlighted from the various studies reviewed concisely as it relate to bank financial soundness and operational efficiency.

In the review, there was no serious priority paid to the issue of theoretical foundation liking some of the hypothetical drive employed by some studies. According to Kothari (2001), cause-and-effect hypothesis must drive the empirical tests to be carried out to justify a sound theoretical connection between the variables and the hypothesis before conclusion. Moradi-Motlagh et al. (2011) clearly failed to demonstrate the theories on which the hypotheses tested were based as well as its shortness in sample size which could impede its logical relevance. Similarly, Mohamed (2015) failed to demonstrate any theoretical foundation on which to anchor its submissions, notwithstanding the establishment of the specification effects in the study.

In addition, Eriki and Osifo (2015) did not provide any theoretical construct to base its empirical evidence as well as the short period of study. Adeusi et al. (2014), demonstrated a high level of compliance with extant empirical findings but lacked any theoretical foundation. This could provide a ground to puncture the empirical effect of its results on bank performance efficiency. As a result, these studies were found to have failed in establishing the nexus between the various explanatory variables employed and the response variable of the studies.

The problem of heterogeneity across the sample units especially across the diverse environmental background of the studies was found rampant among the studies. The presence of heterogeneity from population of diverse features and across sample units form an integral part of panel data regression analysis (Greene, 2012). According to Gujarati *et al.* (2010) and Greene (2012), Housman specification should be performed to detect specification errors when ordinary least square is employed in line with the Classical Linear Regression Model (CLRM) standard. Despite the multi-dimensional approaches demonstrated by Mohd-zaini et al. (2010), it failed to establish normality test for the parametric data distribution employed, hence its results generalization could be punctured due to heterogeneity problem.

Sheedy *et al.* (2015) equally failed to observe the Gauss- Markov theorem in its study of cross boarder and multilevel framework. The failure of the study to establish diagnostic checks on which efficiency and consistency of the regression estimates were based could affect its findings. Ncube (2009) and Akhter and Roy (2017) equally failed to demonstrate the specification effects of the balanced panel data employed in their studies which could form the bases for empirical validation. Abata (2014) failed also in the specification effects test for its study. Bank specific, industry and macroeconomic factor attributes needs to be established to avoid falling into heteroscedasticity and time specific error, which could have impact on findings and its validity (Greene, 2012). Thao and Thuy (2015) clearly failed to demonstrate the unique firm attributes required in the study which could affect the efficiency and consistency of its findings.

According to Gujarati and Porter (2010), Classical Linear Regression Model assumptions should be observed for relevant diagnostic tests in order to have efficiency and consistency in the regression estimates where OLS is employed in a study. This will give assurances, that the estimation model is fit and indicates that it is best linear unbiased estimate (BLUE). Berihun-Engida (2015), was found to have failed the OLS assumptions and appropriate diagnostic checks as well as the possibility of variable measurement problem, hence this could affect the validity of their submissions. Additionally, in a bid to obviate biasness in risk measurement based studies, and to avoid basic estimation technique problem, especially when

sample units are heterogeneous in nature, the researcher is expected to prioritize the specification effect well. More so, when the modelling approach employed by the study is good as found in Haan and Poghosyan (2011).

Failure to observe this normality (Gaussianity) process could impede the efficiency, consistency and reliability of the regression estimates. By extension, it could affect the validity test of the parametric data employed. Also, the issue of heterogeneity was observed in Staub, Silva and Tabak (2009) study that employed 4 estimation methods of regression models of pooled OLS, fixed and random effect modelling and Tobit censored regression were employed at the same time. This is at variance with Gujarati (2010) stating that OLS has minimum variance that depicts best linear unbiased estimators which are expected to form bases for establishing statistical findings.

Finally, the existing studies have shown weak or low consideration empirically in the investigation of possible influence of bank financial soundness on banking efficiency as clearly demonstrated in the advanced world. This is not borne out of lack of research interest but for lack of understanding of the theoretical, conceptual and empirical constructs of the subject matter of efficiency in banking. For instance, Eriki and Osifo (2015)'s period of study could be punctured for shortness of evaluation for sound operational efficiency. Furthermore, the state of our financial markets and financial service industry may have contributed to this empirical dearth in Africa and Nigeria in particular. Some of the studies reviewed exhibited weak consideration for examining the important role of operational efficiency but concentrated on bank profitability mostly ignoring the possible influence of variables like liquidity, credit risk exposure, asset quality and capital adequacy (Othman et al., 2014; Opoku, 2016; Ani et al., 2012).

2.6 Research Gap

Based on the findings and critical review of related extant empirical studies relating to the influence of bank financial soundness on operational efficiency of banks, this empirical discourse has revealed, lots of research gaps begging for examination. Interestingly, many of these studies had concentrated on equating banking efficiency

with bank profitability (Nuray 2015; Jaouadi et al., 2014; Ncube, 2009), instead of examining the concept of efficiency as it relates to cost efficiency that promotes financial soundness for banking system. This study is determined to fill this vacuum of knowledge so created by these prior studies.

Secondly, prior studies had concentrated on investigating banking efficiency on financial institutions specifically without much attention paid to deposit money banks whose primary duty is financial intermediation (Akhtar et al., 2010; Ezezobor, 2010). Hence, the employment of bank specific variables by this study would reveal the special specific attributes and contributions of these variables to efficiency and bank financial soundness. This special focus may enhance and arose more researchers and scholars to work on operational efficiency.

Thirdly, the empirical analysis has indicated that little or limited examination was conducted on the influence of bank financial soundness and operational efficiency. For instance, studies by Eriki et al. (2015), Moradi-Motlagh et al. (2011), and Abata (2014), have limited short period of study. For instance, Eriki et al. (2015) used only one (1) year of 2009 for his study. This is considered not adequate considering the nature of panel data involved with the need to perform various econometric tests in such studies. Thus, this study attempted an extension to ten (10) period of study which makes it unique for a developing or emerging economy such as Nigeria.

Furthermore, most literature reviewed, considered bank-specific, industry-specific and macroeconomic variables to examine performance, effectiveness and efficiency (Ebenezer *et al.,* 2017; Moradi-motlagh et al., 2011). This may affect the heterogeneity and the regression analysis of these studies especially in highly developed financial markets of the world. Some of the studies even failed to carry out basic econometric tests to justify the bases of their findings (Staub et al., 2009; Berihun-Engida, 2015). In consistence with prior studies, (Olarewaju, 2016), who employed panel least square regression model to analyze its findings, same was employed by this study to fill the research gaps, with special attention to ensure quality specification check on the balanced panel data collected for this study. By this submission, all the OLS assumptions was fulfilled by this study on the two

regression models applied, one with moderation and the other with no moderation. Summarily, for clearer picture and understanding of the empirical processes undertaken by this study, these research gaps are to be filled.

2.7 Summary

The chapter reviewed relevant theories in line with the study objectives. The theories were then critiqued for relevance to both general and specific objectives of the study. The chapter also explored the conceptualization of the independent and the dependent variable by analyzing the relationships between the two sets of variables. Theoretically, the provision of information to all the stakeholders to reduce agency cost, asset liabilities mismatch to attain optimal investment portfolio is important to achieve overall efficiency goal. Additionally, empirical reviews were conducted for both local and international (global) research studies following the criteria: title, scope, methodology, research findings before the critique with mixed and major confounding evidence. The research gaps were equally identified for adequate investigation by this study. The critique cover how bank size act as a moderator to influence asset quality, capital adequacy, profitability and bank liquidity holding it at the optimal level. Thus, this provide watershed gap that provides the basis for the general and specific objectives of this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the study focused on the procedures on how the research will be carried out. The section covered the research design, target population, sample size and sampling techniques and data collection Instruments. It also provided the rationale for testing the hypotheses of the study as well as the details of the variables of the study. The research techniques employed for data analysis, the study models and the model diagnostic tests form part of this chapter.

3.2 Research Philosophy

This study is largely guided by the positivistic and pragmatism philosophical approach due to the nature of its data sets. This is based on its observable social phenomenon called banking products and services which is regarded as intangible in nature (Ifeacho & Ngalawa, 2014). The principles of positivism and pragmatism entail an observable social reality for study, and observable phenomenon that produces credible data that can be used for generalization (Saunders, Lewis, & Thornhill, 2009). Positivism and interpretivistic philosophy is deductive, highly structured samples with quantitative measurement techniques over a wide range of data (Saunders et al., 2009). The choice of the research paradigm was hinged on the quantitative nature of banking operation, banking efficiency requirements and its relationship on bank-specific attributes employed by this study.

A research philosophy entails the belief and the systematic way in which data should be gathered, analyzed and employed about a phenomenon. It consists of positivistic, interpretivistic and pragmatism philosophical approaches through the formulation of the hypotheses on the existing relevant banking theories (Saksonova, 2011; Fernando et al., 2015). The hypotheses were tested, confirmed or disproved with quantitative statistical methods as required as academic efforts to answer the research objectives and accomplish quality results. The philosophy allowed the research objectives and

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hypotheses to determine the research design, methods, measuring instruments, aimed at ensuring reliability and validity of the outcome from this research study.

3.3 Research Design

The study employed a quantitative research design to ascertain the influence of bank financial soundness on operational efficiency of deposit money banks over ten (10) year period using cross sectional survey (CSS) to study the time series data. According to Saunders et al. (2009), survey strategy is the quantitative data collected to be analyzed through descriptive and inferential statistics. The research design was adopted due to both its quantitative and non-experimental nature that involves data collection of different individual companies (banks) at specified period of time i.e. from January, 2007 to December, 2016. The research design is formal, objective and uses a systematic process to gather its numerical data (Saunders et al., 2009). The cross sectional survey allows researcher to make statistical inferences to broader populations and permit them to generalize their findings to real- life situations, thereby increasing both its maximum objectivity and the external validity of the study (Franfort Nachmias & Nachmias, 2009).

According to Greene (2012), practically studies have been able to use time series cross- section data to examine social issues that could not be studied in either cross-sectional or time series settings alone. Gujarati (2004) also documented, that it is otherwise called panel data which allow for more informative result, more variability, less collinearity and increased efficiency. Panel data can enrich empirical analysis of phenomena than only when cross sectional or time series data is employed (Gujarati, 2004). The independent variables of this study are: asset quality, capital adequacy, bank profitability and bank liquidity with the introduction of bank size moderating while focusing on the operational efficiency as the dependent variable spanning a decade from January, 2007 to December, 2016. It is therefore a balanced panel data because the cross sectional unit has the same number of time series observations (Gujarati, 2004; Ebenezer et al., 2017). According to Kothari (2014), the degree of uncertainty about a research problem determines the research

methodology by identifying which of the variables or factors play major influence in the relationship.

Consequently, bank financial soundness represents the independent variables of this study that operate to influence/ determine efficiency in daily banking operations. Both descriptive statistics, inferential statistics, panel least regression and correlation coefficients methods were also employed by this study to unravel the influence of bank financial soundness on operational efficiency, and the results were subjected to model diagnostic tests to ensure reliability and validity.

3.4 Target Population

The target population for the study consists of 21 deposit money banks operating in Nigeria as at December, 2016 as listed in Appendix 1. The study covered 10 year period from January, 2007 to December, 2016 for the banks thereby making it a balanced panel data (Gujarati, 2004; CBN). This period suits the purpose of the research as it incorporate recent financial reforms and corporate performance efficiency issues, that shook the Nigerian financial system: (post consolidation era from 2007, bail out scheme for banks 2008-2009, implementation of code of corporate performance issues 2011 and economic recession 2016). This is due to the pivotal role played by the banks in financial intermediation since deposit taking makes one of the principal functions that banks are authorized to perform for the economy (CBN, 2005).

3.5 Sample Size and Sampling Techniques

This study employed cross sectional survey to capture 15 operating deposit money banks in Nigeria. Therefore, the sample size for the study makes up 70.1% of the total population of 21 banks, hence purposive sampling technique was used for the study due to data availability. The study ensured that relevant data were captured in the data collection matrix form of the study. The study examined the influence of bank financial soundness on operational efficiency of deposit money banks in Nigeria with the use of only secondary data. The data was collected from the financial statements and annual reports of the banks as well as the CBN and NDIC

statistical bulletins using document analysis as procedure to extract the relevant information from there. The justification for selecting the sample size was because of their market capitalization in the Nigerian financial system and data availability (Abata, 2014). Banks are reputed to be efficient in driving the rapid economic transformation of the country through the financial intermediation process (Ebenezer et al., 2017). The list of deposit money banks is shown in Appendix 1.

3.6 Data and Data Collection Instruments

The data collection was sourced from secondary method which entails all the relevant data pertaining to all the variables. Data collected are: asset quality proxy as impaired or non-performing loans to gross loans; capital adequacy proxy as total equity to total asset; profitability proxy by return on assets (net income to total asset) while bank liquidity attracts data on liquid asset upon total deposit. Bank size proxy for natural logarithm of the total assets was employed as the moderating variable to ascertain the strength or intensity of the relationship between the independent and dependent variables of the study. The dependent variable data proxy as operating efficiency is measured by the ratio of interest and non- interest income plus security gains (loss) against the expenses incurred on those income plus loan loss provision and taxes. Secondary data from the financial statements and annual reports of the banks, the CBN and NDIC statistical bulletins using document analysis as procedure to extract the relevant information is empirically suitable for time series analysis (Lartey et al., 2013).

Its use seems appropriate for this study based on the justification that the data are public documents and more reliable. The data collection matrix on appendix 2 contained both the independent and dependent variables. Matrix method remains an instrument widely used in secondary data collection and provides quick means of extracting pertinent information on a wide range of subjects. This study improved on previous study periods to 10 years from January 2007 – December 2016. The data was restricted to deposit money banks (Commercial banks) since data are publicly available on them and are quoted on the Nigeria Stock Exchange. Data collected for the study (secondary data) were from this reputable source that ensures accuracy and

reliability of information hence they were employed for all the variables of the study in line with few prior studies (Ongore & Kusa, 2013; Obafemi et al., 2013; Olarewaju, 2016).

3.7 Data Processing and Analysis

Data analysis is the application of reasoning to understand the data that has been gathered with the aim of determining consistent patterns and summarizing the relevant details revealed in the investigation (Zikmund et al., 2010). Data collected through the matrix as shown in Appendix 2 were analyzed using both descriptive and inferential statistics with the aid of Stata Statistical package Version 13. All variables already defined in Table 3.1 and the model identified was subjected to hypothesis testing. The descriptive statistics include simple percentage, mean, median, mode and standard deviation. Trend analysis was also employed to study the moving average of the variables over 10 years, which was presented in tables and graphs.

Panel least regression model was employed by this study. Its employment was sequel to its combined feature of both time series and cross sectional units, which provided for more informative data that gives more efficient estimates, reduce variability and collinearity, thereby increasing efficiency of the study's empirical analysis as well as the degree of freedom (Baltagi, 2012; Gujarati, 2004). According to Olarewaju et al. (2015), panel data regression technique has superiority over pure cross section or pure time series. Panel least regression analysis and Pearson's correlation coefficients were performed to measure the statistical significance and the degree of linear relationship between the study variables. According to Hall and Media (2016), this analysis is desirable because researchers often hypothesize that a given outcome of interest is affected or influenced by more than one thing/ factor. Based on the use of secondary method adopted by the study, panel regression analysis was found more suitable on the ground that it enhances both informative and empirical analysis of the data (Gujarati, 2004). It also tends to reduce the likelihood of bias in the parameter estimates. The data was subjected to model diagnostic tests including multicollinearity, heteroscedasticity, stationarity, or unit roots, co integration and

Granger causality, linearity, normality, autocorrelation as well as model effect estimation tests.

3.7.1 Model Specification

The model specification of the study was to examine the bank financial soundness on the operational efficiency of the Nigerian deposit money banks. It is the modified version of Olarewaju et al. (2015) panel data regression models. The study conceptualized operational efficiency as a function of a mix of the identified bank financial soundness, otherwise referred to as bank-specific attributes, within the control of the bank while bank size was employed as the moderating variable. Interestingly, prior studies have employed various modelling methods, including panel least regression model with profound and confounding empirical evidence (Adeusi et al., 2014; Amer et al., 2011; Olarewaju et al., 2015). However, this study adopted the employment of Olarewaju et al. (2015) version, based on the usage of the modified inferential statistical analysis and discussion by the study. The pool panel least regression models are presented in the equations below:

The regression model without a moderating variable is presented as Model I thus:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \quad \text{.....................3.1}$$

$$Y_{it} = \beta_0 + \sum_{J=1}^{4} \beta_j X_{jit} + \Sigma_{p=1}^{s} \gamma_p Z_{pi} + \delta_t + \varepsilon_{it} \quad \text{.........................3.2}$$

$_j$ and p are used to differentiate between different observed and unobserved explanatory variables

Z_p = variables responsible for unobserved heterogeneity (and dependence on y)

$\Rightarrow$ Since they are unobserved, they can be summed as C_i

$$C_i = \sum_{p=1}^{s} Y_p Z_{pi}$$

Therefore, we have:

$$\mathcal{Y}_{it} = \beta_0 + \sum_{j=1}^{4} \beta_j X_j + C_i + \delta_t + \varepsilon_{it}$$

The model with a moderating variable is presented as Model II below:

$$\mathcal{Y}_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 M + \beta_3 (X*M) + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.3.3$$

Substituting M for Z_{it}

Therefore,

$$\mathcal{Y}_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 Z_{it} + \beta_3 (X*Z_{it}) + \varepsilon_{it}$$

Where: β_0 = Intercept of the model

$\beta_1 - \beta_4$ = Parameters to be estimated

$X_{i,t}$ = Variables of Interest (AQ. CA. PR. BL.)

$Z_{i,t}$ = Bank size (moderator) measured by the log of total assets of each bank for bank i in year t

i = refers to the individual banks of the study (15)

t = refers to the time in years (10)

$\varepsilon_{i,t}$ = Error or Stochastic term

Where:

$\mathcal{Y}_{it}$ = Operating Efficiency Ratio

$AQ_{i,t}$ = Asset Quality

$CA_{i,t}$ = Capital Adequacy

$PR_{i,t}$ = Profitability

$BL_{i,t}$ = Bank Liquidity

According to Adjei-Frimpong (2014), studies across the world have documented various methods and approaches to measure bank efficiency majorly concentrating on the developed world. Some of the studies cited by Adjei-Frimpong (2014) are: (Staub et al., 2010 for Brazil; Loukoianova, 2008 for Japan; Delis et al., 2009 for Greek; Pasiouras, 2008 for Greek, Ifeacho et al., 2014 for South Africa; & Ataulla et al., 2006 for India) Hughes and Mester (2012), documented that the two most widely used approaches are the structural approach and non-structural approach. The structural approach requires that the underlying production features of intermediation and production of banks are used in the measurement while and non-structural approach relates to the use of accounting/financial ratios. Olarewaju et al. (2015), posited that the accounting approach using the financial ratio has the following attributes of popularity, simplicity, easy understanding and comparability as measurement parameter over others and good for operational efficiency measurement.

The approach adopted for the dependent variable is justified based on the following: firstly, it is a ratio that complies with the definition of operational efficiency which is output over input of the resources of the bank. This implies that total income with other securities gains (losses) which are generated from loans and advances and other income makes the output for the bank while the input is represented by expenses incurred on deposits, loan loss provision and taxes paid by the bank. Secondly, the ratio may capture the influence of all the independent variables (bank financial soundness) on operational efficiency (dependent variable) as they impact directly on practical banking operations. Lastly, interest income constitute the most important source of revenue for the bank with the loans and advances as products (output), therefore the product's unit price is interest rate charged on loans as part of operational income (output), hence the inclusion of interest income is justified. This inclusion is in consonance with Liao (2009) on the inputs and outputs efficiency ratio for banks.

It can be stated that deposits are viewed as materially important from the production stage before it can be transformed at the intermediation stage for investment in the economy (Shyu et al., 2014). Table 3.1 below demonstrated type of study variables, measurement, data collection method, type and level of analysis. Panel least regression model adopted is increasingly being used in many fields especially in social sciences (Greene, 2012). Using this panel regression model, the regression analysis was validated using the fixed effect and random effect estimation through the Housman test to indicate the degree of relationship and influence among the variables, their pattern of behavior and their performance at 5% significance level.

3.7.2 Measurement and Operationalization of the Study Variables

Sequel to the standard guides from the relevant theories and existing empirical studies on the selection of variables for the estimated models and consistent with Olarewaju et al. (2015) modified version adopted by this study. The study variables were measured primarily with information obtained from the CBN statistical bulletins, financial statement and annual reports of deposit money banks. The variables have been identified with their measurements and analysis as presented below:

Table 3.1: Measurement and Operationalization of Study Variables

S/N	Variable	Measurement	Data type required for the study	Form of data & Source	Analytical tools to be used.
	Dependent Operational Efficiency (OE) **Independent**	Ratio of total income (gross earnings) to total expense, loan loss provision & corporate tax	Continuous time series data collected from the banks & CBN	Panel & Secondary data	Descriptive statistics, Panel regression, correlation coefficients.
1	Asset Quality (AQ)	Ratio of impaired loans (non-performing loans) to gross loans of the banks	Continuous time series data collected from the banks & CBN	Panel & Secondary data	Descriptive Statistics, Panel regression, Correlation Coefficients.
2	Capital Adequacy (CA)	Ratio of total equity to total asset (current & non-current)	Continuous time series data collected from the banks & CBN	Panel & Secondary data.	Descriptive statistics, Panel regression, Correlation coefficients.
3	Profitability (PR)	It is measured as the ratio of net income to total assets (ROA)	Continuous time series data collected from the banks & CBN	Panel & Secondary data	Descriptive Statistics Panel regression, Correlation Coefficients.
4	Bank Liquidity (BL)	Ratio of the banks liquid assets to total deposits	Continuous time series data collected from the banks & CBN	Panel & Secondary data	Descriptive statistics, Panel regression, Correlation Coefficients
5	Bank Size(BS) (Moderating variable)	It is measured by the total assets of the banks	Continuous time series data collected from the banks & CBN	Panel & Secondary data	Descriptive statistics, Panel regression, correlation coefficients.

Note: Total asset = current/earnings and non- current/earnings asset of the banks
Total equity = share capital, retained earnings and other reserves.

Operational Efficiency Measurement (Dependent variable): According to Ncube (2009), there are two broad approaches to measure efficiency: Accounting or financial ratios and the econometric e.g. DEA, SFA et cetera. This study adopted Operating Efficiency (Financial ratio) as a measure for the following reasons and is

in tandem with the studies from (Amer et al., 2011; Olarewaju et al., 2015; Abata, 2014). It is the ratio of interest income plus non- interest income plus securities gains (or losses) over interest expense plus non- interest expense plus provisions for loan losses and taxes. The study adopted it as dependent variable, based on the following: firstly, operational efficiency is defined as the ratio of output over input of the resources of the bank. This implies that total income (interest and non-interest) with securities gains (losses), which are generated as income make the output for the bank while the input is represented by expenses incurred on deposits, loan loss provision and taxes paid by the bank. Secondly, the ratio may capture the influence of all the independent variables which are identified as bank financial soundness on operational efficiency for banks as the variables impact directly on banking services as documented by Abata (2014).

