

**EFFECT OF LIQUIDITY MANAGEMENT ON DEPOSIT
MONEY BANKS PERFORMANCE IN NIGERIA**

BY

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**BEING A DISSERTATION SUBMITTED TO THE POST GRADUATE SCHOOL,
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FEBRUARY, 2018

DECLARATION

I hereby declare that this dissertation is my original work and has not been previously presented wholly or in part for the award of other degrees.

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Signature.....

Date.....

CERTIFICATION

We the undersigned, certify that this research dissertation titled the impact of liquidity management on deposit money banks performance in Nigeria is the original work of the candidate and has been fully supervised, and found worthy of acceptance in partial fulfillment of the award of Master of Science (M.Sc) Degree in Banking and Finance.

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DEDICATION

This Dissertation is dedicated to Almighty God who gave me the ability to accomplish this research work.

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ABSTRACT

This research seeks to examine the impact of liquidity management on deposit money banks performance in Nigeria. The study spanned from 2000-2016 which is 17 years study. The independent variables used for the study are current ratio (CR), quick ratio (QR), net-working capital, cash ratio (CHR) and debt ratio (DBTR) while the dependent variable is returns on equity, the aggregate of all the variables for ten (10) deposit money banks in Nigeria were used which are First Bank of Nigeria, Zenith Bank, Guaranty Trust Bank, Fidelity Bank, Access Bank, Diamond Bank, Eco Bank, United Bank for Africa, Skye Bank, and Wema Bank. Time series data were used and gotten from annual reports of the banks under study. The result revealed that the p-value of current ratio (CR) is 0.0000, quick ratio (QR) is 0.000, net-working capital (NWC) 0.000, cash ratio (CR) 0.008, debt ratio (DR) 0.982. The result reveals that all the independent variables except debt ratio have significant impact on returns on equity of deposit money banks in Nigeria because their p-values are all less than 5% significant level except the p-value of debt ratio which is greater than 5% significant level. The model has high explanatory and predictive power as suggested by the R-squared and adjusted R-squared respectively. The R^2 is 0.985 and $AdjR^2$ is 0.978, this further shows that (CR, QR, NWC, CHR and DEBT) have 97% positive impact to ROE of deposit money banks in Nigeria, more so ($AdjR^2$) is 0.978 which suggest that 97% of the independent variables could be explained by the changes in returns on equity and the remaining 3% could not be explained due to some error in the financial system. The study recommended that there is need for banks to engage competent and qualified personnel. The right personnel will ensure that the right decisions are made especially with the optimal level of cash and to keep also Instead of keeping excessive liquidity as a provision for unexpected withdrawal demands of the customers, the commercial banks should find it reasonable to adopt other measures of meeting such requirements, which can include borrowing and discounting bills. In addition, the surplus funds of the commercial banks should be seasonally invested in short-term instruments of the money market. The study contributed to knowledge by serving as an eye opener to those variables that have the most significant impact on liquidity management in deposit money banks in Nigeria. Also a good understanding of the impact of liquidity management will foster sound decisions which will enhance the performance of deposit money banks in Nigeria.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In every system, there are major components that are essential for the survival of the system. This is also applicable to the financial system. The banking system had contributed significantly to the effectiveness of the entire financial system as they offer an efficient institutional mechanism through which resources can be mobilized and directed from less essential uses to more productive investments, (Wilner, 2015).

The recent turmoil in the global economic system has revealed some deficiencies in liquidity management of the financial institutions. Financial institutions like banks are seen as the backbone of financial system, providing capital for infrastructure, innovation, job creation and overall development (Edem, 2017). The fundamental role played by banks in the society does not only affect the spending by individual consumers but also the general growth of the industry.

Liquidity management in banks has posed several challenges during the distress era of 1980s and 1990s and persisted to the re-capitalization phase in 2005 when banks were mandated to have an increased capital base from N2 billion to an astronomical N25 billion (Agbada and Osuji, 2013).

Liquidity management is a concept that is receiving serious attention all over the world especially with the current financial situations and the state of the world economy. Some of the striking corporate goals include the need to maximize profit, maintain high level of liquidity in order to guarantee safety, attain the highest level of owner's net worth coupled with the attainment of other corporate objectives. The importance of liquidity management as it affects corporate profitability in today's business cannot be over emphasized.

A firm should ensure that it does not suffer from lack-of or excess liquidity to meet its short-term obligations. A study of liquidity is of major importance to both the internal and the external analysts because of its close relationship with day-to-day operations of a business (Saha and Bhunia, 2012). Dilemma in liquidity management is to achieve desired trade-off between liquidity and profitability (Nahum, and Amarjit, 2013).

Edem, (2017) also stated that during the banking crisis in 2009 many banks ran out of liquidity, some raised funds at a large discount in order to meet up with high pressure of demand for urgent cash. Many financial and non-financial institutions had to revisit their corporate governance policies to accommodate market and liquidity risk exposures. Equity prices, foreign exchange rate, commodity prices, interest rate and credit spread exhibited negative impacts on bank performance as returns on investment and net-worth of the businesses fell drastically. A lot of assets were devalued and some banks hardly meet their obligations as at when due or discharge them at exorbitant cost. This influenced the bank's ability in stimulating productive

economy evidenced in gradual falling in real Gross Domestic Product. This is why liquidity issues have always been a concern of all the nation's stakeholders across the globe, because no sector of the economy can succeed without sufficient funds. The Central Bank of Nigeria, over the years, precisely since 1958, has formulated excellent policy thrusts to revamp the Nigerian financial system for sustainable economic growth. The policy which came in form of re-capitalisation, merger and acquisition, consolidation all aimed at strengthening the financial system with little or no emphasis on liquidity management efficiency. For instance, the event of 1980s which characterized the unprecedented level of bank distress reflected by large volume of non-performing loans, insolvency, liquidity problem and default in meeting depositors and inter-bank obligations necessitated innovations in banking industry in 1986. This innovation and other banking reforms in Nigeria have not yielded sufficient fruits in stabilizing the banking industry due to poor implementation or sudden termination of the reforms. Government directive to withdraw the deposits of governments and other public sector institutions in 1989 from banks to Central Bank of Nigeria and several historical distresses in the banking sector are instances of liquidity problems facing the banking industry in Nigeria. However, financial regulators have made conscious efforts to ensure that banks hold more liquid assets than before to help against potential liquidity problems. For example, Basel II was recently reviewed to provide for more capital buffer to hedge bank flimsiness as well as a common measure of operational risk.

The purpose of business organizations like banks is to maximize profit. Striking a balance between liquidity and bank return is of utmost importance. Many approaches have evolved over the years to measure bank performance such as the use of accounting ratio and econometric approaches. The most commonly approach is return on investment and return on assets.

With this in mind, such essential empirical information is crucial for standardization in the perspective of domestic and international liquidity regulations. Although regulations can make the financial system more resilient to liquidity shocks, standardization should take into consideration any associated costs to the efficiency of financial intermediation as this could result in higher borrowing costs for other agents in the system.

1.2 Statement of the Problem

Liquidity management and bank performance are key factors in determining the development, survival, sustainability, growth and performance of a banking system and the ability to handle the trade-off between the two is a source of concern for bank managers. For instance, banks make loans that cannot be sold quickly at a high price and also issue demand deposits that allow depositors to withdraw at any time. Such a mismatch of liquidity, in which bank's liabilities are more liquid than its assets, causes problems for banks when too many depositors attempt to withdraw at once as it affects bank liquidity position. The challenge is to select or identify the optimum point or the level at which a deposit money bank can maintain its assets in order to optimize these two objectives since each of the liquidity has a different effect on the level of profitability. This problem becomes more pronounced as good number of deposit money banks are engrossed with profit maximization and as such they tend to neglect the importance of liquidity management. However, the profit maximization becomes a myth as the resulting liquidity can lead to both technical and legal insolvency with the consequence of low patronage, deposit flight, erosion of asset base.

Inappropriate liquidity planning and implementation can affect bank operations and might exhibit long term effect on the economy.

This research seeks to investigate excess liquidity and the problem of establishing the proportion of the deposits that will be demanded by the depositors at any particular time. All these problems are what the study intends to consider, find solutions and make recommendations where necessary.

1.3 Research Questions

Based on the statement of the problem, the study propounded solutions to the following research questions relevant to the study:

1. What is the effect of current ratio on return on equity of Deposit Money Banks in Nigeria?
2. To what extent does quick ratio have any impact on return on equity of Deposit Money Banks in Nigeria?
3. How does net working capital affect return on equity of Deposit Money Banks in Nigeria?
4. To what extent does cash ratio affect return on equity of Deposit Money Banks in Nigeria?
5. How does debt ratio have impact on return on equity of Deposit Money Banks in Nigeria?

1.4 Objectives of the Study

The main objective of this study is to ascertain the impact of liquidity management on deposit money banks performance in Nigeria. Other specific objectives are:

1. To determine if current ratio has effect on return on equity of Deposit Money Banks in Nigeria.
2. To establish if quick ratio has impact on return on equity of Deposit Money Banks in Nigeria.

3. To ascertain if net working capital has impact on return on equity of Deposit Money Banks in Nigeria.
4. To establish if cash ratio has effect on return on equity of Deposit Money Banks in Nigeria.
5. To know if debt ratio has effect on return on equity of Deposit Money Banks in Nigeria.

1.5 Statement of Hypotheses

The following hypotheses are formulated from the research questions and objectives in answering the major aim of the study and are stated as thus:

Ho₁: Current ratio does not have any significant effect on return on equity of Deposit Money Banks in Nigeria.

Ho₂: Quick ratio does not have any significant impact on return on equity of Deposit Money Banks in Nigeria.

Ho₃: Net working capital does not have significant impact on return on equity of Deposit Money Banks in Nigeria.

Ho₄: Cash ratio does not have significant impact on return on equity of Deposit Money Banks in Nigeria.

Ho₅: Debt ratio does not have significant impact on return on equity of Deposit Money Banks in Nigeria.

1.6 Scope of the study

This study focus on the effect of liquidity management on Deposit Money Banks in Nigeria within the period 2000-2016, which is seventeen years of a time series frame in which a secondary data

will be used as a means for sourcing data. Also the study covers ten (10) Deposit Money Banks in Nigeria: First Bank of Nigeria, Zenith Bank, Guaranty Trust Bank, Fidelity Bank, Access Bank, Diamond Bank, Eco Bank, United Bank for Africa, Skye Bank, and Wema Bank. The study will use the annual report of the banks head-quarters located in Lagos. Also the variables to measure liquidity management will be limited to: current ratio, quick ratio, net working capital, cash ratio and debt ratio.

1.7 Significance of the study

1. For the fact that deposit money banks operate on liquidity and profitability motives in the mind to satisfy their shareholders and depositors, the need arise for them to bring into agreement these two motives with same aim concurrently. With this the deposit money banks need effective and efficient liquidity management approaches and principles that will help them realize these motives.
2. The result gotten form this study will reveal the level of attachment of the deposit money banks to the monetary policies (liquidity ratios) established by the government and these will help the government to set appropriate liquidity ratio's and cash ratio's that will not be harmful to the operation and survival of the deposit money banks.
3. It will also help banks operators to evaluate how effective liquidity management and credit policy guidelines will affect profitability level and also the impact bank credit will play on bank's liquidity and finally minimize the effect of illiquidity and help in providing effective liquidity formulations.

1.8 Limitations of the study

1. This study was supposed to cover all so many other variables that can be used as indicators of liquidity management as in regards to collection of adequate data. The intended scope cannot be attained due to the fact that some variables do not have sufficient data that could make significant impact.

Be it as it may, the desired objectives was achieved.

1.9 Definition of Terms

Cash ratio: Cash Ratio is the amount of cash and short term equivalents a company has over current liabilities. The cash ratio is an effective and quick way to determine if a company could have potential short-term liquidity issues.

Current ratio: It measures whether or not a firm has enough resources to meet its short-term obligations. It compares a firm's [current assets](#) to its [current liabilities](#).