Lastly, interest income constitute the most important source of profits for the bank with their loanable funds as products (output), therefore the product's unit price is the interest rate charged on loans (input), hence the inclusion of interest income is justified. Suffice it to say that, deposits can be viewed as "material" from the production stage to be used in the intermediation stage to generate interest income as a major source of income for the bank (Shyu et al., 2014; Olarewaju, 2016).

 Independent Variables Measurement (Predictors): Four independent variables were identified by this study, which include: Asset Quality, Capital Adequacy, Profitability and Bank Liquidity. They are bank core financial soundness indicators under the control of the bank that can influence operational efficiency and its level of attainment by deposit money banks. Therefore, panel regression models were employed to analyze the data due to its informative ability and efficiency in empirical analysis especially when a moderator is involved. Correlation coefficient was equally be used. The two (2) sets of the study variables as highlighted above are the independent and dependent variables.

Moderating Variable: Bank size was introduced by the study as moderating variable based on its relevance and significance in affecting the strength or intensity of the relationship between bank core financial soundness indicators and banking

efficiency. Empirical research have reported confounding evidence as to the various determinants for measuring operational efficiency both at micro, industry and macro level for different economies of the world (Aremu et al., 2013; Eriki et al., 2015). According to Adebiyi (2016), larger banks performs better due to enhanced diversified investment opportunities, quality control of corporate resources and employment of better technology hence bank size is positively related to quality of the financial reports indicating that the larger the bank, the better the efficiency of its investment opportunities and earnings.

Unarguably, several prior studies have however documented differently both negative, positive or neutral findings and some inconclusive (Ncube, 2009). For this study therefore, bank size as a moderating variable is justified on the ground that the largeness or smallness of a bank will have an interaction effect on its level of efficiency in terms of the utilization of assets, mostly earning assets and control of operating expenses. This was measured by the natural logarithm of total asset of the sampled banks. The bank financial soundness (independent variables) and operating efficiency (dependent variable) and their measurements were employed to determine its moderation.

3.7.3 Model Diagnostic Tests

In the submission of Gujarati and Porter (2010), the popular use of OLS and its assumptions is not only for its easy use but because it possesses strong theoretical construct or abstraction (properties) as summarized in the Gauss-Markov theorem. Therefore, all the assumptions regarding ordinary least squares (OLS) regression analysis under CLRM such as normality distribution of data, serial autocorrelation of the error terms, multicollinearity, heteroscedasticity, stationarity and linearity among others, were considered for testing. This study, therefore preformed the following diagnostic tests for reliability and validity of its findings to ensure valid inferences and after testing the hypotheses in chapter four of this study:

Normality Test: Normality test was run through the statistical software of Stata statistical package version 13 using Jarque - Bera (JB) test, being the most powerful and popularly used. The test is necessary for the data to demonstrate that the

standardized residuals are significantly normally distributed to ensure validity of inference and reliability of the regression estimation (Alejo et al., 2015). For instance, if p- value is less than the chosen alpha level, then the null hypothesis is rejected while if p- value is greater than the chosen alpha level, then we fail to reject indicating that the data came from a normally distributed population (Gujarati & Porter, 2009). This will show whether the data is normally distributed.

Hypothesis- The distribution of error terms is normal.

Multicollinearity Test: Test for multicollonearity was carried out on the data using Variance Inflation Factor (VIF) with the aid of a statistical package regression procedure. The guiding rule is that a VIF that exceeds 4 indicates need for further investigation while a VIF of 1 will imply absence of correlation among the predictors. A VIF of more than 10 (VIF ≥10) indicates a problem of multicollonearity. A tolerance statistic values below 0.1 shows a serious problem while those below 0.2 indicate a potential problem of collinearity (Lind et al. 2011). The predictor (s) were examined to show whether a strong linear relationship exist between a predictor(s). Again, correlation coefficients analysis was employed through Pearson's Correlation Coefficients. Explanatory power of the influence of bank financial soundness on operational efficiency for banks was observed and adjusted coefficient of determination of (R^2) performed appropriately for the study (Lind et al., 2011).

Autocorrelation Test: Autocorrelation otherwise called serial-correlation or cross-correlation determines the similarity between observations as a function of the time lag between the data. According to Gujarati and Porter (2010), serial correlation may be defined as correlation between members of series of observations ordered in time or in space. Autocorrelation test is germane as one of the assumptions of classical linear regression model (CLRM), hence its observation necessary especially in panel data regression analysis (Gujarati & Porter, 2010). These were performed to ensure that the model parameter estimates were efficient since autocorrelation usually occur in cross sectional time series research. This test is usually conducted through Durbin

Watson as employed by this study. A value of d = 2 means there is no autocorrelation. A value substantially below 2 (especially a value less than 1) means that the data is positively correlated i.e. on average a data element is close to the subsequent data element. A value of "d" substantially above 2 means that the data is negatively auto-correlated, i.e. on average the data element is far from the subsequent data element (Gujarati & Porter 2010). This will show that there is no serial autocorrelation for the study

 Hypothesis- The errors are uncorrelated with one another.

.Stationarity Test: Based on the nature of the data of cross sectional and time series, there is the need to test for stationarity. Unit root tests were used to detect non-stationarity for all the variables (Gujarati & Porter, 2009). If variables are non-stationary, the tendency for the estimates to change over time exists. The study employed Levin- Lin- Chu (2002) unit root test. The choice of this test was based on the fact that it is best suitable for most micro and macro time series data with 2 hypotheses as pi identical and negative because pi is fixed across i. It also function well as test statistic when N is between 10 and 250 and when T is between 5 and 250 hence suitable for the study since N=15 and T=10.

Co-integration test and Granger Causality tests: These tests were also conducted to determine the long run relationship among the variables using Engle-Granger Test. According to Engle-Granger (1987), an individual economic variable in a time series exhibits the probability of wandering extensively in panel data. There is the like hood of some series not drifting apart. As a result, the economic theory proposes the objective of forces that binds such series together. Consequent upon this, testing for market integration and Granger causality model was formed. According to Adeoti et al. (2013) submitted that the application of co integration model has led to the reduction of multicollinearity issues in estimation and specification effects. This test indicates whether the data are stationary.

Hypothesis – panel data are stationary

Heteroscedasticity Test: Test for heteroscedasticity was performed to discuss the relationship between the mean and average and detect whether the random variables have different variances or not or there was unequal spread or variance. It is usually performed to confirm that the variance of the error term is constant, hence homoscedasticity would be proved. It is one of the properties of classical linear regression model to show that the estimators are efficient (Gujarati, 2004). Breusch Pagan Godfrey (BPG) was employed by the study which is simple to interpret for social sciences study. According to Gujarati et al. (2010), heteroscedasticity is usually common in cross sectional data and not in time series. This study employed both cross sectional and time series as properties of the panel data employed to unravel the influence of bank financial soundness on operational efficiency. This in consistency with prior studie: (Liao, 2009; Berihun-Engida, 2015; Akhter et al., 2017).

Decision rule: If the computed t value exceeds the critical t value, we may accept the hypothesis of heteroscedasticity, otherwise we may reject it (Greene, 2012).

Linearity Test: It is a test to detect whether the dependent variable has a linear function of the predictor variables. The relationship between the independent variables and the dependent variable should be linear in nature; however in social science research, a non- linear relationship usually occur, so it's necessary to test for linearity. Based on the need to detect sample size biasness as part of the unbiasedness properties of least squares estimators, linearity test was performed through the normal Q-Q plot or P-P plot for data verification. This was to ensure a test of statistical significance from large samples of normally distributed population and that there is a linear functionality (Gujarati & Porter, 2010).

Model Effect Estimation Test: According to the classical linear regression model assumption which says that the OLS must be best linear unbiased estimators (BLUE) i.e. linear, unbiased and efficient, hence the estimation of the model effect was performed for the study. Panel data models that examine cross sectional units and time series effects may be fixed and / or random when the Housman test is performed on the panel data. The test was meant to establish which estimation effects between

fixed effect and random effect models (FEM and REM) provide superior results for the specified panel regression model of the study. According to Kariuki et al. (2016) who stated that Housman test is employed basically to test whether the unique errors (Ui) are correlated with the regressors and the null hypothesis or that they are not. The test's null hypothesis is that the preferred model is random effects versus the alternative fixed effects. This indicates whether fixed effect or random effect is suitable for the model.

Hypothesis: The specified model is either random effect or fixed effect in the panel data estimation.

3.7.4 Descriptive Statistics

Descriptive statistical analysis was employed for the study. It was employed to describe the basic features or predict the nature of the data collected and provides simple summaries of the sample; this statement is consistent with submission from (Mugenda et al., 2010). According to Kothari (2004), descriptive research includes surveys and fact finding enquires of different kinds that describe the state of affairs as it exists at present. Descriptive statistics as adopted by this study can be measured with graphic illustrations: tables, graphs, charts, trend analysis, percentages, frequency distribution, mean and standard deviations as well as coefficients of variation that tends to capture the basis of further quantitative analysis for a study.

3.7.5 Test of Hypotheses

The hypotheses formulated from the specific objectives of the study were subjected to testing. According to Lind et al. (2011), the sampling distribution with x from a normal distribution with r known will have 95% of the sample means to be 1.96 standard deviations of the population mean (μ) using 5% level of significance. The hypotheses formulated were tested with t test statistic within the 95% confidence interval at 5% significance level, as related to coefficients of correlation (Gujarati, 2004). Coefficients of variation for the population were equally determined to compare the degree of dispersion relative to mean of the distribution. The overall model was tested for the goodness of fit of the balanced panel data. R^2 employed as

coefficients of determination and for the degree of variation between the independent variables and dependent variable of the study clearly indicated that the balanced panel data was fit for the overall model.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of data, interpretation of results and discussion of findings based on the objectives and the research hypotheses of the study as presented in chapter one. Specifically, this study examined the influence of bank financial soundness (BFS) on the operational efficiency of deposit money banks in Nigeria. This study focused on asset quality, capital adequacy, profitability, bank liquidity as predictor variables. In other to know the strength or the intensity of a moderating variable in studies such as this, the study therefore, introduced bank size as a moderator so as gauge its influence or effect on the overall model of the study. Thus, this study is based on two research models, that is, first model was without bank size as a moderator while the second model tested the influence of bank size as a moderator.

Specifically, the study investigated the influence of bank financial soundness (BFS) on the operational efficiency of deposit money banks in Nigeria as presented in the conceptual framework in chapter one. The conceptual framework showed the relationship between the predictor variables and the dependent variable: asset quality, capital adequacy, profitability and bank liquidity as the predictors and operational efficiency as dependent variable with the introduction of bank size moderating for one model out of the two models. According to Lartey (2013), accounting data is reputed to be secondary data that is reliable and suitable for cross sectional and time series studies all over the world, hence its acceptability for this study.

Njoroge (2016) submitted that accounting data is publicly acceptable as a standardized method for collecting public information subject however, to its limitation of the currency of a dynamically propelled situation. The data collected shown in the data collection matrix were processed, analyzed, interpreted and presented in tables and figures with the employment of Stata statistical package version 13. The statistical analysis include model diagnostic tests, descriptive

statistics, correlation coefficients and the panel least regression analysis for the study. This was adopted because the study made use of balanced panel data.

Against this backdrop, this chapter comprise of 10 subsections. Section 4.1 introduced the chapter while sections 4.2 and 4.3 discussed descriptive statistics involving trends and graphical analysis with its statistical findings by this study. Section 4.4 discussed model diagnostic tests results and discussion while section 4.5 was devoted to the inferential statistical analysis. Sections 4.6 have discussion on Pearson's correlation test. Additionally, section 4.7 was specifically devoted to Regression analysis while section 4.8 discussed test of hypothesis (i) to (v) with inferential statistics of this study. Lastly, section 4.9 discussed the comparative analysis of the two research models of the study. The study presents both the descriptive statistics and the inferential analysis in the chronological order as follows.

4.2 Descriptive statistics of the sampled banks trend analysis

This study as stated in chapter three, adopted the sample criteria of purposive sampling comprising of 15 deposit money banks out of the target population of 21 to make 70% of the population. The sample size adopted is in line with the submission of Saunders et al. (2009), stating that, a sample that is greater than or equal to 50% is considered appropriate, more so where the population is highly skewed or possesses outliers. Additionally, prior empirical studies have documented the use of different sample size in various studies. For instance, prior studies employed the use of low sample size: (Ifeacho & Ngalawa, 2014; Gizaw et al., 2015) while relatively higher sample were employed in the studies of Shyu et al. (2014) and Dawood (2014).

4.2.1 Trend analysis of the operational efficiency ratio for the period covered by the study (2007-2016)

In order to fully understand the direction of the operational efficiency ratio of the banks for the period of this study, trend analysis is presented to demonstrate the level of movement of this important measurement. Hence, Figure 4.1 depicts the overall mean efficiency trend analysis for deposit money banks sampled by this study. The

trends indicate the level of operational efficiency in terms of resource allocation, cost/revenue management and general optimization of resources in banking operations.
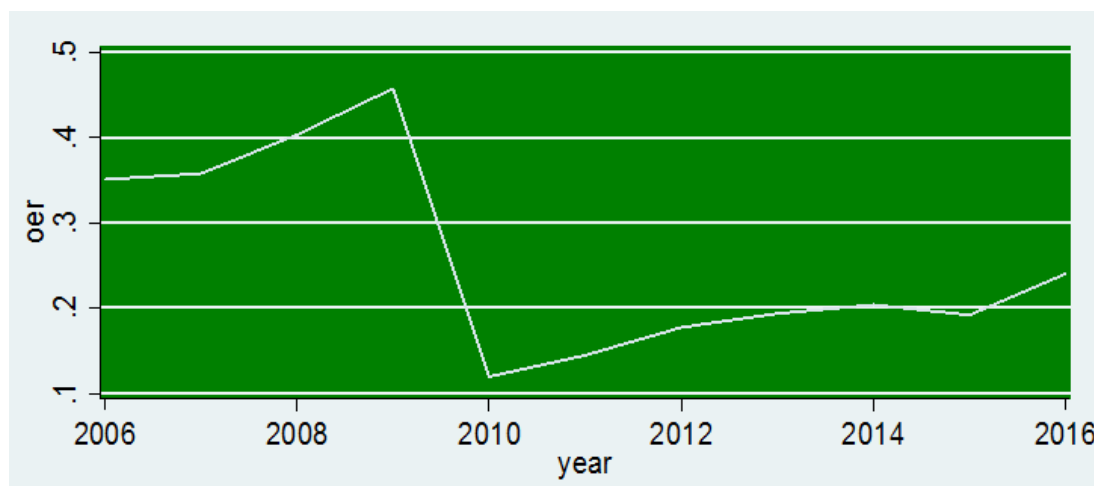
Figure 4.1: Graphical charts showing the trends of operational efficiency of the sampled banks

The graph showed that there was a rise in the efficiency level for banks of between 35% to 45% in the year 2007 to 2009, indicating that banks were able to control operating cost in banking operations marginally especially interest on deposit and personnel (Olarewaju et al., 2015). The trend indicate that operational efficiency (oe) was at its peak of 45% in 2009 due to the liberalized policies of the CBN as shown in the graph for all the 15 banks (Lamido, 2009). After 2010, the operational efficiency ratio nosedived till 2015. This result indicates that the sampled banks would have been able to reduce their input by about 55% efficiency without affecting level of output for the period. From 2009 however, the efficiency level for the banks nosedived from 45% to 12% in 2010. This can be accounted for as a result of the CBN's tight and stringent policies such as mandatory implementation of code of

corporate governance for all banks, the issue of bail-out scheme for banks that have delinquent loans or toxic asset.

The ratio also witnessed failure of strict compliance to prudential guidelines and classification of credit/loan portfolio of banks (Standard, Sub-standard, Doubtful and Loss) as well as tight monetary policy rates (MPR) operated within these periods (Lamido, 2009). Furthermore, the trend suggests poor asset and liability management structure of the banks. This was due to the fact that majority of the banks have high non-performing loans in their portfolio which eventually turned to toxic asset sold to the asset management company of Nigeria (AMCON) (Lamido, 2009). Against this finding, Zawadi (2013), indicated that the overall mean efficiency of 4 banks in Tanzania was 90.4% as against previous ratio of 57.1% for 3 banks. This suggests that the banks could have reduced their inputs by 9.6% efficiency without affecting level of output. However, reverse is the case in Nigeria as revealed by this finding. All these could be reasons attributable to the sharp drop in the efficiency level of banks witnessed during the period. In fact, some banks were taken over by CBN who eventually appointed technical management for the ailing banks with a bail-out fund of 621billion naira for those found with poor corporate governance issues (Lamido, 2009; Umar, 2015).

Again, it was noticeably discovered by the CBN and other regulatory agencies (NDIC) that the boards' composition and compensation packages of the banks were exorbitant and skewed in favor of the directors especially the non-executive directors. They enjoy long tenure and high salary package thereby increasing the personnel cost and the total overhead cost for the banks. Empirically, evidence had established overhead cost to be high for the Nigerian banking industry (Olarewaju & Obalade, 2015). The CBN therefore mandated that a non-renewable tenure of 10 years should be implemented through the instrument of code of corporate governance. The code was eventually and strictly implemented by the CBN beginning from 2010.

Based on the foregoing, the trend recorded a little rise from 2011 to 2015 (18%-20%), but an improved and higher rise in efficiency level was again noticed in 2016

with a margin of 5% increase, thus indicating that the banks braced up to their statutory functions more effectively and efficiently. It could be suggested that the socio-political climate of 2015 when the general elections were held and the general economic conditions of the country equally accounted for the inefficiency of the banking sub sector in Nigeria (CBN, 2009). The trend from the graph showed a sign of improvement in 2016 with an indication that there may be rise in the economic conditions of the country moving from 20% to 25% in operational efficiency ratio. Umoren et al. (2016) documented in his study that, there is the need to control the increasing trends of non-performing loans as a component of asset quality by banks.

4.3 Descriptive Statistical Result and Findings

As stated in Chapter three of this study, data were extracted from audited annual financial statements of the banks as well as from the CBN and NDIC statistical bulletins. Data collection matrix highlighted in Appendix 2 was equally adhered to as a guide in making this research effort successful. The sample size comprise of the 15 deposit money banks in Nigeria as at 31st December, 2016 was the main focus of this study, thereby excluding other financial institutions like Development bank, Mortgage banks, Microfinance banks, Insurance and pension fund among others. Similar prior studies (Abata, 2014; Olarewaju, 2016; Mohd-zaini, 2010) focused their studies on the entire financial system to arrive at the results. The justification for the sample size is that deposit money banks are regarded as the most active player in the financial intermediation process of any financial system all over the world (Akhtar et al., 2010).

Summarily, the descriptive statistics analysis of the data series provides information about sample statistics such as mean, median, maximum value, minimum value and the distribution of the sample captured by Skewness and Kurtosis. The use of trend analysis using graphical presentation was also employed by this study. Table 4.1 below shows the descriptive statistics of the variables used in the analysis for the study period of 2007 to 2016.

4.3.1 Descriptive Statistics for Dependent variable Operational Efficiency (OE)

The descriptive statistics of the data series provided information about the sample statistics: mean, median, maximum value, minimum value and the distribution of the sample captured by Skewness and Kurtosis. The Skewness and Kurtosis tests for normality returned a statistical significance of p-value = 0.000<0.05 jointly for all the variables. This suggests that the predictor variables jointly and significantly explained their explanatory powers on the response variable and are properly skewed. The mean value of 0.2486 indicates that the average efficiency for banks was about 25% which may be due to the tight economic condition for the period. The standard deviation of 0.1101 even confirmed the inefficiency suggesting that it cut across the entire banking industry. This is consistent with studies from Staub et al. (2009) and Thao et al. (2015).

The coefficients of variation of 0.442 showed that there is relative degree of dispersion to mean in terms of efficiency level of the banks and that they have moderate degree of variability. This suggests that the efficiency level of all the sampled banks is fair but needs improvement across the banking industry. The mean value of 0.25 further confirm that the proportion of total interest income and other income to total interest expense, loan loss provision and corporate tax of the banks within the study period is about 25%. It implies that for every N100 income generated by the banks, N25 is expended as expense for generating the income. This is considered high and should be put under control to increase efficiency in the Nigerian banking industry (Umoren et al., 2016).

Table 4.1: Descriptive Statistics and Analysis

Variable	Obs	Mean	Std. Dev.	Min.	Max.	CoV
Oe	150	.2486695	.1101137	.1199643	.4574035	.4428114
aq	150	.5437782	.8131537	.176361	2.96831	1.495377
ca	150	.0003653	.000046	.0003147	.000603	0.125923
pr	150	.0049125	.001444	.001922	.0080279	0.293944
bl	150	23.82734	21.84643	5.3118	68.8604	0.916863
bs	150	27.68338	.5207515	26.52069	28.9218	.0188109

Note: CoV means coefficients of variation while Obs means no of observations

The section again investigated the dependent variable as the ratio of total income of the banks to total expenses incurred including provision for loan loss and the corporate tax paid (dependent variable) by the sampled banks within the period under review. It revealed the extent or level of the efficiency of the banks using these parameter metrics against the predictor variables of the study. The analysis of the dependent variable of the study (Operational Efficiency, OE) indicated a minimum value of 0.11996 with a maximum value of 0.45740 Efficiency in the financial service industry is equivalent to efficient economic development of a country where the banking subsector serves as the pivot of the financial industry and as driver or manager of such economy (Umoren & Enang, 2015).

4.3.2 Descriptive Statistics for Asset Quality

The analysis of the asset quality (AQ) of the sampled banks shows a minimum value of 0.17636 and maximum value of 2.96831 with mean value of 0.54377 and standard deviation of 0.81315. The result suggests that banks have wider dispersion and spread of non-performing asset across their customers within the industry. For instance, the mean value suggest that the banks could maintain the credit risk of their

asset portfolio a little above 50% which automatically affects the quality of the assets. According to studies documented by (Kolapo et al. 2012; Umar, 2015; Lamido, 2009), high non-performing loans as a component of asset quality can negatively affect bank financial soundness and efficiency. Muraina (2018) concurred that credit risk influenced significantly banks profitability and improve financial health and soundness of banks.

The implication of the standard deviation of 81% suggests that all the banks are involved in this practice. The result again suggests that for every N1 worth of gross loans of the banks, there is 17K worth of non-performing loan. In effect, this suggest the fact that the quality of the asset of the banks seems not adequate and affect the profitability of the banks since higher asset quality means higher intermediation efficiency (Kariuki et al., 2016). The coefficients of variation of 1.495 showed that there is relative degree of dispersion to mean in the distribution of bank assets among sampled banks. This suggests that asset quality of the banks is not adequate as confirmed by its mean value of 0.54. This however, can affect profitability where optimal efficiency is not guaranteed.

In practice, where the proportion of non-performing loans are high in the income generated, this tells on the credit-risk exposure aspect of the bank (Opoku, 2016). This can make the bank to be more vulnerable to toxic asset accumulation if unchecked or undetected early enough. Consequently, it may be suggested that this scenario can affect operational efficiency of the banks sampled by this study and by extension the entire banking industry.