Debt ratio: A financial ratio that measures the extent of a company's or consumer's [leverage](#). The debt ratio is defined as the ratio of total – long-term and short-term – debt to total assets, expressed as a decimal or percentage.

Liquidity: It describes the degree to which an [asset](#) or [security](#) can be quickly bought or sold in the market without affecting the asset's price, also the ability of a current asset to meet current liabilities.

Net working capital: Net working capital is the aggregate amount of all [current assets](#) and [current liabilities](#). It is used to measure the short-term liquidity of a business, and can also be used to obtain a general impression of the ability of company management to utilize assets in an efficient manner.

Quick ratio: The quick ratio is an indicator of a company's short-term liquidity. The [quick ratio](#) measures a company's ability to meet its short-term obligations with its most liquid assets.

1.10 Organization of the Study

This study consists of five chapters and will be presented in the following order:

Chapter One: Introduction

This subsection is concerned with the general background to the area of study and why the research is chosen. This will include; overview of the study, statement of the problem, objectives of the study, Research Questions, research hypothesis, scope of the study, definition of the terms, organization of the study, summed up to summary.

Chapter Two: Literature Review

This chapter talks about the various literatures related to the study. Here, emphasis was made on conceptual, theoretical and empirical review of literature.

Chapter Three: Research Methodology

This is an important part of the research work, the methods adopted in collecting the data is taken recognition of, which include how the data was obtained and analysed, presentation, analysis and interpreting the research work.

Chapter Four: Data Presentation and Analysis

The fourth chapter (i.e. results and discussion) will be organized into an introduction, data presentation, data analysis, test of hypotheses already formulated, and a summary of the research findings.

Chapter Five: Summary, conclusion and recommendations

The last chapter of this study will include the summary, conclusion and recommendations of areas for further research.

1.11 Summary

Liquidity management is a concept that is receiving serious attention all over the world especially with the current financial situations and the state of the world economy. Some of the striking corporate goals include the need to maximize profit, maintain high level of liquidity in order to guarantee safety, attain the highest level of owner's networth and with the attainment of other corporate objectives. This chapter is broken down into background to the study, statement of the problem, research questions, research objectives, statement of hypotheses etc.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Introduction

Liquidity is a financial term that means the amount of capital that is available for investment. Today, most of this capital is credit, not cash. Bank Liquidity simply means the ability of the bank to maintain sufficient funds to pay for its maturing obligations. It is the bank's ability to immediately meet cash, cheques, other withdrawals obligations and legitimate new loan demand while abiding by existing reserve requirements. Nwaezeaku (2016) defined liquidity as the degree of convertibility to cash or the ease with which any asset can be converted to cash (sold at a fair market price).

Liquidity management therefore involves the strategic supply or withdrawal from the market or circulation of the amount of liquidity consistent with a desired level of short-term reserve money without distorting the profit making ability and operations of the bank. It relies on the daily assessment of the liquidity conditions in the banking system, so as to determine its liquidity needs and thus the volume of liquidity to allot or withdraw from the market. The liquidity needs of the banking system are usually defined by the sum of reserve requirements imposed on banks by a monetary authority (CBN 2012). This section broadly is divided into conceptual framework, theoretical review, empirical review and literature gap.

2.1.2 Concept of Liquidity

Liquidity management has assumed strategic position in bank management hierarchy due to its critical nature highlighted by recent market turmoil. It is the core function of revenue generation,

lending and payment. Success of any bank depends on level of liquidity that is sufficient for its operation. Inefficient management of liquidity results in serious impairment of banking functions and contagious effect on the economy. A bank is set to be liquid if it stores sufficient liquid assets and cash together with the ability to raise fund quickly from other sources to enable it to meet its payment obligations and financial commitments in a timely manner.

Liquidity is the capacity of business concerns to meet maturing financial obligations. It is also portrayed as the conversion and exchangeability of an asset for another in a timely and cost effective manner. Acharya & Naqvi (2012) views it as the speed and certainty of converting an asset to cash whenever at the discretion of the asset holder. Anyanwu (2013) posited that liquidity is the convertibility of an asset to cash with minimum cost or loss. In same vein, Kurotamunobaraomi (2016) posited that liquidity is the capacity to exchange an asset at a negligible cost, price and (on) short notice. Therefore adjudged among many others, on the grounds of its ability to facilitate transactions. Jinghan (2012) asserts that banks need a high degree of liquidity in their assets portfolio. The bank must hold a sufficient large proportion of its assets the form of cash and liquid assets for the purpose enhancing customers' confidence and corporate performance (profitability).

According to Spindt and Tarhan (2015), banks operations are facilitated by liabilities from depositors, liquid assets constitute a sine qua non in the overall asset basket of banks. It is apparent that liquidity is defined by marketability, stability and conservatism. Marketability establishes the shift ability; transact ability and exchangeability of an asset for another with the capacity of being redeemed before maturity in an easy and prompt manner. Stability connotes value preservation. Consequently, liquid assets have fixed and relatively lesser price variability.

Also, conservatism establishes assets holders' capacity to market the assets with minimal price impact.

2.1.3 Components of Liquidity

It is imperative for banks to have adequate and sufficient proportions of these liquid components as it helps mitigate funding risk, compensation for the non-receipt of inflow of funds if the borrower(s) fail to meet their commitments, and risk arising from calls to honour maturing obligations (Nwankwo, 2012). Inadequate liquidity culminates in the compulsion to liquidate assets at unfavourable prices which could instigate losses. Liquidity shortfalls also erode customers' confidence, leading to bank runs which could expose the bank to unnecessary borrowing from the Central Bank at which eventually subjects the bank to heightened scrutiny.