4.3.3 Descriptive Statistics for Capital Adequacy

The descriptive analysis of capital adequacy (CA) of the banks within the study period shows a minimum value of 0.00031 and maximum value of 0.00060 with standard deviation of 0.00004 and mean value of 0.00036. The mean value shows that the capital funding of the banks remain inadequate especially when equity fund is considered. This may also mean high leverage for the sampled banks if at all the regulatory capital is to be maintained by them. It also suggests that their present capital cannot sustain their operational capability in terms of proper financial

intermediation within the economy. Ejoh et al. (2014), had documented that assessing capital adequacy ensures the general safety and soundness of the system. However from the study, it could be suggested that, this scenario is only applicable to certain banks as revealed by the standard deviation and confirmed by the coefficient of variation (0.126).

This result suggests that little or low level of equity capital was maintained by the banks as compared to total assets of the banks. Again, it suggests that virtually all the banks were affected by this undesirable development present in the banking system as revealed by the standard deviation of 0.0004 and confirmed by the coefficients of variation. This situation cut across the banks under review. The general implication of this, is that the safety and soundness of the deposits of the customers may be negatively affected if there is serious banking problem in the economy e.g. panic withdrawal by the customers (Muraina, 2018). Ejoh et al. (2014), summarized it that, the higher the capital ratio, the more profitable a bank will be, hence higher capital adequacy is desirable. According to Ezike and Oke (2013), capital adequacy for banks pose a major concern for bank regulators worldwide, hence its continuous regulation. By extension therefore, the operating level of efficiency of the banks may be on the line.

4.3.4 Descriptive Statistics for Profitability

The descriptive statistics for profitability (PR) as a predicting variable for the sampled banks has a minimum value of 0.00192 and maximum value of 0.00802 with a mean value of 0.00491 and standard deviation of 0.00144. This statistics depict that there is a wide degree of variability in the profitability level of the banks and the finding is consistent with (Lipunga, 2014; Berihun-Engida, 2015; Muraina, 2018). It also suggests that, the amount declared as profit may not be adequate to the level of the resources committed, especially in terms of the total asset of the banks. This result was also confirmed by the coefficients of variation (0.2939), suggesting that the banks' corporate resources were inefficiently managed. Adeusi et al. (2014), documented that, financial gains accrues in relation to the level of operational activity and the reasonable risk taken by banks. It is possible that lack of adequate

control of expenses such as remuneration for staff (personnel cost) or total overheads (high) may have been responsible.

The mean and standard deviation suggests that adequate returns are not being generated and it spreads throughout the sampled banks. This situation has been corroborated by Olarewaju (2016). This showed an indication that about 1% of the net income is generated by total asset of the banks and this does not justify the new capital requirement of N25 billion introduced by CBN in 2005 (Soludo, 2004). Further revelation from the descriptive statistics show that the data was normally distributed; hence there is an average distribution of profitability amongst all the sampled banks. This suggests that higher operating expenses were incurred by the banks, thus resulting in inefficiency in their day to day operations (Olarewaju et al., 2015).

4.3.5 Descriptive Statistics for Bank Liquidity

In the same vein, bank liquidity (BL) within the study period hover from minimum value of 5.3118 and 68.86 maximum value with the standard deviation of 21.85. The mean value shows 23.82 that the liquidity position of the banks is fair especially in line with the CBN requirements. The coefficient of variation of 0.9168 suggests further that the banks were holding idle cash which could have been invested. The degree of dispersion for liquidity was high within the industry. However, a caution should be taken by the banks that high liquidity holding impacts negatively on the profitability, which further confirms why they have low profitability. In the contrary, Lartey et al. (2013) stated that the relationship between liquidity and profitability is weak for the Ghanaian banking system. Ebenezer et al. (2017) documented that, capital adequacy and liquidity have positive significant effect on bank profitability. This result suggests that the banks maintained reasonable statutory liquidity level for the period of study. In reality and in relation to the sampled banks, this suggests that for every N1 worth of total deposits of the banks, N5 worth of liquid assets was provided for by the banks.

The liquidity position of the banks may have been influenced by the policies of the CBN such as the economic stabilization, stable oil revenue and exchange rate system

as witnessed in the economy. Affirming the importance of liquidity, Mohamed (2015), found that liquidity has significant impact on performance and efficiency statistically while Ibrahim et al. (2017), documented otherwise liquid assets have a negative effect on profitability of banks. Banks are expected to be liquid enough to meet up with their statutory responsibilities and customers' demand. The statutory liquidity level of banks is usually 30% (CBN, 2010). The result further shows that, there was improved average efficiency level and improved spread or variability of liquidity across the banking sector.

4.3.6 Descriptive Statistics for Bank Size as the moderating variable of the study

This section investigated and analyzed Bank Size (BS) as a moderating variable which showed minimum value of 26.52 and a maximum value of 28.92 with a mean value of 27.68 and standard deviation of 0.52. This implies that the size of the banks measured by the natural logarithm of the total asset have good spread amongst the banks and it could be suggested that the banks are faring well as regards asset accumulation and maintenance (52%). This procedure is not in isolation with Alejo et al. (2015) that lack of Gaussianity sometimes harms the reliability of sample estimation and testing procedures, hence transformation to the use of natural logarithms are acceptable. The values for bank size through this procedure are within the acceptable threshold of normality (Gujarati, 2004). It may be deduced that, large sized banks with more quality assets are more effective and efficient than small sized banks (little assets) as it was documented by Moradi-Motlagh et al. (2011). It further reinforces the belief that the sampled banks with a mean value of 27.68 are operating with average dispersion in total asset in the banking system; hence this suggests moderate efficiency and stability especially as regards total asset coverage for the period 2007-2016.

In a nutshell, the results reveal that for every #100 generated by the banks, #26 of it represent total asset acquired by them during the period. The banks should however, be cautious in the type of assets accumulated. The result from the coefficient of variation suggests that assets are clustered and concentrated in few large banks within the industry. Sheaba-Rani et al. (2017) documented that asset quality ratio

negatively related with return on asset implying that an increase in asset quality ratio will reduce return on asset. For instance, if fixed asset such as building offices, obsolete computer wares are high proportionately to liquid asset holding such as treasury bills, cash and other short convertible instruments, there may be the possibility of asset liability mismatch in operation. It may again suggest that many branches where deposits (bank size) are derived are operating below efficiency rating especially rural branches with high personnel costs being incurred on them. This finding is consistent with Haan et al. (2011) submission that, larger banks located in concentrated markets have higher volatility during financial crisis in the US.

4.4 Model Diagnostic Tests Results and Discussion

The panel data collected for the study has both features of cross sectional and time series characteristics. The attributes of panel data hereby poses several estimation and inference problems that usually affect cross-sectional and time series data. There are various estimation techniques that are applicable in panel data: Pooled OLS, Fixed Effect Model (FEM), and Random Effect Model (REM). To know the best estimation test to adopt for this type of study, diagnostic tests are used to identify the best model, hence Housman test was applied on the study's panel datasets to ensure best estimation technique and ensure the validity and reliability of the data. These include unit root test, multicollinearity test, autocorrelation test, heteroscedasticity test, normality test and test of stationarity. The results and the interpretations are as follows:

4.4.1 Normality Test

The test for normality of the model was performed through Jarque-Bera (JB) Test. The test of normality is necessary to ascertain whether or not the standardized residuals are significantly normally distributed. In the JB Test, the chi square value is checked with its corresponding probability value. If the p-value is less than the chosen alpha level, then the null hypothesis is rejected while if the p-value is greater than the alpha level of 0.05 significance level (95% confidence level), then we fail to reject the null hypothesis. The normality result indicated that the sample is from a

normal distribution for the dependent variable with p-value of 0.2 ($p > \alpha = 0.05$). The hypothesis for J-B test for this study is:

Ho: Data are normally distributed

H_1: Data not from normal distribution

Thus, the null hypothesis of the normality assumption cannot be rejected meaning that the sample distribution is not significantly different from the population and that the sample represents normal distribution. The skewness and kurtosis tests thus confirm that the data came from normally distributed population. Again, the sample size biasness was tested through the normal Q-Q Plot for additional data verification to test for its statistical significance from relatively large samples of normal distribution. Q-Q which was performed indicated same results of normality as shown in Figure 4.3 below:
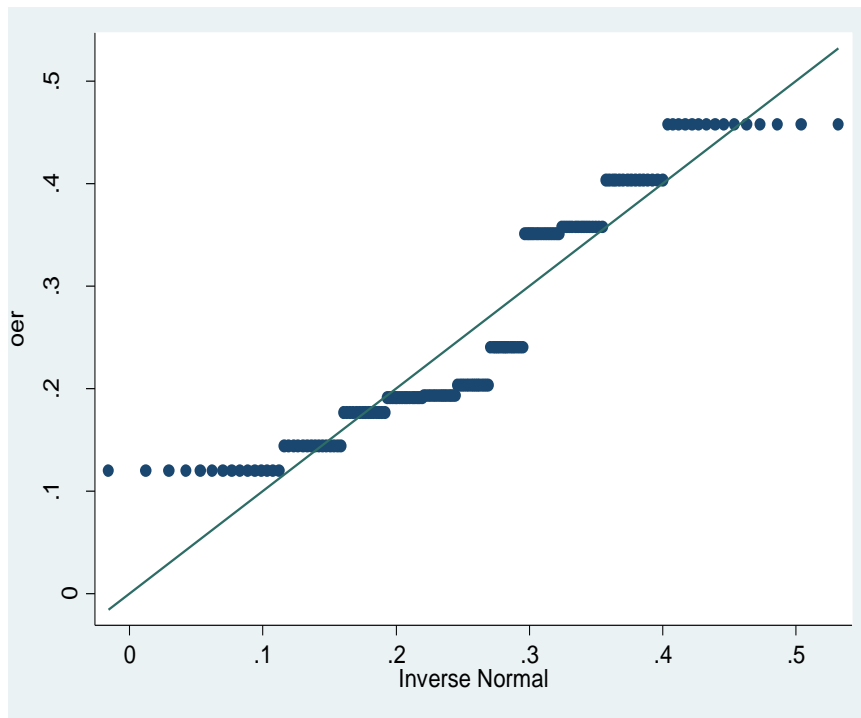
Figure 4.3: Normal Q-Q plot of OE

The result from the Q-Q plot therefore means that majority of the data were closer to the normality line. It is evident that the banks' operational efficiency ratio was normally distributed as there were no outliers. This type of data was therefore suitable for all types of statistical analysis in testing for outliers or not (Saunders et al., 2009). Therefore, the null hypothesis here is that the model is normally distributed, while the alternative hypothesis is that the model is not normally distributed. The study failed to reject the null hypothesis since the probability value was less than 5%. From the Figure 4.3 above, since the probability value of 0.2 is greater than 0.05, at the 5% significance level, the study failed to reject the null hypothesis and conclude that the model is normally distributed.

4.4.2 Panel Unit Root Test Result

In order to examine whether there is stability or non-stability in the overall period model, the study conducted the unit root test through Levin-Lin-Chu test method. To

guide against model specification biasness, Breusch- Pagan Gofrey (BPG) was employed to test or to choose for no fixed or random effect. Data was pooled together for the OLS to be best linear unbiased estimates (BLUE) so as to fulfill part of the specification test requirements. Under the fixed effect model, Ho is rejected and Ho not rejected for either effect but it is rejected under the fixed effect model while it is not rejected for random effect. However, on the contrary, under random effect model, Ho is not rejected for no fixed model but it rejected for random effect. Therefore, if the Ho is rejected as in this case, fixed effect model is used for the study and vice versa. The study employed Stata statistical package (Version 13) to carry out unit root tests using Augmented Dickey – Fuller (1979) in order to determine possible stationarity and auto correlation problems. The ADF Regressions test was performed using the Levin-Lin-Chu unit root test method.

Table 4.2: Panel Unit Root Test Results Output

Ho: Panels contain unit roots

Ha: Panels are stationary

Method: ADF Regressions: 1 lag.

LeR Variance: Bartlett Kernel, 7.00 lags average (chosen by LLC)

Variable	Statistic	Prob.
Asset Quality	97.0599	1.0000
Capital Adequacy	-4.1049	0.0000
Profitability	12.9485	1.0000
Bank liquidity	-3.7864	0.0001
Bank size	0.6180	0.7317

The result in Table 4.2 was performed on the individual intercept based on the test equation option. The results indicate different p-values < 0.05 level of significance at 95% level of confidence in the overall period model. This suggests that the null

hypothesis that panels contain unit roots should be rejected. Hence, the acceptance that panel data are stationary (i.e. variances and covariance do not vary systematically overtime) as there are no unit root in the panel data. According to Gujarati (2004), variances and covariance do not vary systematically over time and the tendency for the estimates to change over time does not exist where data are stationary. The overall result suggests that the resultant regression is fit and not spurious. All the variables were stationary at all levels for random effects since probability values are greater than 0.05 hence the study employed random effect method. Further tests were extended for the first difference. The result shows that all the variables are stationary; hence they are 1(1) stochastic process.

4.4.3 Co integration and Granger Causality Tests and discussion

Having established that the panel data is stationary and that no unit root exists as the variance and covariance of order one, there is the need to conduct co integration test as well as granger causality test. This is necessary to investigate the long-run relationship among the co integrating variables. The null hypothesis follows no co integration equations or simply no existence of co integration among the individual units of the study. Augmented Dickey-Fuller Test Equation was performed with the assumption of no deterministic trend. The test estimation of co integration models lead to the model output showing coefficients, standard error, t-statistic and p-values.

Table 4.3.1 Co integration Tests Results Output

Augmented Dickey-Fuller Test Equation

	T-Statistic	Critical value	P-value
ADF	-6.781609	0.05	0.0000
Residual variance	0.05593		
HAC variance	0.002017		

Table 4.3.2 Augmented Dickey-Fuller Test Equation Results Output

Variable	Coefficients	Std. Error	t-statistic	p-value
RESID (-1)	-1.124204	0.095165	-11.81323	0.000
D (RESID (-1)	0.206645	0.061436	3.363593	0.001
R-squared	0.590526	Mean dep var	-0.012169	
Adj R squared	0.587056	S.D. dep var	0.073632	
S.E (Regression)	0.047317	Akaike I. Criterion	-3.247383	
Sum sq. resid.	0.264186	Schwarz crit.	**-3.200924**	
Log. likehood	196.8430	Hannan-Quian	-3.228516	
D-W statistic	2.755205			

Note: Statistical significance level = 0.05

The result output from ADF Test equation as shown in Tables 4.3.1 and 4.3.2 indicate that since the probability value is less that the critical value of 0.05, then it suggests that the null hypothesis of no co integration is rejected (p-value=0.000<0.05). This result suggests that there is adequate evidence of co integrating variables within the overall model period. The coefficient of determination was further confirmed by the adjusted R^2 of 0.58 while the standard deviation of 0.095 confirmed the degree of variability within the model. The model Durbin Watson still falls within the threshold of 3 of the model overall period. This result is consistent with the submissions of Olila et al. (2016) stating that price variables are granger causal and exhibits co integration as well as Bidirici et al. (2015) stating that there is evidence of bidirectional causality between variables employed by the study.

Based on the outcome of the co integration test conducted, the next step is to determine the causality and existence of causal relationship for the study. From Table 4.3.2, the result suggests that the variables granger cause each other based on the negative coefficient that's acceptable in stationary order (1) of the model (Olila et al., 2016). This is important because of the like hood of causality contributing to predictability of running from one bank to another by customers. When it happens, it

suggests that the assumption of non-correction in the residuals holds with the resultant effect of no Granger causality, hence the population experiences non-normality distribution. In such instance, the model output results may be spurious, hence valid inferences may be difficult to draw from such result. According to co integration methods, if there exist at least a long-run relationship between variables in all groups, a causality relationship must at least in one direction (Gujarati, 2004).

According to Olila et al. (2016), co integration test are important since it help to identify the number of co integrating vectors in the system. The pairwise granger causality test result as shown in Appendix III suggest that there is evidence of long run granger causality in all the variables identified by this study. This is possible because banks sell homogenous product known as banking service and at the same time within the same financial market or industry. Furthermore, the low level of the financial market and the attendant agency problem may be responsible for the granger causality results output. This result is arrived at after necessary adjustment for the lags has been made in the observations of the time series data.

4.4.4 Autocorrelation Test

As presented in chapter three and Table 4.3, Durbin-Watson was used to test for autocorrelation of the study. A value of "d"= 2 means there is no autocorrelation. Therefore, a value substantially below 2 (and especially a value less than 1) means that the data is positively correlated i.e. on average; a data element is close to the subsequent data element. A value of "d" substantially above 2 means that the data is negatively auto correlated i.e. on average, the data element is far from the subsequent data element. From the finding therefore, the Durbin-Watson result gives a value of 2.05 which is greater than 1.

 According to Kothari and Garg (2014), autocorrelation occurs when the residuals are not independent from each other. According to Gujarati and Porter (2010) also stated that, a value that is substantially above 2 means that the data is negatively auto-correlated i.e. on average the data element is far from the subsequent data element, and a value substantially below 2 means that the data is positively correlated, i.e. on average, it means a data element is close to the subsequent data element. In other

words, when the value of y(x+1) is not independent from the value of y(x). Therefore, the null hypothesis that there was no serial autocorrelation in the data collected for this study was tested with the use of Durbin-Watson Statistics. Thus, the result suggests that there is no serious problem of autocorrelation in the data. This suggests that the regression error terms are random or stochastic indicating that two data elements are uncorrelated. This also could be interpreted that there is no specification bias or error that could have led to assume inefficient regression estimation and standard error. Specification biasness could result in minimum variance leading to non-reliability of R^2, t, and F statistic Tests. Similarly, the result is in consonance with the rule of thumb stating that values of $1.5 < d < 2.5$ show that there is no auto-correlation in the data (Barley, 2009). These results suggest that the intercepts of each cross-sectional unit are not correlated with the regressors for the overall period model.

4.4.5 Multicollinearity Test

Multicollinearity test was conducted using Variance Inflation Factor through the employment of the Stata statistical package, version 13. A VIF of more than 10 (VIF $\geq$ 10) indicates a problem of multicollinearity. Also, a tolerance statistical value below 0.1 shows a potential problem of collinearity. The predictor variable(s) is (are) examined to show whether a strong linear relationship exist between a predictor(s) while Pearson's correlation coefficient was used for coefficient analysis.

Table 4.4 Multicollinearity Test Result Output

Variable	Tolerance	VIF
AQ	0.470713	122.
CA	0.826240	1.21
PR	0.327228	3.06
BL	0.555328	1.80
Mean VIF	2.05	

Based on the result presented in the Table 4.4 for multicollinearity test carried out on the data, no value of the VIF is greater than 3 except profitability; they all fall within

the threshold adopted by this study implying that no problem of multicollinearity exists among the data used. This implies that each predictor variable can make its individual meaningful contribution within the overall model fitness of the study.

4.4.6 Heteroscedasticity Test

This is a systematic change in the spread of the residuals over the range of measured value. It is a test of determining whether there exists unequal spread or variance among the residuals of the population of study (Gujarati, 2004). Where it exits, it poses a problem because OLS regression assumes that all residuals are drawn from population that has a constant variance.

H_O: The data is homoscedastic in variance

H_i: The data is heteroscedastic in variance

Table 4.5 Heteroscedasticity Test Result output

Ho: Constant variance (Homoscedastic)
Variables: fitted values of oe
Chi Square (1) = 14.41
Prob > Chi Square (2) = 0.0001

To test for the presence of homoscedasticity in the model, the study employed the BPG/C-W Test. The test is usually performed to test for the residual requirement of data used in the model. The null hypothesis here is that the model is homoscedastic, while the alternative hypothesis here is that the model is heteroskedastic. The study rejected the null hypothesis if the probability value is less than 0.05. From Table 4.5, since the probability value of 14.41 is greater than 0.05, at the 5% significance level, the study accepted the null hypothesis of homoscedasticity and rejected the alternative hypothesis of presence of heteroscedasticity.

This indicate that the error term was constant in variance thus necessitating the acceptance of null hypothesis that the data is homoscedastic and can be relied upon for regression analysis having satisfied all the assumptions of classical linear regression model. Hence, the model is homoscedastic meaning that the model is desirable. A test for homoscedasticity is made to test for variance in residuals in the regression model used. If there exist equal variance of the error term, we have a normal distribution. However where there is lack of an equal level of variability for each value of the independent variables is known as heteroscedasticity. Breusch-Pagan-Godfrey heteroscedasticity test was carried out to ascertain whether there was constant variance of error–term.

Table 4.6 Extract of Breusch-Pagan-Godfrey/Cook-Weisberg Heteroscedasticity Test Output

Ho: Constant variance		
Variables: fitted values of OE		
Chi Square (1)	=	14.41
Prob > Chi Square 2	=	0.0001

Using pooled unstructured/undated data loading option, the rule is that if the p-value is greater than 0.05, H_o is accepted and H_1 is rejected, if the p -value is less than 0.05, H_o is rejected and H_1 is accepted. The result of the test as shown in Table 4.6 suggest that, since the Chi square Statistic is 4.03 with the p-value greater than 0.05, the null hypothesis was accepted suggesting that there was homoscedasticity in the data (that is, the data is not heterogeneous in variance), which satisfies the assumption of regression model. Further tests as required for standardized residuals for panel least square regression estimation model were conducted to address errors of covariance and standard errors so as to ensure that the data was free of possible

heteroscedasticity and assumed autocorrelation which may affect the results from the data.

Table 4.7 Output of Hausman Specification Test for Fixed or Random Effect Results

	Coefficients		(b - B)	
	(b)	(B)	Difference	Standard Errors
	Fixed	Random		
AQ	-0.031841	-0.036350	0.004508	0.004013
CA	-0.015983	0.014763	-0.001219	-0.002237
PR	0.049960	0.028960	0.021000	0.011337
BL	0.003698	0.003661	0.000036	0.000110

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

Chi Square (2) = 4.03; Prob. > Chi Square = 0.1332; Prob. > Chi Square > 0.05

Based on the panel least square regression model analysis employed by this study, it is necessary to address usual estimation and inference problems associated to the use of panel data as established by Gujarati (2004). Housman Specification Test was employed to address estimation and inference problems usually encountered in panel regression data as shown in Table 4.7. The Housman test conducted depict that the intercepts of each cross-sectional unit are correlated throughout the overall period of model of study. This suggests that the specification estimation that best fits the model is random effect since Prob. > Chi Square is greater than 0.05 (0.1332). From the foregoing statistical results, the study reveal that random effect as its model estimation parameters will be more desirable and fit for the model. The table 4.7 also show that all the coefficients for random effects (-0.03635, -014763, 0.02896,

0.00366) are higher than the fixed coefficients indicating that random effects will be more appropriate to use for the model estimation (Wald chi square (5) = 134.32, Prob. > Chi Square =0.0000), hence its adoption by the study. The outcome of the specification effects tests suggested the use of random effect model for the overall period model, hence employed by this study.

In summary, the various diagnostic tests performed suggest that the data was free from normality and problems of multicollinearity problems. The heteroscedasticity test satisfied the choice of random effect estimation for the general regression model analysis. The descriptive statistical analysis equally returned good results as evidenced from the results.

4.5 Inferential Statistical Analysis

This section presents results and discussion with inferential statistical analysis of the modified Olarewaju (2016) model of pooled OLS regression employed by this study. Efficiency ratio seeks to unravel the pattern or level of banking efficiency attained by the banks through the use of the explanatory variables identified as bank financial soundness, as documented by studies from (Ebenezer et al., 2017; Ifeacho et al., 2014; IMF 2009). Operational efficiency (OE) as the dependent variable comprise of ratio of interest income and other income to total expense plus loan loss provision and corporate tax for the banks while the predictors are Asset quality, Capital adequacy, Profitability and Bank liquidity as empirically identified by Ifeacho et al. (2014) and Ebenezer et al. (2017) respectively.

Data was collected from the sampled banks audited annual financial reports and financial statements for the ten year (10) period before applying inferential statistics to unearth the statistical significance of the predictors on the response variable of the study. This study employed the use of correlation matrix as shown in table 4.7 to determine the degree of the relationship existing between the predictor variables to explain their explanatory powers on the dependent variable and among themselves. The results obtained indicate that operational efficiency has both positive and negative correlations at 5% level of significance. Concisely, negative statistical

relationship were established for (aq, ca and bs) while (pr and bl) have positive statistical relationship with operational efficiency.

Furthermore, panel data collected were analyzed and discussed with the panel least regression model employed by this study. It was established by the study that all the identified predictors have statistical significance with the dependent variable, thus confirming that bank financial soundness has statistical significant influence on operational efficiency for the banks. The model output results were either in consistency with prior studies or vary, thus confirming that they are controversial and have mix empirical evidence in the literature (Ncube, 2009).

4.6 Pearson's Correlation Test and discussion

Correlation matrix was used to determine the extent to which changes in the value of an attribute is associated with changes in another attribute. According to Kothari (2004), Karl Pearson Correlation Coefficient is the most widely used method of measuring the degree of relationship between two variables. Kothari and Garg (2014) however, posited that correlation coefficients can range from -1 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all.

Table 4.8 Pearson's Correlation Results Output

	oer	aq	ca	pr	bl	bs
oer	1.0000					
aq	-0.0079	1.0000				
ca	-0.3525	0.0947	1.0000			
pr	0.0482	0.7041	0.1017	1.0000		
bl	0.2470	-0.2328	0.2802	-0.5406	1.0000	
bs	-0.2834	0.2391	-0.1552	0.1869	-0.3076	1.0000

Capital Adequacy, Profitability, Bank Liquidity, and Bank Size. All are significant at 0.05 level (two tailed). **Source:** Stata Statistical Package V. 13.

Table 4.8 present the results of preliminary correlation analyses among the variables to evaluate the degree of association of bank financial soundness and operational

efficiency of the sampled banks in Nigeria. Generally, the closer the result to 1, the stronger the association of the variables. It is found that most of the correlation results are greater than 0.2 indicating no potential problem of collinearity. According to Lind et al. (2011), a tolerance statistic value below 0.1 shows serious problem while those values below 0.2 indicates potential problem.

The Tolerance value of the explanatory variables generally further confirmed the absence of multicollinearity among them as shown in table 4.3 above (AQ=0.47, CA=0.82, PR=0.32 and BL=0.55). The result further reveal that AQ and CA have positive correlation with profitability, suggesting that the higher the efficiency asset quality and capital adequacy, the more the profitability. It indicates that AQ and CA have predictive effect on the level of profitability of the banks.Bank size representing the moderating variable (natural logarithm of total asset) had significant effect in the relationship of the model variables such that it has a positive relationship with AQ and PR respectively. However, weak negative relationship was recorded by bank size for the remaining explanatory variables employed in the model (OE, CA and BL).

Summarily, it suggests that bank size showed influence or strength on the relationship between the predictors and the dependent variable either negatively or positively. This is equally submitted by Haan et al. (2011) findings that, bank size has a negative effect on return volatility. Practically speaking, the spread of the total asset of the banks have wide variability among the banks. In addition, the mean Variance Inflation Factor of 2.05 shows the average value for the predictors. This suggests that there is no problem of autocorrelation for the study. Similar results were recorded in the negative relationship between bank liquidity (BL) and asset quality (AQ) and profitability (PR). It therefore mean that the higher the liquidity position of the bank, the less the quality of asset and profitability of the banks.

Banks universally trade in money making it their stock in trade and use it to engage in financial intermediation for the productive sector of the economy (Auta et al., 2010). It suffices that, the more they keep liquid assets, the less the income to be generated for the bank, more so where non-performing or delinquent loans are high leading to low profitability (Akhter et al., 2017). The aforementioned evidences,

thus suggest that the data was devoid of possible multicollinearity problem among the independent variables indicating that they are fit to be employed to determine the explanatory powers of each predictor(s) on the response variable (OE), hence an acceptable coefficient of determination (R^2) could be arrived at.

4.7 Regression Analysis of Bank Financial Soundness (BFS) and Operational Efficiency (OE) of DMBs in Nigeria

This section established the regression results of the relationship between bank financial soundness and operational efficiency of listed deposit money banks in Nigeria. Table 4.8 show the regression model output of BFS and OE. The Regression analysis show a relationship indicating $R^2 = 0.802$. According to Kothari (2004) and Frankfort Nachmias and Nachmias (2009), the coefficient of variation should be calculated and reported for the purpose of comparing the degree of dispersion relative to mean of the population distribution where ratio scale and difference in distribution are noticed. The finding show that the explanatory variables jointly accounted for about 80% variation in the operational efficiency (OE) for the banks. It means that a unit change in OE is explained by same unit change in BFS without moderator. The remaining 20% is explained by other independent variables not captured in this study. There is overall significance among all the parameters of this regression model p-value = 0.000<0.05 level of significance.

In conclusion, the model is fit and desirable; hence the explanatory variables are properly selected, combined and used as substantial value. Thus, it can be stated that the explanatory variables have significant reporting quality on the operational efficiency. Based on this result, we reject the hypothesis (H_0) of no significant relationship between bank financial soundness variables and operational efficiency ratio of the sampled banks, meaning that there is significant relationship between bank financial soundness and operating efficiency for deposit money banks in Nigeria.

Table 4.9 Model without Moderating Variable

OE/Variables	Coefficients	Standard Error	t- statistic	p-value
AQ	-0.03635	0.01241	-2.93	0.003
CA	-0.01437	0.00163	-8.81	0.000
PR	0.00526	0.00083	6.33	0.000
BL	0.00366	0.00042	8.71	0.000
Constant	0.44751	0.06169	7.25	0.000

$R^2 = 0.8020$; Durbin-Watson Statistic $= 2.05$

From Table 4.9, Regression statistics result also confirms that all the independent variables: Asset Quality (AQ), Capital Adequacy (CA), Profitably (PR) Bank Liquidity (BL) have significant influence on operational efficiency (OE) of the deposit money banks in Nigeria. By extension and implication, change in any of the bank financial soundness variables will lead to a significant change in the operational efficiency ratio of deposit money banks. All the explanatory variables have significant relationship with the operational efficiency (p-value $= 0.000 < 0.05$). The breakdown of the result shows that profitability (PR) and bank liquidity (BL) have positive and significant influence on operational efficiency (OE). This result is consistent with (Ebenezer et al. 2017; Lipunga, 2014). It means that an increase in any of these variables, will automatically lead to increase in operational efficiency of the banks. From Table 4.9, the overall R square of 0.802 had confirmed the goodness of fit of the model. R^2 is a measure of the goodness of fit of the explanatory variables in explaining the variation on operational efficiency. It suggests that the variables jointly explain 80% of the variation in the operational efficiency of banks.

According to Kothari (2004) and Frankfort et al. (2009), coefficients of variation should be calculated and reported to compare the degree of dispersion to mean of the population. The coefficients of variation result for operational efficiency suggests an average degree of dispersion within the industry; hence the banks' efficiency level seems not adequate. Further descriptive statistics indicate that the correlation coefficients further confirmed the positive relationship of profitability and bank liquidity (0.00526 and 0.00366). It is however disheartening that negative

relationships were shown for asset quality, capital adequacy (-0.0363,-0.0143) respectively with coefficient constant of 0.4475.

The overall implication of the result for asset quality is that the quality of the banks' assets were not efficiently handled by these banks, thus indicating poor credit risk management/policies (Umar, 2015; Opoku, 2016). It also suggests that, the total equity of the banks does not commensurate with the total asset held during the period. Additionally, the risk weighted capital was not adequate to the operational activities undertaken by the banks during the period of study. Ayanwaokoro (2008) had indicated how to calculate the weighted risk assets and prudential guidelines for banks to follow so as to engender high operational efficiency. This again suggests that, the banks may have operated with low equity capital against the recommendation of Basle international standard for capital adequacy. The second model output with moderation (BS) is hereby presented and discussed.

Table 4.10 Model Output with Moderating Variable

OE/Variables	Coefficients	Standard Error	t- Statistic	p-value
AQ	-0.0255	0.012142	-2.11	0.035
CA	-.043831	0.004831	-9.38	0.000
PR	0.01882	0.00288	6.06	0.000
BL	0.00324	0.000418	7.75	0.000
BS (nlTA)	-0.05413	0.013729	-3.94	0.000
Constant	1.98569	0.394540	5.03	0.000

$R^2 = 0.8467$; Durbin-Watson = 2.05

Size of the banks proxy as log natural logarithm of total asset indicated that the sampled banks' asset were not adequate or risky for the level of banking activities engaged during the period of this study as sown in Table 4.10. Therefore, at this juncture, it can be suggested that all the explanatory variables have joint and individual statistical significance as indicated in the above model output result. It shows that the overall model is statistically significant (Wald chi square (4) =107.95, Prob >chi square = 0.000). The results obtained from the two models using ordinary

least square (OLS) estimation technique is R^2 of 0.802; about 80% for first (1st) model as against second (2nd) model R^2 of 0.8467; about 85% suggesting that bank size (BS) has a stronger effect or intensity on the independent variables (difference of about 5%).

However, the Durbin-Watson statistic 2.05 indicates that our long-run model is fit and not spurious. The strength or the intensity of the effect of moderating variable as indicated by this study, identified (PR) as having higher influence on operational efficiency (OE) in Nigeria and followed by (BL) in the long-run. The result suggests that the overall model is statistically significant (Wald chi square (4) = 107.95, Prob. > chi square = 0.0000). Based on the findings, it can be suggested that OE will assume the value of 0.4475 units when other variables are held constant and that all the independent explanatory variables were statistically significant of operational efficiency ratio (OE). By extension, it depicts that: AQ (β= -0.0363502, t-statistic = -2.93; $p<0.05$), CA (β = -.014377, t-statistic =-8.81; $p<0.05$), PR (β = 0.005269, t-statistic =6.33; $p<0.05$), BL (β =0.00366, t-statistic =8.71; $p<0.05$).

4.8 Test of Hypotheses with inferential statistics

As shown in Appendix 2, the statistical analysis of the data collected for this study were processed, analyzed, discussed and presented below where the following results were obtained: The dependent variable is Operational Efficiency (OE) while the independent variables are: Asset Quality (AQ), Capital Adequacy (AC), Profitability (PR), Bank Liquidity (BL) and Bank Size (natural log of total asset) as moderating variable. The data were subjected to various diagnostic tests for presence of autocorrelation, multicollinearity heteroscedasticity as well as normality. The tests reveal that there is no problem of autocorrelation as revealed by the Durbin-Watson test statistic "d" = 2.05 is within the acceptable region. Additionally, the data were also free from the problem of multicollinearity since all the values of Variance Inflation Factor (VIF) for all the explanatory variables are less than the threshold of 3 which is acceptable statistically.

Furthermore, there is no problem of heteroscedasticity since the p-value is less than 0.05 as revealed by the analysis. Consequently, since no violation of the assumptions

of Ordinary Least Squares (OLS) as observed from the diagnostic tests conducted, the data is therefore free to draw valid inferences from the results obtained for the study. Hence, this study employed OLS method as its inferential statistical analysis. The sample size of the study comprise of 15 deposit money banks which is significantly higher in terms of percentage from the target population of 21 deposit money banks in Nigeria. This represents about 70.1% of the population which serves as good representative of the banking system in Nigeria; hence generalizations can validly be made from this sample. This agrees with the submission from Saunders et al. (2009).

The selection of the banks was purposively done due to the availability of the financial data from the individual website/financial statements and CBN bulletins. The sample size agrees with Ani, Ugwunta and Imo (2012), Adeusi, Kolapo, and Aluko (2014) while it was substantially higher than the sample size used by Olanrewaju et al. *(2015)*. This empirical evidence further confirmed the peculiarity of missing data problem especially in developing economies for empirical studies in relation to targeted study population (Castellacci & Natera, 2011). The following subsections present the test of hypotheses, the statistical analysis and the discussions for all the predictor variables of this study.

4.8.1 Effect of Asset Quality on Operational Efficiency of DMBs in Nigeria

In an attempt to unearth the possible influence of bank financial soundness on operational efficiency of deposit money banks in Nigeria, this provided ground for the formulation of hypothesis one from the study's first objective. The study tested the hypothesis indicating a statistical significance (beta of 0.05) at (95% confidence level), degree of freedom (df) of 5 and two tailed, p-value<0.05 (0.003). However, the R^2 of 74.05% for asset quality as individual predictor indicate that the variable is statistically significant in this model. Thus, AQ explained about 74% of the variations in operational efficiency (p-value = 0.03 < 0.05).

Hypothesis 1:

H$_o$: Asset quality has no significant effect on operational efficiency of DMBs in Nigeria.

Table 4.11 Inferential Statistics of OE and Asset Quality

Model 1 as equation 1: $OEit = \beta_0 + \beta_1 AQit + \beta_2 CA_{it} + \beta_3 PR_{it} + \beta_4 BLit = \varepsilon_{it}$

Variables	Coefficient	Std. Error	P-value
Intercept	0.4475	0.0619	0.000
Asset Quality	-0.0363	0.01241	0.003
R^2	0.7405		
Durbin-Watson	2.05		

As indicated in Table 4.11, the coefficient of correlation of -0.0363 shows that the two variables, (OE) and (AQ), are weakly negatively correlated. Hence, Asset quality has significant negative effect on operational efficiency of deposit money banks in Nigeria since p-value is less than 0.05 (p-value=0.035<0.05). The result therefore statistically suggests that banks have not been operationally efficient in the employment of assets (loans and advances) at their disposal for the period. It could be inferred that, banks should improve on credit/loan appraisal cum credit risk management as regards non-performing loans (high) with a view to reduce this noticeable inefficiency operationally. However, both R^2 show an explanatory power of 0.7405 stating that about 74% of the variation on OE is accounted for by AQ. A further test for normality, multicollinearity and serial autocorrelation indicate that the model is devoid of problems from these diagnostic tests and as such the model is fit.

As revealed by this result, it means that individually this explanatory variable (AQ) has significant influence on OE since the p-value is less than 0.05 with R^2 (0.7405) and "d" value of 2.05. It was also confirmed by the descriptive statistics result with the mean value of about 54% indicating a high degree of variability amongst the banks with wide dispersion of 81% and coefficient of variation of 1.49 respectively. This suggests that the low quality of asset cut across the banks under investigation.

The result is consistent and in conformity with prior studies from Abata (2014) who documented that asset quality had a statistically significant relationship and effect on bank performance while Adeusi et al. (2014) concurred in his findings that asset quality has high statistical significance in all the models employed by the study, thus emphasizing that credit risk remain a major determinant of commercial banks profitability.

Contrary finding was submitted by Ifeacho et al. (2014), that asset quality has a positive relationship with banking efficiency. Also, Mohd-zaini et al. (2010) reported that cost efficiency score negatively affects bank efficiency. Again, contrary findings were submitted by Adjei-Frimpong et al. (2014) that loan loss provision has no effect on bank efficiency in Ghana while Roman *et al*. (2013) documented that a higher ratio of non-performing loans to total loans coupled with absolute deterioration of credit portfolio quality negatively affect commercial banks' profitability. Kamau (2009) however confirmed that asset quality has higher influence on ROA of banks in Kenya through the use of bank-specific attributes as variables of the research study. Another similar study from Mohd-zaini (2010), documented that asset quality can act as a significant source of banking failure with evidences drawn from Malaysia and Singapore. Also in Kenya, Kariuki et al. (2016) documented a negative correlation coefficient but showed a statistically significant relationship with intermediation efficiency for savings and cooperative societies.

A strong positive linear relationship exists between Asset Quality and Profitability (PR) indicating that for a bank to be profitable, the quality of its asset should be maintained. It must be structured in terms of low proportion of the non-performing loans (NPLs) to higher performing loans (PLs) (Umoren et al., 2016). Based on the submission from Fiordelisi et al. (2010) and Sheedy et al. (2015), the mix must be appropriate but depends on the risk appetite and the understanding of the dynamics of the risk climate by the individual bank. Apart from the strong relationship recorded between (PR) and (AQ) (0.7041), banks must always endeavor to maintain good credit risk policies and procedures in its credit portfolio and must ensure that adherence to CBN credit guidelines and regulations are taken seriously.

Affirmatively and in consistent with this findings, Anjichi (2014) documented that poor asset quality as evidenced from this study, and low levels of liquidity are the two major causes of bank failures in a study from Kenya. The study also indicated that Central Bank of Kenya (CBK) measures asset quality by the ratio of the Non-performing loans to gross loans as adopted by this study. In a nutshell, the findings, suggest that bank should improve on credit risk management policies/loan appraisal as well as credit rating of customers for sound credit assessment. Summarily, Abata (2014) reported that deterioration in bank asset quality affects the operating efficiency as well as the general soundness of the financial system in which it is an entity. Similar submission was made by Muraina (2018), stating that a negative and significant influence of credit risk on profitability do occur. These efforts will go a long way to reducing the proportion of non-performing loans that can improve the fortunes of banks generally. Lina et al. (2013) had documented that, asset and liability of the bank must be managed efficiently because its cycles are not identical with business activity level.

4.8.2 Effect of Capital Adequacy on Operational Efficiency of DMBs in Nigeria

A bold academic attempt was made to unravel the possible effect of capital adequacy on the efficiency level for deposit money banking operation in Nigeria. The hypothesis was therefore subjected to further inferential statistics to ensure that the explanatory power of the variable is significant statistically. Specific objective two of the study provided for the formulation of second hypothesis which is presented and analyzed below:

Hypothesis 2:

H_0: Capital Adequacy has no significant effect on operational efficiency of DMBs.

Table 4.12 Inferential Statistics of OE and Capital Adequacy

Model 2 as equation 2: $OE_{it} = \beta_0 + \beta_1 AQ_{it} + \beta_2 CA^* + \beta_3 PR_{it} + \beta_4 BL_{it} = \varepsilon_{it}$

Variables	Coefficient	Std. Error	P-value
Intercept	0.4475	0.06169	0.000
Capital Adequacy	-0.01437	0.00163	0.000
R^2	0.8036		
Durbin-Watson	2.05		

As obtainable from Table 4.12 result, capital adequacy has statistically significant effect on operational efficiency of DMBs in Nigeria since p-value is less than 0.05 (0.000). The result also show that there is a strong relationship between Capital Adequacy and Operational Efficiency with R^2 of 0.8036 meaning that it accounted for about 80% of the variation in the model. This is an indication that the total capital fund of the sampled banks was not adequate to the level of banking/operational activities engaged during the period hence, this could be adjudged efficient. Having performed all the diagnostic tests required with the data returning a valid and reliable model fit, the model output result are discussed.

Based on the model output result, statistical inference could be drawn that capital funding of the banks were not adequate especially in terms of the equity capital holdings of the banks. It has been empirically established that adequacy of capital as recommended by Basle accord is critical for bank survival especially the minimum capital base in the area of risk weighted assets and to align with the prudential guidelines from the CBN as a way of ensuring operational efficiency. Muraina (2018), emphasized that capital adequacy is required to achieve bank financial health and soundness. This statement has been consistent with the following prior studies from Ayanwaokoro (2008), Ezike et al. (2013), Kamau (2009), Anjichi (2014), Ibrahim et al. (2017), submitted the findings that capital ratio and liquid assets negatively affects profitability in Pakistan.

A contrary submission was made in South Africa, Ifeacho et al. (2014) found that capital is positively related to return on equity Furthermore, contrary finding was documented by Muraina (2018), that capital adequacy had a positive and significant influence on profitability while credit ratio (asset quality) had a negative and significant relationship with profitability. Also Lipunga (2014), found that capital adequacy has insignificant statistical effect on profitability (ROA). Thus, more premiums should be placed by banks on enough capital funds to be more profitable and efficient, operationally. However, a note of caution from Sheedy et al. (2015) was indicated that, efficiency can only be improved with better understanding of the risk climate and risk tolerance from the bank and not only for the adequacy of capital fund.

For inconsistency and non-conformity with this finding, Ani et al. (2012) documented that capital adequacy show significant positive correlation. Again, the findings of Kamau (2009), reported that, capital adequacy has a significant effect on profitability in Kenyan banking sector and that it plays a crucial role in reducing the number of bank failures and losses to depositors when bank eventually fails. Ifionu et al. (2016) documented and consistent with this study, that a negative significant effect was observed for capital adequacy ratio to return on asset (ROA) in Nigeria. Empirical evidence from Amer et al. (2011) again contradicted that operational efficiency have positive significant influence on capital adequacy, asset quality, credit ratio and bank liquidity in lowly and highly competitive banks in Egypt. According to Adjei-Frimpong, 2014, it was documented that well capitalized banks in Ghana are purely technically efficient and competitive but are not cost effective. The study submitted a negative capitalization for the Ghanaian banks which is consistent with the findings from this study.

Ejoh et al. (2014) reinstated the importance of capital adequacy with a large proportion of equity fund since such banks are perceived safe, stable and sound. This can be translated to efficient performance leading to higher profitability for the banks. According to Roman et al. (2013), capital adequacy ratio aims at protecting banks' fund depositors in order to promote efficiency and stability of the financial soundness or health generally. Again, descriptive statistics of this study confirm it

with a mean value of 0.03% suggesting that the total equity accounted for about 3% of the total assets of the sampled banks which was grossly inadequate. It suggests that owner's stake/ contribution was low in these banks. The degree of the variability range for this variable and its dispersion in the regression model was not too encouraging either (0.003; 0.006).

According to Marozva (2015), an insignificant long-run relationship exists between bank performance and liquidity. This concurs with the study from Olarewaju et al. (2015). Capital fund form the last resort (shock absorber) for deposit withdrawal and meeting other financial obligations on the long run when problems occur, hence its adequacy germane. Ezike and Oke (2013), summarized it that, capital adequacy remains the major concern for bank regulators globally. Consequently, the CBN's recapitalization of Nigerian banks in 2005 from #2 billion to #25 billion was a welcome development. The weak positive linear relationship of (PR) with (BS) indicates that the higher the profits generated, the higher the total asset of the banks and vice versa. Summarily, it means that the equity capital should be improved so that the owners' stake can be increased. By extension, the total assets can be transformed into higher revenue (investment) and operational efficiency for the banks in Nigeria.

4.8.3 Effect of Profitability on Operational Efficiency of DMBs in Nigeria

Based on the specific objective three of the study, the null hypothesis three was equally drawn to statistically unravel the possible effect of profitability as explanatory variable of operational efficiency for banks in Nigeria. The hypothesized statement in the null form as hypothesis three as used in the panel least regression model with the result analyzed, discussed and presented below:

Hypothesis 3:

H_o: Profitability has no significant effect on operational efficiency of DMBs in Nigeria.