According to Olagunju, Adeyanju and Olabode (2013), liquidity consists of the following:

- i. Vault Cash,
- ii. Balances Held With CBN,
- iii. Balances Held With Other Banks in Nigeria,
- iv. Balances Held With Offices and Branches outside Nigeria,
- v. Money at Call in Nigeria,
- vi. Inter-bank Placement,
- vii. Placement with Discount Houses,
- viii. Treasury Bills,
- ix. Treasury Certificates,
- x. Investment in Stabilization Securities,
- xi. Bills Discounted Payable in Nigeria,
- xii. Negotiable Certificates of Deposits,
- xiii. Bankers Acceptances and Commercial Papers,

xiv. Investments in FGN Development Stock and Industrial (Other) Investments

2.1.4 Objectives of Liquidity Management

Tito and Haizhou (2012) among other financial experts have viewed the following objectives as appropriate but not exhaustive, (Tito and Haizhou, 2012). The specific design of efficient liquidity management is dependent on features specific to individual bank's size, nature and structure as well as the type, extent and complexity of its product. These include:

- i) ensuring solvency at all times for settlement of all cash outflow commitments (both on- and off-balance sheet) on an ongoing daily basis;
- ii) ensuring that funding is minimum, by avoiding raising fund at market premiums or through the forced sale of assets;
- iii) ensuring compliance with the statutory liquidity and reserve requirements through development of adequate management information system and internal control;
- iv) optimising the refinancing structure and coordinating issuance of own instruments in the money and capital markets; and
- v) optimising intra-group cash flows such as liquidity "pooling" to reduce dependency on external refinancing.

The more liquidity is generated the greater the risk of severe losses in attempts to dispose of illiquid assets to meet accidental demands of depositors and borrowers. Torre defines treasury management as a set of techniques that act on the short-term liquidity of a firm and at the same time affect those factors and processes that translate immediately into cash, with the ultimate aim of increasing both the liquidity and profitability of the firm. Liquidity in excess of what is

required need to be invested in short term securities pending when it is required. The major problem faced by most businesses is the ability to determine the minimum liquidity level required by the business. Minimum liquidity level assists management to maintain enough liquidity to meet its day-to-day operating expenses.

Optimising liquidity balances require a strong and detailed understanding of the bank's liquidity position across all the currencies, accounts, business lines and counterparties, (Jeanne, and Ranciere, 2009).

The process requires four steps – identifying, analysing, managing, and optimising liquidity. They are interdependent, each requiring successful accomplishment of the others. In research conducted by Bordeleau and Graham (2013) and similar work in Nigeria by Edem, (2017) they found evidence that banks with optimum liquidity maximise returns.

The results showed that the relationship takes the form of a downward-concave parabola in that the relationship becomes flat around at the maximum liquidity level.

Comprehensive liquidity management programme therefore requires:

- a) establishment of sound liquidity management policy,
- b) improvement of funding strategies,
- c) development of contingency funding strategies to ensure that liquidity gaps are backed up,
- d) development of alternative scenarios in liquidity planning and
- e) measurement of mismatches through gap analysis.

2.1.5 Sources of Liquidity

Financial institutions have increasingly funded loan growth not only by reducing their level of highly liquid investments, but also by seeking alternative funding sources. Funding theories classify sources of liquidity into two namely: Stored liquidity and Purchased liquidity. The deposit money banks fund their operations through the following means:

(a) Asset-based sources: This is a source in which funds are temporarily invested or stored with the hope that they would either mature when liquidity is needed or be sellable without material loss in advance of maturity.

Stored liquidity theory is based on three asset liquidity theories – liquid asset, real bill doctrine and shiftability theories of liquidity management (Nzotta, 2012). The liquid assets include cash and balances due to other banks, call balance with CBN, balance with other banks at local and foreign, call money funds, short term government securities such as treasury bills, treasury certificates and government bonds near maturity within three years; commercial paper, certificate of deposit and other marketable securities e.g. local and state securities.

(b) Liability-based sources: This is also called purchased liquidity. Bank liabilities include all sources of funds acquired and the main sources of bank funds are (i) deposit accounts (ii) borrowed funds and (iii) long term funds. For example banks receive from large depositors and also borrow from the big investment banks in order to utilise their investment opportunities. The funds are pooled together and then allocated to various earning and nonearning assets as appropriate. It extends to include borrowing from CBN through discount or advances, call money held for other banks, certificate of deposits, and other liabilities like large time deposits of local and state government and pension funds etc. Liability funding theory holds that funds can be

purchased from the market at a price and used for profitable investment e.g. lending and other investment.

Such markets include inter-bank market in which the excess fund in the counterparty's bank can be lent to members at a cost .25 to 1.00. However, easiness of this transaction depends on the credit worthiness of the borrowing bank and the economic condition. It is the private last resort for liquidity funding. Other markets include money and capital markets. This is the largest source of liquidity. It is a market for wholesale of financial assets. Commercial papers of varied ratings are sold. In this market pre-maturity assets are also liquidated.

(c) Off balance sheet sources: Kashyap, Rajan, and Stein (2012) suggest that banks may also create significant liquidity off the balance sheet through loan commitments and similar claims to liquid funds. This source has become very important in the management and analysis of liquidity. Depending on the transaction and level of interest rate at the period, off balance sheet activities can either increase cash inflow or outflow. For instance, interest rate risk debt can be hedged through an interest rate swap arrangement with a highly rated investment bank. If a fixed rate is higher than the floating rate, the bank receives payment for the difference between the two rates and vice-versa. Hence the cash flow from the derivative portfolio aids in the determination of liquidity. The modern theory of financial intermediation shows bank as playing liquidity creation role, by transforming of short term deposits into long term investment. By investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with coverage against consumption shocks.

2.1.6 Major Risks Faced by Deposit Money Banks in Nigeria

Liquidity planning is an important aspect of bank risk management framework. Liquidity risk refers to the risk that the institution might not be in position to generate sufficient cash flow to make payment, withdrawal and other financial obligations in time. Liquidity risk consists of and can manifest in different dimensions:

(a) Funding Risk: bank's inability to raise required fund to meet the desired obligations, occasioned by unanticipated withdrawals/non-renewal of deposits (wholesale and retail).

(b) Time Risk: It is the inability of the bank to compensate for non-receipt of expected inflows of funds, i.e. performing assets turning into non-performing assets; and

(c) Call Risk: It happens due to crystallisation of contingent liabilities and inability to undertake profitable business opportunities when desirable.