As presented in chapter three of this study, the underlying objective to measure here is the effect of profitability on operational efficiency of banks, thus forming the premise of the null hypothesis for the study. Panel least square regression analysis was employed to unravel the statistical inference of this predictor variable on (OE) as presented in its null hypothesis form in table 4.12 below:

Table 4.13 Inferential Statistics of OE and Profitability

Model 3 as equation 3: $OE_{it} = \beta_0 + \beta_1 AQ_{it} + \beta_2 CA_{it} + \beta_3\ PR^* + \beta_4 BL_{it} = \varepsilon_{it}$

Variables	Coefficient	Std. Error	P-value
Intercept	0.44751	0.06169	0.000
Profitability	0.00526	0.000838	0.000
R^2	0.8374		
Durbin-Watson	2.05		

From Tale 4.13, the coefficient of correlation 0.0052 shows that the two variables, (OE) and (PR) are positively correlated. Hence, profitability has statistical significant influence on operational efficiency of deposit money banks in Nigeria (p-value =0.000 < 0.05). The model suggests that profitability as an explanatory variable has significant influence on operational efficiency of banks for the period under review with positive statistical relationship (0.0052). Prior studies indicated and confirmed that positive statistical relationship exist between profitability and efficient banking operation as established in the study carried out by Opoku (2016) in Ghana while bank size had an inverse relationship with profitability. According to Dawood (2014), the study's empirical findings indicated that capital adequacy ratio and liquidity significantly influenced profitability in Pakistan banking industry while Adeusi et al. (2014) documented that internal factors or bank specific factors (CAR, AQ, BL) were found to be statistically significant on profitability using panel method of time series and cross-sectional data in Nigeria.

According to Onuonga (2014) who submitted that, corporate resources must be efficiently controlled, since bank size, capital and operational expenses significantly influence profitability. This is as a result of the fact that the stock in trade of banks is money (adequate liquid assets), hence an appropriate balance must be observed between its asset and liability especially as regards liquidity component side of the balance sheet (Sangmi et al., 2010). Suffice it to say that, bank liquidity (production stage) should be operationally turned into income generation (intermediation and transmission stage) leading to higher efficiency and profitability.

Babalola (2012) equally concurred with this finding that (CAR) actually determine banks' profitability in the short run while bank size determines it in long run in Nigeria. Olweny et al. (2011) found out that all bank specific factors (CA, AQ, BL) had a statistical impact on profitability while market factors had significant operational cost efficiency for banks in Kenya. Contrarily, Tingting et al. (2016) submitted that financial soundness indicators do not have significant effect on bank profitability for China's commercial banks. Moradi-Motlagh et al. (2011), also submitted that, some banks gain higher profits due to taking more risks, although not sustainable in the long run. Ncube (2009) further documented that; efficient banks must be cost efficient to generate profitability. The overall implication from the model result output indicate that, though banks have been declaring profits year by year but they are not operationally efficient in the management of banks' corporate resources available to them as revealed by the various studies highlighted above.

4.8.4 Effect of bank liquidity on Operational efficiency of DMBs in Nigeria

The specific objective four of this study provided for the formulation of the fourth hypothesis as hypothesized, processed, analyzed and discussed to seek for the possible influence of bank financial soundness on operational efficiency of deposit money banks in Nigeria. It was hypothesized as hypothesis four through the null hypothesis as presented below:

Hypothesis 4

Ho: Bank liquidity has no significant effect on operational efficiency of DMBs in Nigeria

Table 4.14 Inferential Statistics of OE and bank liquidity

Model 4 as equation 4: $OE_{it} = \beta_0 + \beta_1 AQ_{it} + \beta_2 CA_{it} + \beta_3 PR_{it} + \beta_4 BL^* + \varepsilon_{it}$

Variables	Coefficient	Std. Error	P-value
Intercept	0.44751	0.06169	0.000
Bank liquidity	0.00366	0.000425	0.000
R^2	0.8147		
Durbin-Watson	2.05		

Aside the preliminary result from the descriptive statistics used in analyzing the model's fitness, further inferential statistics was employed after confirming that the data is BLUE in tandem with OLS assumptions. The inferential statistical analysis is stated by the regression was analyzed and discussed below.

From Table 4.14, the model depicts a positive correlation coefficient meaning that banks employed moderate liquid assets that they actually needed in their total asset portfolio. They can borrow through the inter-bank financial/treasury window in order to meet up with daily banking liquid requirement for operational efficiency e.g. purchase of forex, loans and advances disbursement, stabilization securities etc. In addition, the CBN statutorily act as lender of last resort to the banks in case of liquidity problem. It was confirmed that bank liquidity has a mean value of (23%) with a spread between the maximum and minimum values (5% & 68%). The standard deviation also confirmed that there was wider dispersion of liquidity management by the banks, thus impacting on the general operational efficiency within the Nigerian banking system.

In the same vain, the correlation coefficient of 0.247 shows that the two variables OE and BL are fairly positively correlated. Hence, bank liquidity has significant influence on operational efficiency of deposit money banks in Nigeria (p-value =0.000<0.05). This result varied significantly with the study of Berihun-Engida (2015) stating that liquidity has a negative significant impact on bank size and loan growth for banks in Ethiopia. Even though same measurement metrics used by the study is employed by this study (liquid asset to total asset). From a different environment, the findings from Lartey et al. (2013) supported the weak positive relationship that existed between bank liquidity and profitability in Ghana. Furthermore, in Tunisia, Mohamed (2015) documented that bank liquidity had statistical significant effect on other explanatory variables used by the study. The finding is consistent with SheabaRaini et al. (2017), submitting that positive relationship of liquidity exists with return on asset. It was established by the findings from Njoroge (2016) that bank liquidity has a statistical positive significant effect on banks' profitability indicating that the higher the liquidity, the higher the profitability

Summarily, bank liquidity remains a principal tool in banking operation, so banks must gear up efforts to increase liquid assets such as cash, deposit with CBN and other liquid negotiable instruments (treasury bills, bonds from FGN, credit bank balances). This will augment and improve their operational activities with the aim to achieve optimum efficiency. Even though, a positive relationship was shown, the banks sampled need to improve on their liquid asset holdings for efficient operational capability in line with global competitiveness. Sufficiency in liquidity position of banks has direct positive influence on the banking sector acceptability and confidence, assurances, as well as investors and customers. This will afford the depositors and demand holders in meeting up with their daily individual cash requirements from the banks (Njoroge, 2016). However, a negative significant relationship was found between net interest margin and liquidity risk in South Africa.

4.8.5 Moderating Effect of bank size on the influence of BFS on operational efficiency of DMBs in Nigeria.

In a bid to further examine the influence of bank financial soundness on the operational efficiency of deposit money banks in Nigeria, bank size was hypothesized as the moderating variable of the study. This is done with an attempt to unearth the strength and the intensity of the effect of bank size (log of total asset of the sampled banks) on operational efficiency of the banks. The result from the panel regression model revealed that the coefficients of determination, R^2 show that about 85 percent (84.67) of the variability in the model has been explained by the explanatory variables while the remaining 15 percent (15.33) unexplained variations are being accounted for by the error term.

The strength and the intensity of moderation introduced could be felt in the model when compared with no moderation. The statistical relationship between the first model (0.802) and the second with moderation (0.846) was significant with about 5% significant difference. This suggests that bank size improves the operational efficiency of the banks by about 5%. It again suggests that largeness of the bank can influence asset accumulation (size) especially where there are widespread branches of the bank (Adebiyi, 2016). In the light of this, the possible moderating effect of bank size on operational efficiency of banks which serves as the fifth specific objective paving the way for the hypothesis formulation of this study. The null hypothesis is hereby analyzed, discussed and presented below:

Hypothesis 5

Ho: Bank Size has no significant moderating effect on the influence of Bank Financial Soundness (BFS) on the operational efficiency of DMBs in Nigeria

As clearly indicated in the conceptual framework of this study, bank size proxy as total asset of the banks was employed to establish the moderating effect using the panel least squares regression model. The investigation of the above hypothetical statement will go a long way to establish the intensity and strength and/or direction of the association between the bank financial soundness and operational efficiency of

banks. The essence of moderation test is to examine when or the direction under which a predicting variable influences the response variable (Baron & Kenny, 1986). To this end, the model was subjected to Housman estimation effect test with the specification test returning 0.1332 (p-value>0.05) indicating that random effect will be more appropriate and suitable than the fixed effect estimation. The study, therefore adopted random effects for the estimation of the data. Bank size was employed as a variable using its natural logarithm of total assets in the model output result and other diagnostic tests were conducted on the moderating variable.

Table 4.15 Moderating effect of bank size on the influence of BFS on OE for DMBs in Nigeria

Model 5 as equation 5: $OE_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 X*Z_{it+} \varepsilon_{it}$

Variables	Coefficient	Std. Error	P-value
Intercept	1.9856	0.39454	0.000
Bank Size	-0.05413	0.01372	0.000
R^2	0.8467		
Durbin-Watson	2.05		

X_{it} and Z_{it} represents both the predictors (X_{it} = AQ, CA, PR and BL) and the moderating variable is the natural log of bank size (Z_{it}).

As revealed by the result output from Table 4.15, the coefficient of correlation of -0.054 show that the two variables, OE and bank size are negatively correlated. Hence, bank size used as natural logarithm of total asset has significant effect on the influence of bank financial soundness on operational efficiency of deposit money banks in Nigeria since p-value is less than 0.05 (p-value = 0.000<0.05).

Based on the statistical analysis, bank size (natural log of total asset) demonstrates negative significant moderating effect statistically, therefore, there is fair statistically established intensity or strength or significant association within the variables of the

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independent and the response variable (coefficient of -0.054, standard error of 0.0137). It could be suggested that there is high degree of variability of presence of high non-performing loans in the portfolio of the sampled banks. Equally, this result suggests that the degree of dispersion among the banks seems high with the coefficients of variation from the descriptive statistics. This finding is consistent and concurred with the studies of Aremu et al. (2013) and Naceur et al. (2003), whose studies indicate a negative significant moderating effect of bank size on bank profitability and banking efficiency especially when considering the contextual business environment where each bank operates. On a contrary submission and inconsistent with this findings, Hallunovi et al. (2016) and Adjei-Frimpong et al. (2014), employed bank size (natural log of total asset) in their studies and documented that bank size had a positive impact on profitability and cost efficiency. In consistency with the findings from this study, Haan et al. (2011) documented that bank size reduces return volatility suggesting that less efficient and small banks are more vulnerable to market risk. Liao (2009), equally lend credence to this finding that banks returns to scale are decreasing in an oversize phenomenal rate in Taiwan.

Ncube (2009) documented that the influence of bank size on banking efficiency is not clear, controversial in finance literature due to varying micro and macro-economic variables pertaining to different economic environments. This study has further confirmed and statistically established that bank size demonstrated a negative significant moderating effect on bank financial soundness variables: (asset quality, capital adequacy, and profitability and bank liquidity) on operational efficiency. The findings reveal that the composition or mix of bank assets in favor of earning asset to fixed asset must be constantly reviewed by banks to gain marked operational efficiency. This will afford the banks to earn higher income, bearing in mind the operating efficiency level to generate superior income. The quality of the asset (credit) especially liquid assets against the total asset held by the sampled banks need to be reviewed as well.

Furthermore, the credit risk policies of the banks need to be critically looked into as constantly as practicable by both the banks and the CBN for quality assurance must always be on ground for compliance. The study's findings are generally consistent

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with previous studies globally for developed and developing countries of the world as regards banking efficiency and performance. The international financial organizations had equally contributed to its empirical relevance through some of the financial reports so far released by them. For instance, IMF (2009) confirmed in its study that the core-sets of indicators responsible for bank's financial soundness remain the predictor variables chosen by this study (CA, AQ, PR, BL and BS).

As regards the introduction of the moderating variable which is bank size (BS) proxy as natural logarithm of total asset, the strength of its relationship with other predicting variables were statistically revealed by the result of the model output. For instance, there is a positive significant and statistical effect of BS on PR and BL meaning that BS has a relationship generating higher profitability and balanced liquidity position as regards the disbursement of credit (loans and advances). Nuray (2015) documented that, both internal and external factors determines bank profitability. In a another study from Ebenezer et al. (2017), a contrary evidence was submitted that bank profitability has significant negative influence on operational efficiency of banks

Olarewaju et al. (2015) cited that the following recent findings that have contributed immensely to banking efficiency levels for banks all over the world: Fareetal (2006) for Spain, Paradietal (2012) for Canada and Matthew et.al. (2007) for U.K., Shyu et al. (2014) for most Asian banks, Staub et al. (2009) and Staub et al. (2010) for Brazil, Akhtar et al. (2010) for Pakistan, Roman et al. (2013) for Romania and Ogllvie (2009) for U.S banking system. In the same vein in Africa, empirical evidence abound with mixed findings on banking and operational efficiency of banks: Amer et al. (2011) for Egypt, Hussein (2001) for Sudan while Kariuki et al. (2016), Odunga (2016) and Odunga et al. (2013) documented their findings on Kenyan banking efficiency while Ajei-Frimpong et al. (2014) documented on the need for cost efficiency for banks in Ghana. In Nigeria specifically, the following minor findings have been documented on operational efficiency of banks: Olarewaju (2016), Ani et al. (2012), Obafemi et al. (2013) with the limitation of the studies in terms of the theoretical, methodological relevance and conceptual validation of findings as submitted by these prior empirical studies.

Summarily, the direction, strength or intensity of association and the statistical significant effect of the bank financial soundness (BFS) on operational efficiency (OE) with respect to each null hypothesis discussed in this study are submitted below. The study took cognizance of the overall regression models for statistical significance based on the model's result output including bank size as moderator resulting in the overall statistical significance (p-value = 0.000<0.05). The summary of the hypotheses are presented in Table 4.15 below:

Table 4.16 Summary of Statistical Hypotheses Test with Results

Null Hypothesis	Period of study	Decision for OE	Statistical Relationship& Significance
1	10	Reject	Negative & Weak
2	10	Reject	Negative & Weak
3	10	Reject	Positive & Good
4	10	Reject	Positive & Fair
5	10	Reject	Negative & Fair

From Table 4.16, the first hypothesis of the study, stating that asset quality has no significant influence on operational efficiency of deposit money banks is rejected. The result showed that there is a negative significant influence of asset quality on operational efficiency of banks statistically with p-value=0.035<0.05 statistical significance. The coefficients estimate of -.0255 shows that a weak negative relationship exists between the two variables (AQ & OE). This statistical and significant relationship was further confirmed by R^2 of 0.74 by this study. This suggests that the higher the asset quality, the lower the operational efficiency of the banks may be due to high non-performing loans or poor cost control measures. This

suggests that the null hypothesis is rejected while accepting that, asset quality has significant influence on operational efficiency of banks. This is in consonance with studies from Abata, (2014), Kariuki et al. (2016), Ani et al. (2012), and Adeusi et al. (2014), Adjei-Frimpong et al. (2014) but inconsistent with Mohd-zaini et al. (2010) and Sheaba-Rani (2017).

Secondly, the table 4.16, showed the second null hypothesis of the study, stating that capital adequacy has no significant influence on operational efficiency is equally rejected based on the coefficients estimate of -.0438 with p-value=0.000<0.05. This was again confirmed by R^2 of 0.80 statistical relationships between these variables. This demonstrates that there is a significant influence of capital adequacy on operational efficiency of banks statistically, although negatively and weakly related. This again suggests that the equity capital of these banks has not been adequate, hence affecting efficiency in operation. This result is in agreement with Ezike and Oke, (2013), and Olarewaju, (2016) but contrary to Ifeacho et al. (2014).

The third specific objective of this study formed the third null hypothesis stating that profitability has no significant influence on operational efficiency of banks as shown in table 4.16. The null hypothesis is rejected based on the model output result, indicating that there is a positive significant influence between profitability and operational efficiency. The result indicate p-value=0.000<0.05 with a coefficients estimate of .01882 and R^2 (0.83) confirming the statistical relationship. This suggests that about 19% profitability will be achieved by the banks through efficiency in operation, when other variables are held constant. This result is in tandem with studies from Nuray (2015), and Alrafadi et al. (2014) that equally submitted positive significant influence of profitability on efficient performance of banks. However, inconsistency was documented by Ebenezer et al. (2017), and Obafemi et al. (2013), which indicated a negative effect of profitability on efficiency by their studies.

Furthermore, from the Table 4.16, a positive significant influence of bank liquidity was indicated with p-value=0.000<0.05 and coefficients estimate of .00324. The statistical relationship was further confirmed by R^2 of 0.81 respectively. This result output indicated that there is a significant influence of bank liquidity on operational

efficiency of bank hence the rejection of the null hypothesis stating that bank liquidity has no significant influence on operational efficiency. This result has been confirmed by studies from Berihun-Engida (2015), Mohamed (2015), Amer et al. (2011), and CBN 2017.

Lastly, the fifth hypothesis was drawn from the fifth objective of this study stating that bank size has no significant moderating effect on the influence of bank financial soundness on operational efficiency of banks. The null hypothesis stand rejected based on the model output result of p-value=0.000<0.05 with a negative coefficient estimate of -.0541. This is further confirmed by the R^2 (0.73) confirming the statistical relationship between these variables. This result has been corroborated by studies from Ani et al. (2012), Moradi-Motlagh et al. (2011), and Eriki and Oke (2015). However, the result is at variance with Haan et al. (2011) study on bank size and earnings volatility in USA. Finally, Ncube (2009) submitted that the influence of bank financial soundness and banking efficiency is not clear and controversial in the literature.

4.9 A Comparative analysis of the Moderating and Non-Moderating Influence of Bank Size on OE of DMBs in Nigeria.

In other to fully understand and expatiate more on the effect of moderation of bank size (BS) between the independent variables and the dependent variable of OE (known as model 1) as well as its non-moderating effect (known as model 2) in a comparative analysis, the following statistical results of the model output for the two models are hereby presented below:

Table 4.17 showing the Comparative Statistics of AQ on OE with and without moderation

S/N	Parameters	Without moderation (Model 1)	With moderation (Model 2)
1	Coefficient (β)	-0.036350	-0.02557
2	Standard Error	0.012410	0.01214
3	P- value	0.003	0.035
4	Overallsig. (Prob>Chi2)	0.0000	0.0000
5	t-statistic	-2.93	-2.11
6	Wald chi-square	107.95	134.32

From the Table 4.17, the overall regression model indicate that bank size have moderating effect on operational efficiency at 0.05 level of significance. The coefficient (β) of asset quality to bank size =-0.0363 implying that an increase of a unit in total asset of the banks might cause a proportionate decrease of -.036 in the operational efficiency for the banks. This clearly indicates further that a unit increase of bank size will have a negative effect (decrease) in the operational efficiency level of these banks. This could be in form of increase in bad or delinquent loans or non-performing loans resulting from poor credit risk administration. The standard error support that there is wide variability among the banks in the industry. The t-statistic of -2.11 also attest to the negative correlation of bank size effect on the operational efficiency of the sampled banks even as statistically significant (Adeusi et al., 2014; Mohd-zaini, 2010).

Table 4.18 showing the Comparative Statistics of CA on OE with and without moderation

S/N	Parameters	Without moderation (Model 1)	With moderation (Model 2)
1	Coefficient (β)	-.014377	-0.43831
2	Standard Error	0.001634	0.000483
3	P- value	0.000	0.000
4	Overallsig. (Prob>Chi2)	0.0000	0.0000
5	t-statistic	-8.81	-9.38
6	Wald chi-square	107.95	134.32

The above Table 4.18 depicts that with the p-value of 0.000 at 0.05 level of significance indicate that the relation between capital adequacy and operational efficiency is statistically significant. However, the coefficient of -.01437 implies that an increase of a unit in total asset of the banks might cause a decrease in the operational efficiency ratio for the banks. It can be interpreted that increasing the capital funding of the banks may or may not improve operational efficiency because if the capital base of the banks are increased above the minimum regulatory requirement, it may automatically not improve the banking efficiency especially where the operational expenses are not adequately controlled (Tingting et al., 2016). The t-statistic and the standard error confirm that the variation and dispersion of the result cut across the banks in a decreasing rate from -8.81 to-9.38.

Table 4.19 showing the Comparative Statistics of PR on OE with and without moderation

S/N	Parameters	Without moderation (Model 1)	With moderation (Model 2)
1	Coefficient (β)	-.005269	.018825
2	Standard Error	0.000838	0.002882
3	P- value	0.000	0.000
4	Overallsig. (Prob>Chi2)	0.0000	0.0000
5	t-statistic	6.33	6.06
6	Wald chi-square	107.95	134.32

From the Table 4.19, the coefficient of 0.00526 indicate that there is a positive relation between profitability (PR) and operational efficiency (OE) meaning that a unit increase in profitability level of the banks will have an equivalent increase in the efficiency ratio by 0.0052 units for the banks through improved performance especially in asset quality that generates substantial income for the bank. Practically speaking therefore, banking efficiency has a direct relationship with bank profitability, bank liquidity and asset and liability structure management policy of banks (Ibrahim et al. 2,017; Lipunga, 2014; Alrafadi et al., 2014). It suggests that the higher the operational efficiency, the higher the profitability to be gained from the operation when all other variables such as liquidity, asset, capital adequacy ratio are prudently and optimally managed. This result is confirmed by the t-statistic of 6.06 when bank size is introduced and controlled optimally. The result is further affirmed by the regression variation of the model output result of the banking system.

Table 4.20 showing the Comparative Statistics of BL on OE with and without moderation

S/N	Parameters	Without moderation (Model 1)	With moderation (Model 2)
1	Coefficient (β)	-.003661	.003247
2	Standard Error	0.0004253	0.000418
3	P- value	0.000	0.000
4	Overallsig. (Prob>Chi2)	0.0000	0.0000
5	t-statistic	8.71	7.75
6	Wald chi-square	107.95	134.32

Table 4.20, indicate the t-statistic and Wald chi square for the moderating effect of bank size and bank liquidity show a significant effect statistically (7.75; 134.32; p-value=0.000 < 0.05). The implication of this is that a positive relationship exists between bank liquidity and operational efficiency with the two models. The intensity of introducing bank size from the model output could be felt when more quality asset are maintained by the banks, and a drastic reduction in bad loans or increase in loans repayment especially the substandard loans/credits are made, leading to higher profitability (SheabaRaini et al., 2017; Naceur et al., 2003; Hallunovi et al., 2016; Adjei-Frimpong et al., 2014). Again, it suggests that the higher the liquidity of the bank, there is the likelihood to increase the quality of total asset of the banks by a unit margin of 0.003 while the t-statistic also showed little improvement for the banks during the period.

Table 4.21 showing the Comparative Statistics of the Overall Model Fitness for the moderating effect of BS on the influence of BFS on OE with and without moderation

S/N	Parameters	Without moderation (Model 1)	With moderation (Model 2)
1	Coefficient (β)	-.447518	1.985694
2	Standard Error	0.06169	0.3945404
3	P- value	0.000	0.000
4	Overallsig. (Prob>Chi2)	0.0000	0.0000
5	t-statistic	7.25	5.03
6	Wald chi-square	107.95	134.32
7	R square	0.802	0.846

The chi square and the overall correctness in the model as shown in Table 4.21, show that bank size as a moderator has an overall significant effect on the relationship between changes in the total asset and the overall operational efficiency ratio in the industry. It suggests that all the predictor variables significantly influenced the efficiency level of the banks. With or without moderation, the two models are statistically significant (p-value=0.000 < 0.05) at 95% degree confidence intervals. The moderation influence could be felt by a difference of about 5% which is statistically significant. (85% & 80%). It suggests that larger banks can influence more asset holding in the industry than smaller banks due to size. The t-statistic support the result with an improved performance from 7.25 to 5.03 suggesting that the strength of the correlational relation was higher under moderation than when no moderation is introduced.

Table 4.22 Variables in Equation for Moderating effect of bank size on the influence between BFS and OE of DMBs in Nigeria.

Variables	β	S.E	Wald	df	Sig.	t- Statistic
AQ	-.0363	.0124	107.95	1	0.003	-2.93
CA	-.0143	.0016	107.95	1	0.000	-8.81
PR	.0052	.0008	107.95	1	0.000	6.33
BL	.0036	.0004	107.95	1	0.000	8.71
AQ by BS*	-.0255	.01214	107.95	1	0.035	-2.11
CA by BS *	-.0438	.0048	107.95	1	0.000	-9.38
PR by BS*	.0188	.0028	107.95	1	0.000	6.06
BL by BS*	.00324	.0004	107.95	1	0.000	7.75
Constant	1.985	.394	107.95	1	0.000	5.03

Variables entered: Asset Quality (AQ), Capital Adequacy (CA), Profitability (PR), Bank liquidity (BL), BS= Bank Size. AQ* Strength/intensity of BS, CA* strength/ intensity of BS, PR* strength/intensity of BS and BL* strength/intensity of BS.

From the above Table 4.22, it clearly depict that bank size has a statistical significant effect on OE with the Wald chi square = 134.32 and probability > chi square = 0.000. From the overall model fitness, it can be concluded that the moderating effect of bank size showed significant intensity or strength on the dependent variable with the following explanations. For instance, bank size indicated a negative influence on operational efficiency ratio indicating an inverse relationship between the two variables. This is confirmed by Haan et al. (2011), that bank size has a negative influence on return volatility. Furthermore, the result indicate a weak linear negative relationship between (OE and AQ); (CA and BS) suggesting that the operational efficiency of the sampled banks have not been adequate. It indicates that an inverse relationship exist between (OE and AQ); (CA and BS) meaning that banks non-performing loans (NPLs) are in high proportion to the active and performing loans (PLs). The study from Mohd-zaini (2010) corroborates it that, high non-performing loans can act as a significant source of bank failure. This suggests that the intensity

and the strength exhibited by bank size on asset quality is that the larger the total asset of the banks. There is the likelihood that asset quality would have been impaired or low as a result of high non-performing loans or delinquent credits in the credit portfolio of these banks (Kolapo et al., 2012; Umar, 2015) (Beta coefficient= -0.363 to -0.255; t-statistic= -2.93 to -2.11).

For capital adequacy, with or without moderation, this variable is found to be significant statistically (p-value= 0.000 < 0.05). This suggests that the intensity of the influence of bank size on the capitalization of the banks is low compared to the level of efficiency attained during this period under the two models. For the variable (CA), it suggests that the total equity of the banks is low compared to the level of operational activities/ capabilities undertaken during the period while for (BS), it suggest that the total assets of the banks is small comparatively to the level of the economic activities present in the economy or a large chunk of the assets are held in bad quality and obsolete.

As regards the profitability as a predictor variable on operational efficiency for the banks, there is a positive statistical significance with p-value = 0.000 < 0.05 at both levels. This indicate that at both levels of the models (with or without moderation), the profitability position of the banks are fair in tandem with their operational capabilities/opportunities. Conclusively and in consistence with Adeusi et al. (2014), it shows that the larger the total asset of banks, the higher the profitability (β=52.69 to 48.82 and t-statistic=6.33 to 6.06).

Similarly, the same positive significant effect is obtained for bank liquidity between its relationship with bank size for the two models (p-value=0.000<0.05, 95% confidence level). It shows that the intensity of bank size could be felt by the larger banks with more favorable liquidity position than the smaller banks in the industry. They can use the advantage to attract higher deposits from numerous customers with (β= 0.0036 to 0.00324; t-statistic= 8.71 to 7.75). Consistency can be drawn from the study of Berihun-Engida (2015), documenting that bank size and loan growth has negative influence on banking efficiency. It also suggests that larger banks always surpass the minimum liquidity requirements of CBN (30%) as a mark of stability and

strength within the industry. Consequently, it can be deduced from the results presented and discussed that the independent variables were all statistically significant at 0.05 level of significance (p-value=0.000<0.05). Apparently, the intensity of bank size moderating showed the required influence positively and negatively for the panel least regression models as well for the correlation coefficients of the output. The intervention of the moderation clearly suggests warning signals to both the individual banks and the regulatory authorities in Nigeria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In furtherance of achieving the core overall objective of this study, to examine the influence of bank financial soundness on operational efficiency of deposit money banks (DMBs) in Nigeria, the cardinal aim of this chapter is to provide a summary of the findings in line with the research objectives and hypotheses tested, from both descriptive and inferential statistics. Based on the empirical findings, conclusions are arrived at for each of the research objective (i-v). Specifically, the study explored the influence between the independent variables (BFS): asset quality, capital adequacy, profitability and bank liquidity on the dependent variable: operational efficiency (OE) while bank size was employed as the moderating variable for the study, thus two models were adopted by the study to unravel the effects or influence of all the predictor variables on the operational efficiency level of the sampled banks.

Summary of discussions of specific objectives/research hypotheses have been carried out as well as the practical pertinent meanings/interpretations of these results. The conclusion and recommendations from the study were principally drawn from the research findings in relation to the specific objectives. Consequent upon the research findings, certain limitations were encountered by the study, seeking further research studies. Relevant recommendations were made based on the findings to both, the bank managerial and the policy makers, so as to engender virile, sound and stable banking system in Nigeria. Suggestions for further research are also included in this chapter.

5.2 Summary of Findings

As presented in chapter one, this study concentrated on the need to unearth the lack of clarity as to whether and how the concept of efficiency operates in the Nigerian banking industry. From the foregoing therefore, the main purpose of the study was to examine and establish the influence of bank financial soundness on operational

efficiency of deposit money banks (DMBs precisely) in Nigeria. Basically, three point research problems were identified as forming the broad objective of this study. Based on this, there exist knowledge gaps on the investigation of the influence of bank financial soundness on operational efficiency in banking operations in Nigeria. The complex concept of banking efficiency worldwide as to its banking principles, measurement, quality and efficient service delivery needs to be critically examined especially in the developing economies of the world. Additionally, the composition of banking efficiency as to whether it is cost, profit or technical in nature remain a puzzle and controversial in banking literature. This has brought inconsistencies and mixed findings over the world. It is also documented by empirical studies that there is lack of clarity and unanimous submissions as regards bank financial soundness and operational efficiency in the finance literature. The multitude of problems and conflicting results therefore, demands further examination as envisioned by this study. From the foregoing research problems as presented in chapter one, five specific objectives were established to unravel the research problems over a lengthy period of ten year panel datasets. However, the study targeted all the deposit money banks but purposively selected fifteen banks based on the panel data available for the study.

Sequel to making this study unique, the theoretical foundation was drawn from major relevant finance literature. The asset and liabilities management structure was given attention first in terms of theoretical literature review. It is based on how to mitigate both liquidity and interest rate risks so as to avoid mismatch by banks. Additionally, Efficiency structure hypothesis and scale efficiency were critically reviewed due to their uniqueness to this study. The theories laid foundations for cost control achievable through economies of scale to make higher gains or profitability. Again the efficiency structure hypothesis emphasized the relationship between market structure and the firms with a view to lower unit cost through large market and efficiency. Agency and stakeholder theory were reviewed to educate the investors and managers on the need to reduce information asymmetry so as to improve their contractual relationship that can lead to higher efficiency.

Due to the nature of this study, quantitative research design method was employed, hence secondary data was collected from the annual reports and financial statements of banks sourced from the individual bank's website, CBN, NSE and NDIC respectively. From the statistical analysis point of view and as presented in chapter one, both descriptive and inferential statistics were employed to evaluate the various aspects relating to the research objectives of the study. The descriptive statistics involved mean, median, skewness, trend analysis and graphs while inferential statistics employed the use of ordinary least squares regression model. Various diagnostic tests were employed to determine the model fitness for the study. This involved normality, multicollinearity, heteroscedasticity, stationarity and linearity tests. Co-integration and Granger causality tests, Durbin-Watson tests for independence of the variables were equally performed. In a nutshell, summary of the various aspects of the research objectives and the findings on the various tests of the hypotheses of the study are indicated in the ensuing subsections.

5.2.1 Influence of Asset Quality on Operational Efficiency of DMBs in Nigeria

The first specific objective of this study was to determine the influence of asset quality on operational efficiency of deposit money banks in Nigeria. The hypothetical statement drawn from it was that asset quality has no significant influence on operational efficiency of DMBs in Nigeria. Descriptive statistical analysis indicated a wide variability and spread among the sampled banks as regards the efficiency in the employment of assets. The significance of coefficients of variation in the model also confirmed higher degree of variation especially as regards the spread of non-performing loans of the banks. The results from the panel least regression model employed indicated that asset quality has statistical significant influence on operational efficiency of the sampled banks. Also the coefficients of correlation showed a negative linear relationship between asset quality (AQ) and operational efficiency (OE). This suggests that the overall model applied can significantly be predictive of the outcome variable, thus leading to the submission that asset quality has significant influence on the operational efficiency (OE) of DMBs in Nigeria.

The basic theoretical foundation that fits for the interpretation of this findings are: the asset and liability management structure as well as the agency theory. The theories have advocated that the composition of a bank's asset must be in the right proportion of its operational capabilities so as to avoid a mismatch. Hence, such that non-yielding income assets like non-performing loans must not have higher proportion in the banks' asset or credit portfolio. This must be maintained by the bank, so as not to impair on its efficiency level as well as the total earnings/income for the bank. Banks should have a sound lending policy that transcend immediate goals of the bank but strategic which can only be achieved through adequate informational synergy between the branch and head office of the bank. Agency theory specifically state, that the owners must satisfy the managers of their business and ensure that information asymmetry does not arise between them. This action will definitely engender higher productivity with superior profitability and higher operational efficiency tailored towards bank financial soundness.

5.2.2 Influence of Capital Adequacy on operational efficiency of DMBs in Nigeria

Specific objective two of this study proposed that capital adequacy has no significant influence statistically on operational efficiency (OE) of listed deposit money banks in Nigeria. Descriptive statistics showed that the mean value of capital adequacy was .03% suggesting that the equity stake in the capital base of the banks were not adequate. Result from the panel regression analysis indicated that capital adequacy has statistical significant influence on operational efficiency. Even though, a negative relationship was established showing that they are inversely related. Coefficients of correlation showed that there was a negative significant relationship while higher degree of dispersion was indicated in the result also. This clearly indicates that the coefficient of correlation was significantly different from zero as shown by this result.

Adequacy of capital fund in banking is very germane to achieve bank soundness which could be likened to the issue of minimum capital standard from Basle Accord agreement. The results could best be interpreted with agency theory, stating that the

survival of an organization is based on the managers, who act as the agents to the shareholders who are the principals (capital providers). The managers of the principals' resources are expected to make sound decision to propel the bank to higher profitability through operational efficiency, for the benefits of stakeholders, especially the investors who are the providers of capital (equity capital). Higher efficiency from operation will bring more confidence into the system and encourage the investors to invest more in the business. However, agency problems usually arises which must be adequately managed by both the capital providers (investors) and the users of the capital (managers) for the organization such as agency cost through information symmetry.

5.2.3 Influence of profitability on operational efficiency of DMBs in Nigeria

The thrust of specific objective three was based on the hypothesis, that profitability has no significant influence on operational efficiency of deposit money banks in Nigeria. Analysis from the descriptive statistics indicated that the mean value shows that improved profitability was recorded and this spreads across the sampled banks. The correlation coefficient of profitability on operational efficiency was positive. This indicates that the explanatory power of the variable has statistical significance on operational efficiency. Inferential statistical analysis of the regression model employed, also suggest that profitability has positive significance statistically on operational efficiency. The descriptive and inferential model output results suggest that there was an improved informational relationship between the principals and the managers of the banks. This is translated into higher efficiency that brought increased profitability for the banks.

The theoretical justification that can be adduced to this level of profitability relates to the theories of scale efficiency and efficiency hypothesis, which are based on the application of economies of scale and optimum allocation of resources available to the banks. It advocate that, efficiency that brings superior profitability is arrived at where minimum levels of inputs are transformed into the optimum number of outputs, thus lower costs will eventually lead to higher productivity/profitability due to scale efficiency practice. Efficiency theory as evident from this finding, assumes

that the internal efficiencies of a firm influences its profitability level. It is equally a theory based on the minimum level of efficiency which should be attained by the banks that will lead to higher profitability than their competitors in the industry. This finding can be interpreted that banks that practice economies of scale could transform into lower operating costs operationally and strategically. In a nutshell, it relates to allocative efficiency practice which the banks adopted to ensure higher profitability leading to financial soundness of the banks.

5.2.4 Influence of bank liquidity on operational efficiency of DMBs in Nigeria.

The fourth specific objective as hypothesized is to investigate the influence of bank liquidity on operational efficiency of banks. The hypothesis states, that bank liquidity has no significant influence on operational efficiency of banks. The result from the descriptive statistics indicated that bank liquidity has the highest mean value with higher degree of variability and dispersions in the model. This suggests that the banks were all involved in high liquid assets holding instead of investing same. It might however be possible that treasury market was volatile during the period. This suggests that liquidity was never a problem for the banks during the period. The coefficients of correlation showed that bank liquidity was positively related to operational efficiency of the banks. Panel least regression analysis also confirmed, that bank liquidity has statistical significant influence on operational efficiency. The relevant theories which could interpret these findings are: asset and liability management structure stating that bank liquidity must be carefully managed in appropriate mix to ensure optimal structure continuously, for a virile and sound banking operation especially in a dynamic and turbulent environment like Nigeria.

The stock in trade of banks is money, hence bank always intermediate with the surplus funds from depositors to the borrowing customers who are always in deficit for investment purposes. To perform the intermediation role effectively, banks must be liquid enough to meet both the regulatory and customers' borrowing demand. However, a caution must be exercised in order to ensure optimal structure for asset and liabilities management especially as regards maturity of investments. This will again translate into higher profitability when bank liquidity is put into an overall

optimal use for the bank as well as when operational efficiency is applied in areas such as credit, foreign exchange, inter-bank transactions, treasury and other operations of the bank.

5.2.5 Moderating effect of bank size on operational efficiency of DMBs in Nigeria

In a bid to explore possible unique influence that bank size could play as a moderating variable for bank financial soundness on operational efficiency, this attribute in the industry was hypothesized. For banking/operational efficiency, the unique characteristic of bank size as industry-specific factor was employed to showcase its uniqueness and moderating influence. Based on this fact, bank size was employed as the fifth objective of this study as stated in chapter one. Consistent with prior studies therefore, natural logarithm of banks' total asset was proxy for bank size in this study's model. Descriptive statistics showed that bank size mean value of 28% was highest in this model. This indicates that, banks total asset were spread and dispersed across the banking industry. It also shows that improved closeness was recorded in the industry in terms degree of asset holding but subject to state of quality (obsolete) of the assets. The dispersion across the banking industry was even encouraging as regards the pivotal function, assets play in bank financial soundness. This is because banking is built on trust, hence holding more liquid asset as a component of total asset, may suggest satisfying customers' withdrawal demands or meeting statutory regulations of the CBN. Coefficients of correlation also attested to it that, asset quality and profitability are positively correlated. A negative correlation was recorded for capital adequacy and liquidity by the findings. This suggests that quality asset may enhance higher profitability but may affect holding more liquid asset and adequate capital at the same time. This will definitely affect the degree of total asset accumulated by the banks.

Inferential statistical analysis carried out corroborated findings from descriptive analysis, confirming that, bank size has significant influence of bank financial soundness on operational efficiency of the listed banks. However, this finding as derived from the model indicate a negative coefficients of influence but statistically

significant. The theoretical implication of this finding is that, both agency and stakeholder theories advocates, adequate information dissemination among the stakeholders of the business, so that efficiency would be improved in the operation of the business. This seems evident in the finding that bank size has significant influence operationally. An inference that could be drawn from this finding, is the present use of automated teller machine (ATMs) for withdrawal purposes where irrespective of the customer's bank, you are allowed to use any ATM machine. The issue of central data base for the banks in Nigeria for data sharing as regards credit information of borrowers supports this. Data sharing among the bank will definitely improve efficiency of banks and ensure optimal liquidity and cost reduction. All these are agency theory based, as regards the value of information symmetry within the banking industry. Again, the efficiency structure hypothesis equally assumes the practice of economies of scale to bring down operational costs, so as to increase bank size and profitability of the bank.

Conclusively, findings from the general model inferential statistics indicated that bank financial soundness have significant influence on operational efficiency of banks in Nigeria. The general coefficients of the variables were both positively and negatively significant, statistically. Additionally, preliminary findings and analyses as displayed by the explanatory powers of the predictors, confirmed the influence of bank financial soundness on operational efficiency. The overall model output result was statistically significant. Given the above statistical analyses, from both the descriptive and inferential statistical research employed by this study, one can conclude that bank financial soundness have considerable and significant influence on the operational efficiency of deposit money banks in Nigeria.

5.3 Conclusions

Based on the findings from the descriptive and inferential analyses conducted, this section presents the conclusions derived from this study.

Firstly, the study established from the descriptive statistical analysis that there is wide variability in the mean scores of the model variables. This is an indication that, the banking industry has higher degree of volatility especially as regards their

efficiency metrics. Both the bank-specific, industry-specific and macroeconomic factors, influences bank financial soundness. However, bank-specific factors play dominant role as supported by this findings. Thus, the finding from inferential statistics as regards influence of financial soundness of banks on operational efficiency was significant statistically. The result depict that, for a sound banking system to thrive, operational efficiency of the banks must be considered as important. However, it can be deduced that the attributes of operational efficiency and its sub-elements in practice are wide and varied across regions and environments.

Secondly, the analysis from this study, confirmed that asset quality has significant influence on operational efficiency of banks. Findings from the descriptive analysis show that the mean value of this variable indicates that all the banks sampled practice quality in their asset base, fairly. There is also high degree of dispersion for this variable among the banks. The findings from inferential statistics equally confirmed that there is a significant influence of asset quality on banks operations so as to ensure improved efficiency within the system. In a nutshell, it can be concluded that, asset quality assurance remain vital in the operation of banking business. This means that its employment as a predictor variable in this study suggests that, it needs improvement so that its implicit merits would be derived for the entire banking system. This suggests that, sound credit risk policies are desirable for the banks, to have higher efficiency level for the banking system in Nigeria.

Thirdly, capital adequacy has significant influence on the operational efficiency of deposit money banks in Nigeria. With inferences from both the descriptive and inferential analyses, there exists, a strong negative significant relationship between capital adequacy and operational efficiency. The mean value recorded by the study indicate weak dispersion among the banks, however, the result show a negative statistical significance to operational efficiency. Consequently, it can be concluded that, capital adequacy remain an important variable that can significantly improve efficiency, if the mix of equity capital is high. In the finance literature, evidence abounds on the influence of capital and its adequacy, which has been proved again, in the light of the submissions from this study.

Exploring the influence of profitability as a predictor variable was conducted and confirmed by the findings from this study. The findings indicate that profitability has a positive statistical and significant influence on operational efficiency. Findings from the descriptive analysis reveal that the mean value of profitability is low among the banks. This suggests that there is inefficiency in the operation of the banks affecting income generation. However, the inferential statistics indicate, that profitability has strong positive influence on operational efficiency. The findings from this study therefore, have contributed to the literature on profitability influence in banking literature. Conclusively, the influence of profitability on the operational efficiency of banks remains significant and important statistically.

Furthermore, the influence of bank liquidity was documented with this finding from this study. It was also documented by this study, that bank liquidity has a fair dispersion within the industry. The regression analysis equally supported the finding by confirming that, bank liquidity has positive influence on operational efficiency of banks. The conclusion to be drawn from this finding, is that bank liquidity remains a vital variable as well as input in banking business, since bank must be liquid to serve its customers and the regulators. This study therefore, documents and adds, to the growing empirical research in finance literature that bank liquidity has influence in banking operational efficiency.

In addition, the strength or intensity of the relationship of bank size, proxy for natural logarithm of total asset as the moderator was equally established by this study. Result from the findings generated from descriptive statistics indicates a fair dispersion within the industry. This show that bank size has a moderately average influence on efficiency among the banks, meaning that total asset is spread across all the banks. It was documented by this study that, bank size and operational efficiency are negatively correlated. This implies that bank size has negative significant moderating effect or intensity on operational efficiency of deposit money banks in Nigeria. It therefore suggests that, a unit increase change in bank size will result into a unit change in an adverse direction (decrease) in operational efficiency. It can therefore be concluded that bank size has exerted strong positive and negative significant influence, in terms of strength/intensity on the relationship between bank

financial soundness (BFS) and operational efficiency (OE). The regression results revealed that, a significant relationship exist between bank financial soundness (BFS) and operational efficiency (OE). In conclusion, it was revealed from the study that the listed banks have relatively poor efficiency ratings generally as compared to the advanced world, where the socio-economic developments of those countries are highly developed. The trend analysis result, showed average improvements over the study period especially towards the end period of 2016 moving higher within a year with the highest efficiency level recorded in 2010. Consequently, this study has documented that, bank size employed as moderator has statistical influence on banking efficiency, even though a negative relationship was established by this study.

Lastly, the overall general objective of this study has provided a fundamental opportunity to understand and draw conclusions on the influence of bank financial soundness and the concept of banking/operational efficiency. Based on the identified predictor variables of this study, the explanatory powers of the variables confirmed that all the variables have significant influence on the response variable (operational efficiency). The regression coefficients for the variables were either positive or negative but statistically significant at 0.05 level of significance. Both the descriptive and inferential statistics indicate that the variables have significance statistically, on operational efficiency of deposit money banks in Nigeria. Again, the preliminary findings also confirm the regression model output results.

Consequently and conclusively, this study has documented statistically the significant influence of bank financial soundness on the operational efficiency in the Nigerian banking sector. As construed by this study through its general objective, one can conclude that, all the explanatory variables identified by this study, significantly and statistically influenced operational efficiency to enhance financial soundness and health in the Nigerian banking sector. The theoretical relevance of efficiency in banking was equally drawn from asset and liabilities management theories, scale and efficiency structure hypothesis while agency and stakeholders' theory were not left out. These theories cannot be underestimated in sound banking

practice across the globe as regards the informational role they play, and the provision of credit risk management policies aim at enhancing operational efficiency.

5.4 Recommendations

With increased competition, the need to be efficient in banking operation requires continuous update of knowledge all over the world. Drawing from the findings and the conclusions of this study, the following recommendations (managerial and policy based) are presented so as to improve banking/operational efficiency in Nigeria.