A bank is liquid when sufficient funds can be raised, either by increasing liabilities or converting assets, promptly and at a reasonable cost. It includes the potential sale of liquid assets and borrowings from money, capital and forex markets. Bank liquidity management involves acquiring sufficient liquid asset to meet the bank's obligation to depositors and other stakeholders. Banks that make commitments to lend are exposed to the risk of unexpected liquidity demands from their borrowers (Gatev, 2012). The more liquidity is generated, the greater is the possibility and severity of losses associated in attempts to dispose of illiquid assets to meet the liquidity demands of depositor.

1. Credit Risk

Credit risk is the risk that a borrower will default on any type of debt by failing to perform his own part of obligation.

It is the cost of replacing cash flow when the borrower defaults. The analysis of the financial soundness of borrowers has been the core banking activity since its inception. Credit risk is the potential financial loss as a result of the failure of customers to honour in full the terms of a loan or contract. This definition includes the risk of loss in portfolio value as a result of migration from a higher risk grade to a lower one. In banking, credit risk means the risk that payments may be delayed or not made at all, which can cause cash flow problems and affect a bank's liquidity. Credit risk management involves ways of treating individual liquidity risk factors such as drawing on committed credit lines and operational risk management. The objective of credit risk management generally is to maximise a bank's risk adjusted rate of return by maintaining credit risk exposure within acceptable margins. Credit risk is considered as the principal cause of potential losses and bank failures.

Credit risk includes both the risk that a obligor or counterparty fails to comply with their obligation to service debt (default risk) and the risk of a deterioration in the credit standing of the obligor or counterparty. This is one of the major factors influencing bank's performance. Financial condition of the borrower and the current value of any underlying collateral are of considerable interest to banks when evaluating the credit risks, (Santomero, 2012). Credit risk management policies should include strict credit estimation, designing effective credit risk system, creating suitable credit risk environment and management processes and developing strategies to limit banks' exposition to credit risk while improving performance and competitiveness of the bank (Ali, 2015). There are basically three kinds of policies related to credit risk management. The first set is aimed at reducing credit risk, which include policies on concentration and large exposures, diversification, lending to connected parties, and

overexposure. The second set aims at classifying assets by mandating periodic evaluation of the collectability of the portfolio of credit instruments. The third set of policies aims to make provision for loss or make allowances at a level adequate to absorb anticipated loss.

2. Market Risks

Banks are exposed to market risk both in the management of trading operations and balance sheets. Market risk management is the determination of the value of liquid assets and formulation of market risk stress scenarios. A bank's market risk exposure is determined by both the volatility of underlying risk factors and the sensitivity of the bank's portfolio to movements in those risk factors (Darryll, and Beverly 2013). Market Risk is the risk of earnings rising from changes in basic economic factors such as interest rates, exchange rates, and bond equity or commodity prices. It is a risk that the value of a portfolio, either investment or trading portfolio, will fall due to the change in value of the market risk factors. There are three common market risk factors to banks and these are liquidity, interest rates and foreign exchange rates. Market Risk Management provides a complete framework for measuring, monitoring and managing liquidity, interest rate, foreign exchange and equity as well as commodity price risk of a bank that needs to be closely integrated with the bank's business strategy. However, market risk can only be hedged but cannot be diversified (Santomero, 2012).

3. Operational Risk

Basel II defines operational risk as 'the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events. Malfunctions of the

information systems, reporting systems, internal monitoring rules and internal procedures designed to take timely corrective actions, or the compliance with the internal risk policy rules result in operational risks (Bassis, 2012).

Operational risk is an event risk, without an efficient tracking and reporting of risks, some important risks will be ignored, there will be no desire for corrective action and this can result in disastrous consequences. Changes in modern banking environment, such as increased reliance on sophisticated technology, expanding retail operations, growing e-commerce, outsourcing of functions and activities, and greater use of structured finance techniques that claim to reduce credit and market risk have contributed to higher levels of operational risk in banks, (Van, Hennie; Brajovic, Sonja, 2013). The Basel Committee addressed operational risk in its Core Principles for Effective Banking Supervision by requiring supervisors to ensure that banks have risk management policies and processes to identify, assess, monitor, and control or mitigate operational risk. In 2013, the Committee further provided guidance to banks for managing operational risk, in anticipation of the implementation of the Basel III Accord, which requires a standard and common measure for operational risks.

However, application of gap analysis, action plan and strategies monitoring can help to address operational risk.

4. Interest Rate Risk

Interest rate risk is the potential loss in a bank's earnings or value due to changes in interest rates. Most of the loans and receivables, term and saving deposits generate revenues and costs that are driven by interest rates. Since interest rates are not stable, so also are such earnings. The combination of a volatile interest rate environment and deregulation, and a growing collection

of on-and-off balance sheet products have made the management of interest rate risk a great challenge. Bank regulators and supervisors have placed great emphasis on the appraisal of bank interest rate risk management, particularly since the Basel Committee recommends the implementation of market risk-based capital charges. Banks encounter interest rate risk from four main sources namely re-pricing risk, yield curve risk, basis risk, and optionality. The primary source of interest rate risk stems from timing differences in the maturity of fixed rates and the repricing of the floating rates of bank assets, liabilities, and off balance sheet positions. The basic tool used for measuring repricing risk is duration, which assumes a parallel shift in the yield curve. Also, re-pricing mismatches expose a bank to risk deriving from changes in the slope and shape of the yield curve. Yield curve risk materialises when yield curve shifts adversely affect a bank's income or underlying economic value. Another source of interest rate risk is basis risk, which arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with similar repricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread among assets, liabilities, and off balance sheet instruments of similar maturities or re-pricing frequencies, (Wright, and Houpt, 2012). Bank asset, liability and off-balance sheet portfolios are another sources of interest risk and should be adequately managed otherwise options can pose significant risk to a banking institution because the options held by customers (both explicit and fixed), are generally exercised at the advantage of the holder and to the disadvantage of the bank. Broadly speaking, interest rate risk management comprises various policies, actions and techniques that a bank uses to reduce the risk of diminution of its net equity as a result of adverse changes in interest rates from any of the sources mentioned above.