5.4.1 Managerial recommendations

Firstly, banks need to improve their asset quality through injecting more equity based funding in the capital base is paramount. Asset quality constitutes a veritable tool to enhance the operational efficiency of banks. Credit risk as a component of the asset of the banks must constantly be reviewed to meet daily challenges of operation. In other words, the credit risk management policies and procedures of the bank must be sound to tackle any financial shocks within the system. Banks must have a holistic institutional approach to monitor the branches regularly for improved asset holdings. Training, retraining and development of staff especially credit officers on how to process credit proposals and engender appropriate credit portfolio standard in tandem with international best practices must be introduced. This will no doubt impact positively on the general operational efficiency level for the banks, mostly on interest income generation which constitute the highest source of income generation for banks.

Secondly, capital adequacy for the banks must be improved for it to commensurate with present operational activities or realities of the banks. Its review must be the focus of the regulators of the industry and should be continuous or time frame bound. Banks should also work on their operational expenses particularly overhead which constitute larger chunk of the expenses they daily incur. They should specifically work on staff remuneration and benefits including the management fee and directors' fee. This will no doubt go a long way to reducing total expenses of the banks and improve efficiency and profitability generally for the banks.

Thirdly, as a strategic option to attain operational efficiency, the liquidity management of the banks should be considered, reviewed in tandem with their daily operational liquidity requirement, and must be taken seriously too. This is germane to the operational performance of these financial intermediating institutions especially as regards foreign exchange market, credit/loan disbursement, treasury operations, as well as other sectors of the economy.

Lastly, banks must take the issue of ICT seriously especially as regards the current abysmal functionality of the Automated Teller Machines and other payment channels which attracts complaints of the customers daily in Nigeria. This will increase customer satisfaction, ensure loyalty and boost public confidence in the banking system. It will no doubt assist the economy to thrive and to achieve her macro-economic objectives.

5.4.2 Policy recommendations

Firstly, the major policy recommendation arising from this study is centered on the supervision and regulation of banking business in Nigeria. The Central Bank of Nigeria and other regulatory authorities involved in the monitoring and supervision of banks should have enhanced risk-based supervision especially as regards credit portfolio management, non-performing loans, liquidity /assets management of the bank. The regulators need to be proactive and ensure early detection of distress signals in the banking system for quick resolution of such problems. The CBN should provide strict enforcement of prudential guidelines as well as a revamped resolution framework for the banking industry.

Secondly, the present 25 billion naira capital base seems not to be adequate for the present banking activities in Nigeria anymore. In agreement with prior recommendations, the regulatory and monitoring machinery of the CBN and other allied institutions should improve on the use of ICT. The IMF report of Article IV consultation had advised the CBN to conduct an asset quality review, so as to identify any potential capital need for the Nigerian banking system. To this end, credit reporting as a vital instrument to bad loan/credit management is advocated for all banks, in line with the submission of the Credit Bureau Association of Nigeria

stating that a sound credit reporting system promotes robust, credit and operational risks management in any economy. Essentially, the issue of code of corporate governance should be strictly adhered to by banks and monitored by the regulatory authorities of CBN and NDIC. This would go a long way to reduce the insider abuse regarding high non-performing loans of the banks and other operational/credit infractions usually engaged by both the executives and non-executive directors of these banks.

Thirdly, the national assembly should legislate and review the existing laws on new methods of payment system in the country especially e-banking system and the cybercrimes pervading the industry. A colossal amount of money is daily being lost to electronic frauds, some of which the existing laws cannot adequately protect the bank as intermediaries/agents of these funds.

Furthermore, based on the findings of this study, the issue of socio-economic infrastructural development especially power and road network is also seeking policy attention. This impedes movement to rural branches/areas as well as its attendant security risks. Banks complain always about the amount of diesel they use to power their generators and computers for efficient performance. They link this to high overhead expense they daily incur in banking operations. This singular bold effort if taken would go a long to reducing bank charges/cost to customers. This will pave way to rapid economic transformation of the country especially through lending/borrowing customers who are regarded as economic actors. The government must wake up to improve on telecommunication network to facilitate quick settlement of payment/funds, improved socio-political climate anchoring the entire financial system as well as power generation. All these measures would reduce drastically, the inefficiency pervading banking industry in Nigeria.

Finally, this study contributes to the field of banking research by establishing and improving on the existing corporate finance theory, through the empirical findings submitted by this study. By way of inference from the findings of the study therefore, efficiency can be improved through improved information across the board, reduction in operational costs that engenders improved quality based banking service

and general improvement of financial soundness or health of the banking subsector. Consequently, the general economy will benefit to attract foreign direct investment and businesses from overseas. In other words, there is the need for concerted effort to be put in place in terms of processes, procedures, standards by the regulators to guarantee efficient service delivery. As a matter of importance, the establishment of central credit risk management system for the banking sector is long overdue from the CBN. This will no doubt improve the general efficiency of the banking sector in Nigeria.

5.5 Suggestions for Further Research

This study experienced various limitations which may attract further research with a view to addressing the constraints, so identified by it. From the foregoing therefore, this study suggests that future study attempt should consider extending the study horizon and period for a relatively longer time as well as total coverage of the financial sector to investigate bank financial soundness as it influences operational efficiency. This will include the non-financial sector, bureau de change, micro finance institutions, and capital market, and insurance, mortgage and development institutions in the Nigerian economy. Such studies may extend to listed companies and tertiary institutions in the country. This will go a long way to gauge and measure empirically the general efficiency of operating banks for the overall economic wellbeing of the Nigerian people.

The study employed quantitative research model to unravel the operational efficiency of deposit money banks in Nigeria, thereby not engaging in the non-quantitative aspect of the research i.e. the use of questionnaire. This study suggests and advocates that, future study should evaluate the influence of qualitative aspect of the research by including management and corporate governance aspects in operational efficiency of banks. This study also suggests that other measurement approach/metrics should be employed to examine operational efficiency with its possible economic implications. Specifically, future study should be extended to concentrate on other factors affecting banking efficiency, such as managerial competence, behavioral/emotional factors affecting staff and the regulators, impact of foreign

currency inflow and other macroeconomic variables in the Nigerian banking system. To this end, mixed research paradigm can be explored in future research.

In a future banking research based study, further investigation should be channeled to study banking efficiency in emerging and developing markets like Africa where current studies are relatively low to developed markets. This will also improve banks' efficient performance generally. For instance, a cross-border research covering the West African sub region can be done so as to unravel the level of efficiency/inefficiency of our banking institutions in West Africa since a single currency is being contemplated by the Economic Community for West African States (ECOWAS) with the regional membership drawn from Nigeria, Ghana, Gambia and Sierra Leone.

Consequently, the quality of banking service can be improved greatly, if future studies are encouraged to unravel the influence of efficiency in the performance of business or government affairs. The exploration of moderating variables in future research can engage more scholars by looking at other variable's attributes, like pricing policy/strategy, market structure. In conclusion, this study's submissions would further enrich the finance literature and at the same time expanding its empirical base for future research.

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APPENDICES

Appendix 1: List of Deposit Money Banks Operating in Nigeria

1. Access Bank Nigeria Plc
2. Citibank Nigeria Limited
3. Diamond Bank Plc
4. Ecobank Nigeria Plc
5. Enterprises Bank Ltd
6. Heritage Bank Ltd.

7. Fidelity Bank Plc

8. First Bank Nigeria Plc
9. First City Monumental Bank Plc
10. Guaranty Trust Bank Plc
11. Keystone bank Ltd.
12. Mainstreet Bank Ltd.

13. Skye Bank Nigeria Limited.

14. Stanbic IBTC Bank Plc

15. Standard Chartered bank Nigeria Ltd

16. Sterling Bank Nigeria Ltd

17. Union Bank of Nigeria Plc
18. United Bank for Africa Plc. (UBA)
19. Unity Bank Plc
20. Wema Bank Plc
21. Zenith Bank Plc

Source: Central Bank of Nigeria (2016).

Appendix II Data Collection Matrix

Total Loan Loss Provision (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	184.5	309.6	363.3	299.6	272.5	303.7	380.9	455.5	524.8	5829.2
Citibank	100.3	168.2	197.4	162.8	148.0	165.0	207.0	247.5	285.1	3167.2
Diamond Bank	155.8	261.4	306.8	253.0	230.1	256.4	321.7	384.6	443.2	4922.5
Ecobank,	623.4	137.6	161.5	133.2	121.1	135.0	169.3	202.4	233.2	2590.8
Fidelity Bank plc	63.8	107.0	125.6	103.5	94.2	104.9	131.6	157.4	181.4	2014.3
First bank plc	73.8	123.8	145.3	119.9	109.0	121.5	152.4	182.2	209.9	2331.7
First City Monument Bank	116.9	196.1	230.1	189.8	172.6	192.3	241.2	288.5	332.4	3691.8
Guaranty Trust Bank	71.8	120.4	141.3	116.5	106.0	118.1	148.1	177.1	204.1	2266.9
Skye Bank plc	61.5	103.2	121.1	99.9	90.8	101.2	127.0	151.8	174.9	1943.1
Stanbic IBTC	86.1	144.5	169.6	139.8	127.2	141.7	177.8	212.5	244.9	2720.3
Union Bank plc	79.8	133.8	157.0	129.5	117.8	131.3	164.6	196.9	226.8	2519.5
United bank for Africa	102.5	172.0	201.9	166.5	151.4	168.7	211.6	253.0	291.6	3238.5
Unity Bank plc	254.3	426.5	500.6	412.8	375.4	418.4	524.8	627.5	723.1	8031.4
Wema Bank plc	195.8	328.5	385.6	317.9	289.1	322.2	404.2	483.3	556.9	6185.5
Zenith Bank plc	127.1	213.3	250.3	206.4	187.7	209.2	262.4	313.8	361.5	4015.7
Total Asset (N' Billion)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	1065.2	1544.2	1699.7	1681.2	1881.5	2065.0	2357.2	2665.7	2727.4	2844.0
Citibank	427.2	619.3	681.6	674.2	754.5	828.1	945.3	1069.0	1093.8	1140.5
Diamond Bank	615.0	891.5	981.3	970.6	1086.2	1192.1	1360.9	1539.0	1574.6	1641.9
Ecobank	2890.4	748.2	823.6	814.6	911.6	1000.5	1142.2	1291.6	1321.5	1378.0
Fidelity Bank plc	275.6	399.6	439.8	435.0	486.9	534.3	610.0	689.8	705.8	735.9
First Bank plc	340.4	493.5	543.2	537.3	601.3	659.9	753.3	851.9	871.6	908.9
First City Monument Bank	472.2	684.5	753.5	745.3	834.1	915.4	1045.0	1181.7	1209.1	1260.7
Guaranty Trust Bank	435.6	631.5	695.1	687.5	769.5	844.5	964.0	1090.2	1115.4	1163.1
Skye Bank plc	427.2	619.3	681.6	674.2	754.5	828.1	945.3	1069.0	1093.8	1140.5
Stanbic IBTC	351.4	509.4	560.7	554.6	620.7	681.2	777.6	879.4	899.8	938.2
Union Bank plc	582.0	843.7	928.7	918.6	1028.0	1128.3	1288.0	1456.5	1490.2	1553.9
United Bank for Africa plc	450.2	652.7	718.4	710.6	795.3	872.8	996.3	1126.7	1152.8	1202.1
Unity Bank plc	1032.3	1496.4	1647.1	1629.2	1823.3	2001.1	2284.3	2583.3	2643.1	2756.0
Wema Bank,	829.1	1201.9	1323.0	1308.5	1464.4	1607.3	1834.7	2074.9	2122.9	2213.6

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Zenith bank plc	1010.3	1464.6	1612.1	1594.5	1784.5	1958.5	2235.7	2528.3	2586.8	2697.4
Total Gross Loan (N' Million)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Access Bank plc	171.6	287.8	337.8	278.5	253.3	282.3	354.1	423.4	487.9	5419.0
Citibank	211.9	355.4	417.2	344.0	312.8	348.7	437.3	522.9	602.6	6692.8
Diamond Bank	293.9	493.0	578.7	477.2	433.9	483.6	606.6	725.3	835.8	9283.6
Ecobank	1165.9	454.8	533.9	440.2	400.3	446.2	559.7	669.2	771.1	8564.7
Fidelity	287.1	481.5	565.2	466.1	423.8	472.4	592.5	708.5	816.4	9067.7
First Bank plc	265.9	446.0	523.5	431.7	392.6	437.5	548.8	656.2	756.1	8398.4
First City Monument Bank	341.8	573.3	672.9	554.9	504.6	562.4	705.4	843.4	971.9	10794.9
Guaranty Trust Bank	847.6	1421.7	1668.7	1376.1	1251.4	1394.6	1749.4	2091.7	2410.2	26771.3
Skye Bank plc	218.7	366.9	430.6	355.1	322.9	359.9	451.5	539.8	622.0	6908.7
Stanbic IBTC	362.3	607.7	713.2	588.2	534.9	596.1	747.7	894.0	1030.2	11442.6
Union Bank plc	280.2	470.1	551.8	455.0	413.8	461.1	578.4	691.6	796.9	8851.8
United bank for Africa plc	212.6	356.6	418.5	345.1	313.8	349.8	438.8	524.6	604.5	6714.4
Unity Bank plc	246.1	412.7	484.5	399.5	363.3	404.9	507.9	607.3	699.7	7772.3
Wema Bank plc	389.6	653.5	767.1	632.5	575.2	641.1	804.1	961.5	1107.9	12306.2
Zenith Bank plc	293.9	493.0	578.7	477.2	433.9	483.6	606.6	725.3	835.8	9283.6
Total Equity (N' Million)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Access Bank plc	120.4	157.1	165.4	226.4	217.0	248.7	229.7	306.7	279.5	333.0
Citibank	168.5	219.9	231.6	316.9	303.8	348.2	321.6	429.4	391.4	466.1
Diamond	156.1	203.7	214.5	293.5	281.4	322.5	297.9	397.7	362.5	431.7
Ecobank	780.4	261.8	275.7	377.3	361.6	414.6	382.9	511.2	465.9	554.9
Fidelity Bank plc	497.5	649.4	683.8	935.7	896.9	1028.2	949.6	1267.9	1155.4	1376.2
First Bank plc	389.2	508.0	534.9	731.9	701.6	804.3	742.8	991.8	903.8	1076.6
First City Monument Bank	156.1	203.7	214.5	293.5	281.4	322.5	297.9	397.7	362.5	431.7
Guaranty Trust Bank	224.7	293.3	308.8	422.6	405.0	464.3	428.8	572.6	521.8	621.5
Skye Bank plc	188.6	246.1	259.2	354.6	339.9	389.7	359.9	480.6	437.9	521.6
Stanbic IBTC	100.7	131.4	138.4	189.4	181.5	208.1	192.2	256.6	233.9	278.6
Union Bank plc	156.1	203.7	214.5	293.5	281.4	322.5	297.9	397.7	362.5	431.7
United Bank for Africa plc	128.4	167.6	176.5	241.5	231.4	265.3	245.0	327.2	298.2	355.2
Unity Bank plc	212.6	277.6	292.3	399.9	383.3	439.5	405.9	541.9	493.8	588.2
Wema Bank plc	164.5	214.7	226.1	309.4	296.5	340.0	314.0	419.2	382.0	455.0
Zenith Bank plc	377.1	492.3	518.4	709.3	679.9	779.4	719.8	961.1	875.9	1043.3

Liquid Assets (N' Billion)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	444.0	648.7	709.0	697.5	783.8	862.0	990.6	1123.9	1124.9	1198.8
Citibank	409.6	598.4	654.1	643.5	723.1	795.3	913.9	1036.9	1037.8	1105.9
Diamond bank	401.7	586.8	641.4	631.0	709.0	779.8	896.2	1016.7	1017.7	1084.5
Ecobank	1285.4	482.7	527.6	519.1	583.3	641.5	737.2	836.4	837.2	892.1
Fidelity Bank plc	547.3	799.5	873.9	859.7	966.0	1062.5	1221.0	1385.3	1386.6	1477.5
First Bank plc	464.8	679.0	742.2	730.2	820.4	902.4	1037.0	1176.5	1177.6	1254.9
First City Monument Bank	477.5	697.6	762.5	750.2	842.9	927.1	1065.4	1208.7	1209.9	1289.2
Guaranty Trust Bank plc	490.3	716.2	782.8	770.2	865.4	951.8	1093.8	1241.0	1242.1	1323.6
Skye Bank plc	503.0	734.8	803.2	790.2	887.9	976.6	1122.2	1273.2	1274.4	1358.0
Stanbic IBTC	515.7	753.4	823.5	810.2	910.3	1001.3	1150.6	1305.4	1306.6	1392.4
Union Bank plc	516.3	754.3	824.4	811.1	911.3	1002.4	1151.9	1306.8	1308.1	1393.9
United bank for Africa plc	1280.4	1870.6	2044.5	2011.4	2260.1	2485.9	2856.6	3241.0	3244.0	3456.9
Unity Bank plc	330.4	482.7	527.6	519.1	583.3	641.5	737.2	836.4	837.2	892.1
Wema Bank plc	259.2	378.6	413.8	407.2	457.5	503.2	578.2	656.0	656.7	699.7
Zenith bank plc	320.1	467.6	511.1	502.9	565.0	621.5	714.2	810.2	811.0	864.2
Other Income (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	3276664.0	4548888.0	3385817.0	6106872.0	4028328.0	5633321.0	6156519.5	6679717.9	7029826.1	7263225.6
Citibank	2695456.0	3742016.0	2785248.0	5023648.0	3313792.0	4634094.0	5064489.0	5494883.6	5782890.4	5974890.0
Diamond Bank plc	4464349.0	6197714.0	4613067.0	8320417.0	5488468.0	7675219.0	8388059.9	9100900.9	9577912.2	9895911.5
Ecobank	18303831.0	4794458.0	3568599.0	6436549.0	4245796.0	5937433.0	6488876.5	7040319.6	7409328.3	7655327.8
Fidelity Bank plc	7917902.0	10992172.0	8181666.0	14756966.0	9734264.0	13612652.0	14876936.5	16141220.5	16987241.0	17551239.3
First Bank plc	2114248.0	2935144.0	2184679.0	3940424.0	2599256.0	3634868.0	3972458.6	4310049.3	4535954.7	4686554.3
First City Monument Bank	2611223.0	3625078.0	2698209.0	4866659.0	3210236.0	4489279.0	4906223.7	5323168.5	5602175.1	5788174.6
Guaranty Trust Bank	3622019.0	5028334.0	3742677.0	6750527.0	4452908.0	6227064.0	6805407.1	7383749.8	7770759.0	8028758.4
Skye Bank plc	3341523.0	4638930.0	3452837.0	6227754.0	4108067.0	5744829.0	6278383.7	6811938.5	7168976.9	7406996.4
Stanbic IBTC	3537786.0	4911396.0	3655638.0	6593538.0	4349352.0	6082249.0	6647141.8	7212034.7	7590043.7	7842043.1
Union Bank plc	2695456.0	3742016.0	2785248.0	5023648.0	3313792.0	4634094.0	5064489.0	5494883.6	5782890.4	5974890.0

United Bank for Africa plc	4464349.0	6197714.0	4613067.0	8320417.0	5488468.0	7675219.0	8388059.9	9100900.9	9577912.2	9895911.5
Unity Bank plc	3453553.0	4794458.0	3568599.0	6436549.0	4245796.0	5937433.0	6488876.5	7040319.6	7409328.3	7655327.8
Wema Bank plc	2619646.0	3636772.0	2706913.0	4882358.0	3220592.0	4503761.0	4922050.3	5340340.0	5620246.6	5806846.2
Zenith bank plc	3032388.0	4209768.0	3133404.0	5651604.0	3728016.0	5213356.0	5697550.1	6181744.0	6505751.7	6721751.2

Gross Earnings/ Total Income (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	101750.0	121249.5	146519.0	160655.6	193007.6	210888.4	260597.8	315377.7	330387.9	347400.0
Citibank	168523.5	200819.5	242672.2	266085.9	319668.9	349283.9	431615.0	522344.3	547205.0	575381.3
Diamond Bank plc	130367.2	155351.0	187727.5	205840.0	247291.0	270200.7	333890.9	404077.6	423309.5	445106.3
Ecobank	405442.0	117839.4	142398.2	156137.2	187579.3	204957.1	253268.4	306507.7	321095.7	337629.4
Fidelity Bank plc	114468.8	136405.7	164833.9	180737.6	217133.6	237249.4	293172.5	354799.9	371686.4	390825.0
First Bank plc	95390.6	113671.4	137361.6	150614.6	180944.6	197707.9	244310.4	295666.6	309738.7	325687.5
First City Monument Bank	133546.9	159140.0	192306.2	210860.5	253322.5	276791.0	342034.6	413933.2	433634.1	455962.5
Guaranty Trust Bank	123689.9	147394.0	178112.2	195297.0	234624.9	256361.2	316789.2	383381.0	401627.8	422308.2
Skye Bank plc	158984.4	189452.4	228936.0	251024.4	301574.4	329513.1	407184.0	492777.6	516231.1	542812.6
Stanbic IBTC	394281.3	469842.0	567761.3	622540.5	747904.5	817192.5	1009816.3	1222088.4	1280253.1	1346175.1
Union Bank plc	136726.6	162929.1	196885.0	215881.0	259354.0	283381.3	350178.2	423788.7	443958.8	466818.8
United bank for Africa	126138.2	150311.5	181637.8	199162.8	239269.1	261435.7	323059.8	390969.7	409577.8	430667.5
Unity Bank plc	123689.9	147394.0	178112.2	195297.0	234624.9	256361.2	316789.2	383381.0	401627.8	422308.2
Wema Bank plc	187601.6	223553.8	270144.5	296208.8	355857.8	388825.5	480477.1	581477.6	609152.7	640518.8
Zenith bank plc	152625.0	181874.3	219778.6	240983.4	289511.4	316332.6	390896.6	473066.5	495581.9	521100.0

Total Non-Performing Loan (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	101.1	183.3	227.3	169.6	139.0	154.9	205.1	269.7	310.8	350.1
Citibank	25.7	45.6	56.6	42.5	34.6	84.0	50.6	68.7	108.7	125.6
Diamond	64.7	117.3	145.4	108.5	88.9	99.1	131.3	172.6	198.9	224.7
Ecobank	342.9	194.3	240.9	179.7	147.3	164.1	217.4	285.8	329.4	371.1
Fidelity	82.9	150.3	186.3	139.0	113.9	127.0	168.2	221.1	254.8	287.9
First Bank plc	67.3	122.1	151.3	112.9	92.5	103.1	136.6	179.6	207.0	231.7
First City Monument Bank	49.3	89.5	110.9	82.7	67.8	75.6	100.1	131.6	151.6	178.5