5. Foreign Exchange Risk

Banks conducting foreign exchange operations are also exposed to foreign exchange risk in forms of credit risks such as the default of the counterparty to a foreign exchange contract and time-zone-related settlement risk. Foreign exchange risk is incurring losses due to changes in exchange rates. The loss of earnings may occur due to a mismatch between the value of assets and that of capital and liabilities denominated in foreign currencies or a mismatch between foreign receivables and foreign payables that are expressed in domestic currency. Foreign exchange risk is speculative and can therefore result in a gain or a loss, depending on the direction of exchange rate shifts and whether a bank is surplus or deficit in the foreign currency (Van, Hennie; Brajovic, Sonja, 2013).

Foreign exchange risk is comprised of transaction risk, economic risk and revaluation risk. Transaction risk is the price-based impact of exchange rate changes on foreign receivables and foreign payables. Economic risk or business risk relates to the effect of exchange rate changes on a firm or nation's long-term competitive position. Revaluation risk arises when a bank's foreign currency positions are revalued in domestic currency, and when a parent institution conducts financial reporting or periodic consolidation of financial statements.

6. Strategic Risk

Strategic risk is an array of external events and trends that can devastate a bank's growth path and shareholder value (Slywotzky, and Drzik 2015). Strategic risk covers a variety of uncertainties which are financial in nature, but rather credit or operational related caused by macroeconomic

factors, industry trends or lapses in a firm's strategic choices which adversely affects the firm's earnings and shareholders' value. Strategic risks often constitute some of a firm's biggest exposures and therefore can be a more serious cause of value destruction.

There are significant events which contribute to strategic risk and can be categorised into seven main classes. These include industry margin squeeze, threat of technology shift, brand erosion, emergence of competitor to gain the lion share of the market value, customer priority shift, and new project failure and market stagnation (Slywotzky, and Drzik 2015). The basic concept is to provide a framework for assessing a firm's strategic risks and develop counter measures to address them. An effective strategic risk management approach should embrace both the positive and negative risks. To grasp positive risk involves searching for opportunities and developing plans to act on these opportunities when the needs arise. To stop negative risk on the other hand involves reducing the possibility of occurring and extent of losses; and financing recovery from these losses. However, it is argued that due to the complexity of the concept of strategic risk, no single quantitative measure proves satisfactory in all strategic situations, (Stephen, 2016).

2.1.7 Factors Affecting Liquidity Risk

There are so many factors affecting liquidity risk. These are:

(a) Over extension of credit. The major factors affecting credit extension include slow economic condition, necessity for further credit extension, improper assessment of the borrower's credit profile and the need to avoid cost associated with litigation. The more credits are extended the greater the risk.

(b) Mismanagement: This is one factor increasing liquidity risk and such include fraud, un-averted strike resulting in loss of customer's confidence, poor customer's credit rating, flawing of credit standard and self-lending.

(c) Non recognition of option risk: The inability of the management to recognize and implement the risk mitigation options increases the liquidity risk.

(d) Large undrawn loan commitments: this increases the volume of liquidity in the treasury hence present false liquidity position. This is misleading and affects liquidity planning. Sudden withdrawals of such commitments will result in serious liquidity shortfall.

(e) Lack of appropriate liquidity policy and contingent plan: Poor liquidity policy to curb with the problem of liquidity in stress period increases the liquidity risk.

2.1.8 Factors Influencing Liquidity

A bank's liquidity needs depend significantly on the balance sheet structure, product mix, and cash flow profiles of both on-and off balance-sheet obligations. External events and internal financial and operating risks (interest rate, credit, operational, legal, and reputation risks) can influence the liquidity profile of an institution. The ability of a bank to provide liquidity requires the existence of a highly liquid and readily transferable stock of financial assets. Liquidity and transferability are the key ingredients for such transactions.

The liquidity requirement means that financial assets must be available to owners on short notice (a day or less) at par. The transferability requirement means that ownership rights in financial assets must be portable, at par, to other economic agents, and in a form acceptable to the other party, (Sinkey and Joseph, 2013). Edem, (2017) broke down the factors in to the following:

2.1.8.1 Short Term Interest Rate

Short term interest rate affects liquidity management as it is influenced by the monetary policy. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread among assets, liabilities, and off-balance-sheet instruments of similar maturities or re-pricing frequencies, (Wright, and Houpt, 2012). The Central and world banks have now published average annual interest rates and banks are expected to disclose more detailed financial information for the determination of spread in the banking system without cost. This stresses the importance of interest rate spread. Intermediation spread is an outcome of bank's decision and is affected by micro and macro level factors. Spread is subject to many macro level issues that shape the efficiencies in financial sector performance. It is a reward for liquidity risk earned by transformation of deposit into loan and for selecting and monitoring the right kind of borrowers. Spread provides sufficient margins for the banks to continue its operations in the market. To be relevant banks must manage other risks such as market risk, legal risk, liquidity risk, strategic risk etc. to enable them cover costs of operation and give good returns for equity holders. Interest rate spread or financial intermediation spread is an important indicator for the banking system and the intermediation process. It is associated with cost of financial intermediation.

Interest rate spread between lending and deposit rates may be used for making judgment on banks efficiency in individual bank or banking efficiency in overall spread of banking system. Overall spread of banking system can be used for assessing profitability and pricing behaviour of banks while spread between high and low of inter-bank rates can be used for the early indication of change in risk perception. Market competition in the banking sector affects spread. A bigger bank enjoys the benefit of bargaining power over other customers thereby giving the opportunity

to widen the spread and indeed increase its profit margin. However, it is obvious that no single bank can extremely dominate loan market due to little product differentiation between banks. There are two markets here - the loan and deposit markets. These markets influence the spread coupled with other environmental factors.

2.1.8.2 Macroeconomic Condition

The recent crisis has highlighted the importance of liquidity as an influence on banks' ability to extend credit and on economic activity. The level of economic activities affects the liquidity holding of a bank. An increase in economic activities of the country indicates that customers demand for loans will increase, and with improved lending activities, banks would be able to generate more profits.