Guaranty Trust Bank	95.0	172.3	213.6	159.4	130.6	145.6	192.8	253.5	292.1	330.0
Skye Bank plc	50.8	92.0	114.1	85.1	69.8	77.7	103.0	135.4	156.0	175.5
Stanbic IBTC	78.7	142.6	176.8	131.9	108.1	120.5	159.6	209.8	241.8	273.8
Union Bank	88.7	162.6	170.8	135.1	120.0	122.7	160.7	215.8	255.7	253.2
United Bank for Africa plc	113.2	205.3	254.5	189.9	155.6	173.4	229.7	302.0	348.0	3921.2
Unity Bank plc	95.0	172.3	213.6	159.4	130.6	145.6	192.8	253.5	292.1	3291.0
Wema Bank plc	84.9	154.0	190.9	142.4	116.7	130.1	172.3	226.5	261.0	2940.9
Zenith Bank plc	78.7	142.6	176.8	131.9	108.1	120.5	159.6	209.8	241.8	2723.8
Corporate Tax paid by banks (N' Million)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Access Bank plc	5973.2	5724.8	4417.8	7855.3	15516.4	9921.3	16326.8	1875.6	2508.1	826.7
Citibank	8598.9	8241.4	6359.8	11308.4	22337.3	14282.5	23503.9	2700.1	3610.6	1190.1
Diamond	7216.9	6916.9	5337.7	9491.0	18747.4	11987.1	19726.5	2266.2	3030.3	998.8
Ecobank	18114.5	3693.9	2850.6	5068.6	10011.9	6401.6	10534.8	1210.2	1618.3	533.4
Fidelity Bank plc	5973.2	5724.8	4417.8	7855.3	15516.4	9921.3	16326.8	1875.6	2508.1	826.7
First Bank plc	4899.8	4696.1	3624.0	6443.8	12728.3	8138.5	13393.0	1538.6	2057.4	678.2
First City Monument Bank	4425.4	4241.4	3273.0	5819.8	11495.7	7350.4	12096.1	1389.6	1858.2	612.5
Guaranty Trust Bank,	3950.9	3786.6	2922.1	5195.8	10263.2	6562.3	10799.2	1240.6	1658.9	546.8
Skye Bank	3476.4	3331.9	2571.2	4571.8	9030.6	5774.2	9502.3	1091.6	1459.7	481.1
Stanbic IBTC	3001.9	2877.1	2220.3	3947.8	7798.1	4986.1	8205.4	942.6	1260.5	415.5
Union Bank plc	1670.0	1184.8	2631.2	5347.1	3314.9	1933.4	3898.1	3664.4	4900.1	615.2
United Bank for Africa plc	6142.1	5886.7	4542.7	8077.4	15955.2	10201.8	16788.5	1928.6	2579.0	850.1
Unity Bank plc	4775.5	4576.9	3532.0	6280.2	12405.2	7931.9	13053.0	1499.5	2005.2	660.9
Wema Bank plc	5527.9	5298.0	4088.4	7269.7	14359.7	9181.6	15109.6	1735.8	2321.1	765.1
Zenith Bank plc	8752.5	8388.6	6473.4	11510.4	22736.2	14537.6	23923.6	2748.3	3675.1	1211.4
Total Share Capital (N' Million)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Access Bank plc	8944.0	8944.0	8944.0	8944.0	8944.0	8944.0	8944.0	8944.0	8944.0	8944.0
Citibank	1878.0	1878.0	1878.0	1878.0	1878.0	1878.0	1878.0	1878.0	1878.0	1878.0
Diamond	2527.0	2527.0	2527.0	2527.0	2527.0	2527.0	2527.0	2527.0	2527.0	2527.0

Ecobank	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0
Fidelity Bank plc	14481.0	14481.0	14481.0	14481.0	14481.0	14481.0	14481.0	14481.0	14481.0	14481.0
First Bank plc	13762.0	13762.0	13762.0	13762.0	13762.0	13762.0	13762.0	13762.0	13762.0	13762.0
First City Monument Bank	5846.9	5846.9	5846.9	5846.9	5846.9	5846.9	5846.9	5846.9	5846.9	5846.9
Guaranty Trust Bank	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0	4352.0
Skye Bank plc	12876.0	12876.0	12876.0	12876.0	12876.0	12876.0	12876.0	12876.0	12876.0	12876.0
Stanbic IBTC	7656.0	7656.0	7656.0	7656.0	7656.0	7656.0	7656.0	7656.0	7656.0	7656.0
Union Bank plc	8468.0	8468.0	8468.0	8468.0	8468.0	8468.0	8468.0	8468.0	8468.0	8468.0
United Bank for Africa plc	8769.0	8769.0	8769.0	8769.0	8769.0	8769.0	8769.0	8769.0	8769.0	8769.0
Unity Bank plc	9781.0	9781.0	9781.0	9781.0	9781.0	9781.0	9781.0	9781.0	9781.0	9781.0
Wema Bank plc	7564.0	7564.0	7564.0	7564.0	7564.0	7564.0	7564.0	7564.0	7564.0	7564.0
Zenith bank plc	4211.7	4211.7	4211.7	4211.7	4211.7	4211.7	4211.7	4211.7	4211.7	4211.7
Total Net Income (Interest & Non Interest (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	230226.7	222621.7	244161.7	210695.8	225655.9	345820.7	401448.6	585760.1	562030.7	847348.2
Citibank	191855.6	185518.1	203468.1	175579.8	188046.6	288183.9	334540.5	488133.4	468358.9	706123.5
Diamond	268597.8	259725.3	284855.3	245811.7	263265.3	403457.5	468356.7	683386.8	655702.4	988572.9
Ecobank	1692166.0	389587.9	427282.9	368717.6	394897.9	605186.2	702535.1	1025080.2	983553.6	1482859.3
Fidelity	358130.4	346300.4	379807.0	327749.0	351020.4	537943.3	624475.7	911182.4	874269.9	1318097.2
First Bank plc	300573.7	290645.0	318766.6	275075.1	294606.4	451488.1	524113.5	764742.4	733762.2	1106260.1
First City Monument Bank	160519.1	155216.8	170234.9	146901.8	157332.3	241113.9	279898.9	408405.0	391860.3	590790.0
Guaranty Trust Bank plc	248772.7	240555.1	263830.2	227668.5	243833.8	373678.5	433787.6	632946.4	607305.3	915606.8
Skye Bank plc	204070.4	197329.4	216422.2	186758.4	200018.9	306531.6	355839.6	519211.3	498177.7	751080.0
Stanbic IBTC	268597.8	259725.3	284855.3	245811.7	263265.3	403457.5	468356.7	683386.8	655702.4	988572.9
Union Bank plc	248772.7	240555.1	263830.2	227668.5	243833.8	373678.5	433787.6	632946.4	607305.3	915606.8
United Bank for Africa plc	319759.3	309196.8	339113.4	292633.0	313411.0	480306.5	557567.6	813555.7	780598.1	1176872.5
Unity Bank plc	409291.8	395771.9	434065.2	374570.3	401166.1	614792.3	713686.5	1041351.3	999165.6	1506396.8
Wema Bank plc	422082	408139	447629	386275	41370	6340	735989	107389	103038	155347

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	.2	.7	.7	.6	2.6	04.6	.2	3.6	9.5	1.7
Zenith bank plc	364525.5	352484.3	386589.3	333601.7	357288.6	547549.4	635627.0	927453.5	889881.9	1341634.6

Total Expenses (N' Million)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	108435.9	114610.7	122668.7	516392.7	468759.0	459194.8	517382.5	599802.3	668201.0	560386.8
Citibank	84824.9	89655.1	95958.6	403952.3	366690.5	359208.8	404726.7	469200.2	522705.7	438367.1
Diamond	42762.2	45197.3	48375.0	203641.9	184857.4	181085.7	204032.3	236534.9	263508.3	220991.2
Ecobank	226639.8	48986.8	52431.0	220716.2	200356.7	196268.7	221139.3	256367.1	285602.1	239520.2
Fidelity Bank plc	60864.0	64329.9	68852.8	289846.2	263109.9	257741.6	290401.8	336663.2	375054.8	314539.7
First Bank plc	135544.9	143263.4	153335.9	645490.8	585948.8	573993.5	646728.2	749752.8	835251.3	700483.5
First City Monument Bank	36728.3	38819.8	41549.1	174907.2	158773.2	155533.7	175242.5	203158.8	226326.2	189808.4
Guaranty Trust Bank plc	55092.5	58229.6	62323.6	262360.8	238159.8	233300.6	262863.7	304738.3	339489.2	284712.6
Skye Bank plc	48108.0	50847.4	54422.4	229099.3	207966.5	203723.2	229538.4	266104.2	296449.6	248617.4
Stanbic IBTC	42762.2	45197.3	48375.0	203641.9	184857.4	181085.7	204032.3	236534.9	263508.3	220991.2
Union Bank plc	57715.9	61002.5	65291.4	274854.2	249500.8	244410.1	275381.0	319249.6	355655.4	298270.4
United Bank for Africa plc	49845.6	52683.9	56388.1	237374.0	215477.9	211081.5	237829.1	275715.6	307156.9	257597.2
Unity Bank plc	30694.4	32442.2	34723.2	146172.4	132689.0	129981.7	146452.6	169782.7	189144.0	158625.6
Wema Bank plc	57715.9	61002.5	65291.4	274854.2	249500.8	244410.1	275381.0	319249.6	355655.4	298270.4
Zenith bank plc	49845.6	52683.9	56388.1	237374.0	215477.9	211081.5	237829.1	275715.6	307156.9	257597.2

Total Deposit Base (N' Billion)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Access Bank plc	19.7	29.2	12.0	10.6	40.6	68.3	129.1	151.3	186.7	236.2
Citibank	13.0	19.3	8.0	7.0	26.9	45.2	85.5	100.2	123.6	156.4
Diamond	17.9	26.6	11.0	9.7	37.0	62.2	117.6	137.9	170.1	215.2
Ecobank	107.4	38.9	16.0	14.1	54.1	91.0	172.1	201.8	248.9	314.9
Fidelity Bank plc	36.7	54.4	22.5	19.8	75.7	127.4	241.0	282.5	348.5	440.9
First Bank plc	69.4	103.0	42.5	37.5	143.3	241.2	456.1	534.7	659.7	834.5
First City Monument Bank	23.1	34.3	14.2	12.5	47.8	80.4	152.0	178.2	219.9	278.2
Guaranty Trust Bank plc	21.4	31.8	13.1	11.5	44.2	74.3	140.6	164.8	203.3	257.2
Skye Bank plc	18.9	28.1	11.6	10.2	39.0	65.7	124.2	145.6	179.6	227.3
Stanbic IBTC	17.9	26.6	11.0	9.7	37.0	62.2	117.6	137.9	170.1	215.2
Union Bank plc	19.7	29.2	12.0	10.6	40.6	68.3	129.1	151.3	186.7	236.2

United Bank for Africa plc	17.0	25.3	10.4	9.2	35.2	59.2	111.9	131.2	161.8	204.7
Unity Bank plc	22.7	33.7	13.9	12.2	46.9	78.9	149.2	174.9	215.7	272.9
Wema Bank plc	19.7	29.2	12.1	10.6	40.7	68.4	129.4	151.7	187.1	236.7
Zenith Bank plc	29.3	43.4	117.9	15.8	60.4	101.6	192.2	225.3	278.0	351.6
Total Retained Earnings Plus Other Reserve (Nbillion)	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Access Bank plc	5.2	5.3	3.1	3.4	27.0	46.9	83.9	96.5	147.0	129.5
Citibank	4.4	4.5	2.6	2.9	23.1	40.2	71.9	82.8	126.0	111.0
Diamond	6.2	6.3	3.7	4.0	32.3	56.2	100.7	115.9	176.4	155.4
Ecobank	24.2	5.9	3.4	3.7	30.0	52.1	93.3	107.3	163.4	143.9
Fidelity	7.4	7.5	4.4	4.8	38.5	66.9	119.9	137.9	210.0	185.0
First Bank plc	18.4	18.7	10.8	11.9	95.5	166.0	297.3	342.0	520.8	458.8
First City Monument Bank	14.1	14.4	8.3	9.1	73.5	127.9	229.0	263.4	401.1	353.4
Guaranty Trust Bank plc	9.2	9.3	5.4	5.9	47.7	83.0	148.7	171.0	260.4	229.4
Skye Bank plc	13.3	13.6	7.8	8.6	69.3	120.5	215.8	248.2	378.0	333.0
Stanbic IBTC	7.2	7.4	4.3	4.7	37.7	65.5	117.3	134.9	205.4	180.9
Union Bank plc	11.3	11.5	6.6	7.3	58.5	101.8	182.2	209.6	319.2	281.2
United Bank for Africa plc	5.9	6.0	3.5	3.8	30.8	53.6	95.9	110.3	168.0	148.0
Unity Bank plc	4.6	4.7	2.7	3.0	24.0	41.6	74.6	85.8	130.6	115.1
Wema Bank	5.3	5.4	3.1	3.4	27.7	48.2	86.3	99.3	151.2	133.2
Zenith Bank plc	8.4	8.6	5.0	5.5	43.9	76.3	136.7	157.2	239.4	210.9

Appendix III: Data Diagnostic Test Results Output

```
Random-effects GLS regression              Number of obs     =        150
Group variable: bank                       Number of groups  =         15

R-sq:    within  = 0.8467                  Obs per group: min =        10
         between = 0.0287                                 avg =       10.0
         overall = 0.7826                                 max =         10

                                           Wald chi2(5)      =     134.32
corr(u_i, X)    = 0 (assumed)              Prob > chi2       =     0.0000
```

oer	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
aq	-.025572	.0121426	-2.11	0.035	-.049371	-.0017729
ca	-.043831	.0048314	-9.38	0.000	-.001726	-.001793
pr	.0188251	.0028825	6.06	0.000	.0033046	.0064606
bl	.003247	.0004189	7.75	0.000	.0024261	.004068
bs	-.05413	.0137292	-3.94	0.000	-.0810387	-.0272213
_cons	1.985694	.3945404	5.03	0.000	1.212409	2.758979

```
sigma_u |          0
sigma_e | .06864365
    rho |          0   (fraction of variance due to u_i)
```

```
Random-effects GLS regression              Number of obs     =        150
Group variable: bank                       Number of groups  =         15

R-sq:    within  = 0.8020                  Obs per group: min =        10
         between = 0.0087                                 avg =       10.0
         overall = 0.7436                                 max =         10

                                           Wald chi2(4)      =     107.95
corr(u_i, X)    = 0 (assumed)              Prob > chi2       =     0.0000
```

oer	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
aq	-.0363502	.0124101	-2.93	0.003	-.0606735	-.0120261
ca	-.0143773	.0016342	-8.69	0.000	-.0176274	-.0111332
pr	.0052691	.0008383	6.29	0.000	.0362695	.0691204
bl	.0036619	.0004253	8.61	0.000	.0028284	.0044954
_cons	.4475186	.06169	7.25	0.000	.3266084	.5684288

```
sigma_u |          0
sigma_e | .08707558
    rho |          0   (fraction of variance due to u_i)
```

Housman Test

```
Note: the rank of the differenced variance matrix (2) does not equal the number of
      coefficients being tested (4); be sure this is what you expect, or there may be
      problems computing the test.  Examine the output of your estimators for anything
      unexpected and possibly consider scaling your variables so that the coefficients
      are on a similar scale.
```

| | —— Coefficients —— | | | |
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
aq	-.0318419	-.0363502	.0045083	.0040134
ca	-.0159831	-.0147632	-.001219	-.002237
pr	.04996061	.02896051	.0210009	.0113378
bl	.003698	.0036619	.0000361	.0001101

```
                    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(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =        4.03
                Prob>chi2 =      0.1332
```

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
oer	150	.2486695	.1101137	.1199643	.4574035
aq	150	.5437782	.8131537	.176361	2.96831
ca	150	.0003653	.000046	.0003147	.0006032
pr	150	.0049125	.001444	.001922	.0080279
bl	150	23.82734	21.84643	5.3118	68.8604
bs	150	27.68338	.5207515	26.52069	28.9218

```
Levin-Lin-Chu unit-root test for aq
──────────────────────────────────
Ho: Panels contain unit roots          Number of panels  =     15
Ha: Panels are stationary              Number of periods =     10

AR parameter: Common                   Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:    Bartlett kernel, 6.00 lags average (chosen by LLC)
────────────────────────────────────────────────────────────────────
                  Statistic      p-value
────────────────────────────────────────────────────────────────────
 Unadjusted t       -0.4730
 Adjusted t*        97.0599        1.0000
────────────────────────────────────────────────────────────────────


Levin-Lin-Chu unit-root test for ca
──────────────────────────────────
Ho: Panels contain unit roots          Number of panels  =     15
Ha: Panels are stationary              Number of periods =     10

AR parameter: Common                   Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:    Bartlett kernel, 6.00 lags average (chosen by LLC)
────────────────────────────────────────────────────────────────────
                  Statistic      p-value
────────────────────────────────────────────────────────────────────
 Unadjusted t       -8.1255
 Adjusted t*        -4.1049        0.0000
────────────────────────────────────────────────────────────────────


Levin-Lin-Chu unit-root test for pr
──────────────────────────────────
Ho: Panels contain unit roots          Number of panels  =     15
Ha: Panels are stationary              Number of periods =     10

AR parameter: Common                   Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:    Bartlett kernel, 6.00 lags average (chosen by LLC)
────────────────────────────────────────────────────────────────────
                  Statistic      p-value
────────────────────────────────────────────────────────────────────
 Unadjusted t        3.2374
 Adjusted t*        12.9485        1.0000
────────────────────────────────────────────────────────────────────

.
```

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```
Levin-Lin-Chu unit-root test for bl
─────────────────────────────────

Ho: Panels contain unit roots           Number of panels  =     15
Ha: Panels are stationary               Number of periods =     10

AR parameter: Common                    Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
───────────────────────────────────────────────────────────────────
                 Statistic      p-value
───────────────────────────────────────────────────────────────────
 Unadjusted t      -7.1149
 Adjusted t*       -3.7864        0.0001
───────────────────────────────────────────────────────────────────




Levin-Lin-Chu unit-root test for bs
─────────────────────────────────

Ho: Panels contain unit roots           Number of panels  =     15
Ha: Panels are stationary               Number of periods =     10

AR parameter: Common                    Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
───────────────────────────────────────────────────────────────────
                 Statistic      p-value
───────────────────────────────────────────────────────────────────
 Unadjusted t      -2.4086
 Adjusted t*        0.6180        0.7317
───────────────────────────────────────────────────────────────────
```

Variable	VIF	1/VIF
pr	3.06	0.327228
aq	2.12	0.470713
bl	1.80	0.555328
ca	1.21	0.826240
Mean VIF	2.05	

Correlation matrices

	oer	aq	ca	pr	bl	bs
oer	1.0000					
aq	-0.0079	1.0000				
ca	-0.3525	0.0947	1.0000			
pr	0.0482	0.7041	0.1017	1.0000		
bl	0.2470	-0.2328	0.2802	-0.5406	1.0000	
bs	-0.2834	0.2391	-0.1552	0.1869	-0.3076	1.0000

	oer	aq	ca	pr	bl
oer	1.0000				
aq	-0.0079	1.0000			
ca	-0.3525	0.0947	1.0000		
pr	0.0482	0.7041	0.1017	1.0000	
bl	0.2470	-0.2328	0.2802	-0.5406	1.0000

Heteroscedasticity

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

        chi2(1)      =    14.41
        Prob > chi2  =   0.0001
```
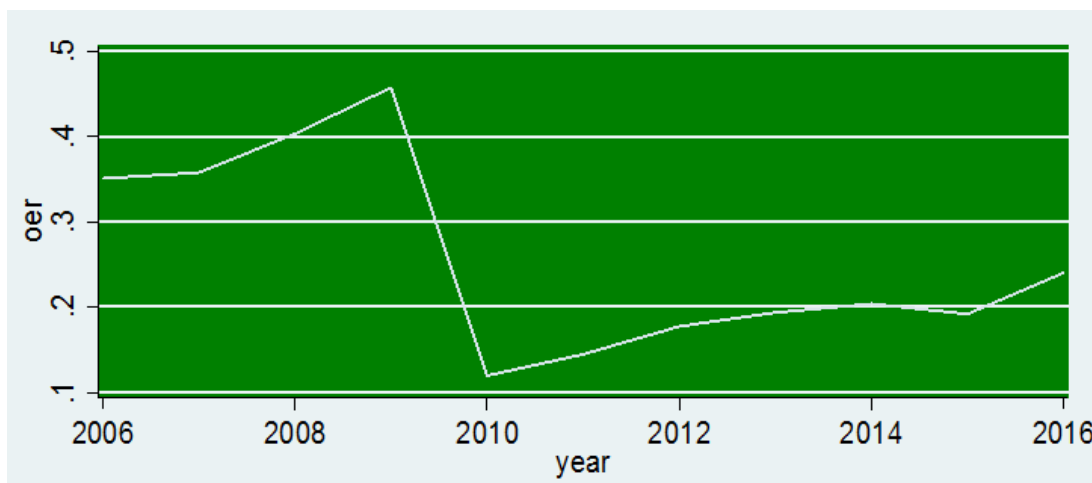
Overall mean operational efficiency for the sampled banks

Kao Residual Co integration Test
Series: OE AQ PR CA BL BS
Date: 10/19/18   Time: 15:35
Sample: 2007 2016
Included observations: 150
Null Hypothesis: No co integration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-6.781609	0.0000
Residual variance	0.005593	
HAC variance	0.002017	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 10/19/18   Time: 15:35
Sample (adjusted): 2009 2016
Included observations: 120 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.124204	0.095165	-11.81323	0.0000
D(RESID(-1))	0.206645	0.061436	3.363593	0.0010

R-squared	0.590526	Mean dependent var	-0.012169
Adjusted R-squared	0.587056	S.D. dependent var	0.073632
S.E. of regression	0.047317	Akaike info criterion	-3.247383
Sum squared resid	0.264186	Schwarz criterion	-3.200924
Log likelihood	196.8430	Hannan-Quinn criter.	-3.228516
Durbin-Watson stat	2.755205		

Pairwise Granger Causality Tests
Date: 10/19/18   Time: 15:39
Sample: 2007 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
AQ does not Granger Cause OE	120	152.495	5.E-33
OE does not Granger Cause AQ		10.1971	8.E-05
CA does not Granger Cause OE	120	0.49734	0.6095
OE does not Granger Cause CA		13.2816	6.E-06
PR does not Granger Cause OE	120	32.0831	8.E-12
OE does not Granger Cause PR		69.4961	2.E-20
BL does not Granger Cause OE	120	595.499	2.E-61
OE does not Granger Cause BL		7343.96	5E-122
BS does not Granger Cause OE	120	3.60303	0.0304
OE does not Granger Cause BS		12.2180	2.E-05
CA does not Granger Cause AQ	120	5.51304	0.0052
AQ does not Granger Cause CA		74.6770	2.E-21
PR does not Granger Cause AQ	120	47.5741	9.E-16
AQ does not Granger Cause PR		24.3906	1.E-09
BL does not Granger Cause AQ	120	61.9931	5.E-19
AQ does not Granger Cause BL		873.421	3.E-70
BS does not Granger Cause AQ	120	5.74827	0.0042

AQ does not Granger Cause BS		21.1889	1.E-08
PR does not Granger Cause CA	120	0.34962	0.7057
CA does not Granger Cause PR		23.0371	4.E-09
BL does not Granger Cause CA	120	29.1245	6.E-11
CA does not Granger Cause BL		16.7641	4.E-07
BS does not Granger Cause CA	120	5.73446	0.0042
CA does not Granger Cause BS		73.2925	3.E-21
BL does not Granger Cause PR	120	40.9929	4.E-14
PR does not Granger Cause BL		25.0698	9.E-10
BS does not Granger Cause PR	120	10.3124	8.E-05
PR does not Granger Cause BS		0.59399	0.5538
BS does not Granger Cause BL	120	13.7089	5.E-06
BL does not Granger Cause BS		8.60488	0.0003