Macroeconomic variables like GDP growth rate, short term interest rate, inflation among others affect corporate liquidity holding. In examining the linkages between real economy and bank performance, Laeven and Majnoni (2013) find evidence that banks increase provisions when earnings increase, but provisions also increase when GDP growth falls. They investigated how loan loss provisions adjust to changes in GDP growth, bank earnings and loan growth and conclude that banks' provisions increase when earnings are strong; and during recessions to reinforce the business cycle but do not increase provisions during normal business period. The empirical evidences show that banks hold large of liquidity during recession than the normal business period. Furlong and Krainer (2014) note that a bank's exposure to economic conditions depends on its portfolio/overall level of lending activity and specific loan exposures to specific industries.

Their study identified differences in the correlations of bank level profitability ratios to state-level averages and interpreted as evidence of the peculiar nature of the linkage between economic condition in a state and the performance of a bank. Jacobson posits that the weaker macroeconomic conditions reduce revenues and business profits and the incomes of households, resulting in households' and businesses' net worth increasing or decreasing slowly.

2.1.8.3 Liquidity Ratio

Risk of liquidity is dangerous to the image of a bank. Bank has to take a proper care to hedge the liquidity risk and at the same time ensure that good percentage of funds is invested in high return generating securities, so that it is in a position to generate profit with provision liquidity to the depositors.

Various conscious efforts have been made by researchers to investigate factors that determine the quantity of liquidity holding. Sinkey and Joseph, (2013) investigated on Bank-specific and macroeconomic determinants of liquidity of English banks and assumed that the liquidity ratio as a measure of the liquidity depends on the following factors: (a) the support from central bank, (b) interest margin (c) bank profitability, (d) loan growth, where higher loan growth indicates increase in illiquid assets, size of the bank, (e) gross domestic product growth as an indicator of business cycle, and (f) short term interest rate to capture the monetary policy effect.

2.1.8.4 Short Term Debt

Reliance on a few wholesale depositors increases liquidity risk. In the event of the major depositors losing confidence in bank's business operation will mean a drastic fall in liquidity and insolvency. Firms that rely more heavily on short-term liabilities are likely to be more profitable, (Christopher, Dorothea, Oleksandr 2012). Evidence in contrast shows that banks that

rely more heavily on non-deposit sources of funds experience a significantly larger decline in stock returns, (Raddatz, 2010).

This results in financial flimsiness while measuring default and volatility of bank stock return. However, financing of illiquid assets with short term debt may lead to liquidity shortages and solvency problems.

Liquidity shortages can occur if depositors suddenly demand payments or liquidity holders are not willing to roll over debt. This can result in banks facing huge losses that will restrain future lending and at the extreme can drive contagious bank failures. The reliance of banks on short term wholesale funding to finance the expansion of their balance sheets and excessive leverage has been highlighted as key factors in the build-up of systemic risks. Fisher described a strong links between distressed asset sales and banks' health, (Fisher, 2012).

The basic mechanism is that given a liquidity or solvency shock, banks start to sell assets, which creates excess supply in asset markets and lowers asset prices. Banks facing urgent need for cash sell their assets at a higher discount to meet up the cash pressure and this affects banks' health.

2.1.8.5 Poor Asset Quality

Poor asset quality affects liquidity as it reduces the value of the asset. Non-performing assets increase the liquidity risk of the bank as it will lead to illiquidity. The higher rate of nonperforming assets the lesser the liquidity, and greater possibility of not meeting the settlement obligations of the affected bank. This also affects the inter-bank market transaction which is on trust and credit worthiness of the counterparty. Such loss of confidence would eventually affect cash inflow especially when wholesale sources seem to be unrealistic.

2.1.8.6 Bank Size

Bank size accounts for the existence of economies or diseconomies of scale. Economic theory suggests that market structure affects firm's performance and if the industry is subject to economies of scale, larger institutions would be more efficient and could provide service at a lower cost. The theory asserts that a firm will enjoy economies of scale up to a certain level, beyond which diseconomies of scale set in. This implies that profitability increases with increase in size, and decreases as soon as there are diseconomies of scale. Thus, there is relationship between the bank size and profitability which may be positive or negative, (Dietrich and Wanzenried 2012).

2.1.8.7 Capital

Capital refers to the owners' fund available to support business operation. Bank capital acts as a buffer in case of adverse condition. Capital is calculated as the ratio of equity to total assets. The ratio measures how much of the banks' assets are funded with owners' fund and is a proxy for capital adequacy of a bank by estimating the ability to absorb the losses. The relationship between capital and profitability is said to be erratic. This is because while some studies show positive relationships, others show negative relationships. However, positive relationship implies efficiency of the banks while negative relationship implies inefficiency, Agbeja, Adelokun, Olufemi, (2015).

2.1.9 Instruments for Liquidity Management

As mentioned before there are several benefits from having an effective liquidity management strategy but there are also some severe implications of misjudging the firms liquidity needs such as risk of bankruptcy (Richards & Laughlin, 2010). In the following sections a discussion of the tools and strategies of handling a firm's liquidity will be conducted.

There are several measures for corporate liquidity and different ratios are more important for different stakeholders. Also from which perspective one is examining the company's liquidity levels affects the use of different measurements. Some of the ratios are more interesting for the bank than investors and accounting measures of liquidity adds another new perspective of the liquidity. As our approach in this study is to examine the liquidity from financial management perspective we have excluded accounting measures and concentrate on those ratios that financial managers use most often. Previous literature verified there are major differences even among the financial management field when it comes to the liquidity planning and monitoring and therefore we have tried to include just the most commonly used formulas, and therefore the list is not extensive.

Ratio information can be used in many ways but one group of the most important users of information are lenders. Huff, Harper, & Eikner, (2013) have identified three important applications of liquidity ratio analysis: "evaluating companies before granting credit, designing of covenants to improve the odds for loan repayment and evaluation whether existing loan covenants are violated".

2.1.10 Current Ratio

One of the most common and also the oldest measure of corporate liquidity is current ratio. It was developed at the end of the 19th century in order to evaluate the credit-worthiness of the companies (Beaver, 2012).

The current ratio is a [liquidity ratio](#) that measures a company's ability to pay [short-term](#) and [long-term](#) obligations. To gauge this ability, the current ratio considers the current total [assets](#) of a company (both [liquid](#) and [illiquid](#)) relative to that company's current total [liabilities](#). The current

ratio is called “current” because, unlike some other liquidity ratios, it incorporates *all current* assets and liabilities.

In its simplicity it expresses the liquid resources available when current liabilities are met and is calculated as follows:

Current ratio = Current asset/Current Liabilities

Maness & Zietlow (2015) has expressed that historically a current ratio of 2.0 has been a norm, meaning that company has approximately twice as much current assets as coverage for short term creditors. As the critique towards this measure often goes, it simplifies the protection available for short-term creditors as not all the current assets are easily liquidated but can be tied in the inventory.

2.1.11 Quick Ratio

Quick ratio or acid-test ratio is very similar to current ratio and solves the liquidation issues mentioned above by excluding inventories from calculation:

Quick ratio =
$$\frac{\text{Cash} + \text{Marketable Securities} + \text{Receivables}}{\text{Current Liabilities}}$$

Usefulness of current and quick ratios for measuring working capital has been questioned because of their static nature. As a balance sheet is a statement of *stock* instead of *flows* with the result that ratios calculated from balance sheet accounts are liquidity stock measures at a certain point in time. Penman, (2015), Shin and Soenen (2014) have studied alternative tools for measuring the effectiveness of working capital and they suggested Cash Conversion Cycle.

Up to date several other measures are used in addition to current ratio and quick ratios. On the other hand, even the importance of ratio analysis has been questioned and considered as a weak

tool for monitoring liquidity. According to Campbell, Johnson and Savoie's study (in Maness and Zietlow 2015), monitoring of accounts receivables and good bank relations are valued over the traditional ratio analysis among the financial managers. A common practice is to combine several methods and use ratios as a part of liquidity management, but not rely solely on them. (Maness and Zietlow, 2015).

Huff, et al. (2013) found evidence of differences in liquidity ratios when different size of companies compared. They put forward an argument that companies with little or no inventory tend to have lower current ratios since their current assets are smaller. Another finding suggested that current liabilities exceeded current assets, i.e. negative working capital balance, more often among the small than larger companies (Huff et al. 2013).

Smaller companies have more extreme current ratio values (both very low and very high) than larger companies and therefore the comparison of current ratios among larger companies is more meaningful since there is likely to be less variation.

In summary, current and quick ratios have been traditionally most widely used tools monitoring corporate liquidity. External users, such as banks and other credit issuers have used them as measure for evaluation companies credit-worthiness, whereas internal users have monitored how working capital policy is executed inside the company. These are only few applications for ratios we have discussed. Usefulness of ratio analysis is questioned time to time and one has to be careful when comparing companies across industries.

2.1.12 Working Capital

If a company's [current assets](#) do not exceed its [current liabilities](#), then it may run into trouble paying back [creditors](#) in the short term. The worst-case scenario is [bankruptcy](#). A declining working capital ratio over a longer time period could also be a [red flag](#) that [warrants](#) further analysis. For example, it could be that the company's sales volumes are decreasing and, as a result, its accounts [receivables](#) number continues to get smaller and smaller. Working capital also gives investors an idea of the company's underlying [operational efficiency](#). Money that is tied up in inventory or money that customers still owe to the company cannot be used to pay off any of the company's obligations. So, if a company is not operating in the most efficient manner (slow collection), it will show up as an increase in the working capital. This can be seen by comparing the working capital from one period to another; slow collection may signal an underlying problem in the company's operations.

Working capital is calculated as:

Working Capital = Current Assets - Current Liabilities

The working capital ratio (Current Assets/Current Liabilities) indicates whether a company has enough [short term](#) assets to cover its short term debt. Anything below 1 indicates negative W/C (working capital). While anything over 2 means that the company is not investing excess assets. Most believe that a ratio between 1.2 and 2.0 is sufficient. Also known as “net working capital”.

2.1.13 Cash Ratio

Investopedia (2016) have it that is the ratio of a company's total [cash and cash equivalents](#) to its [current liabilities](#). The metric calculates a company's ability to repay its [short-term debt](#); this information is useful to [creditors](#) when deciding how much debt, if any, they would be willing to extend to the asking party. The cash ratio is generally a more conservative look at a company's ability to cover its [liabilities](#) than many other [liquidity ratios](#) because other assets, including [accounts receivable](#), are left out of the equation.

The cash ratio compares a company's most liquid assets to its current liabilities. The ratio is used to determine whether a business can meet its short-term obligations. It is the most conservative of all the liquidity measurements, since it excludes inventory (which is included in the current ratio) and accounts receivable (which is included in the quick ratio). This ratio may be too conservative, especially if receivables are readily convertible into cash within a short period of time.

The formula for the cash ratio is to add together cash and cash equivalents, and divide by current liabilities. A variation that may be slightly more accurate is to exclude accrued expenses from the current liabilities in the denominator of the equation, since it may not be necessary to pay for these items in the near term. The calculation is:

Cash + cash equivalents / current liabilities

The metric calculates a company's ability to repay its [short-term debt](#); this information is useful to [creditors](#) when deciding how much debt, if any, they would be willing to extend to the asking

party. The cash ratio is generally a more conservative look at a company's ability to cover its [liabilities](#) than many other [liquidity ratios](#) because other assets, including [accounts receivable](#), are left out of the equation.

If a company's cash ratio is equal to 1, the company has exactly the same amount of current liabilities as it does cash and cash equivalents to pay off those debts.

If a company's cash ratio is less than 1, there are more current liabilities than cash and cash equivalents. In this situation, there is insufficient cash on hand to pay off short-term debt. If a company's cash ratio is greater than 1, the company has more cash and cash equivalents than current liabilities. In this situation, the company has the ability to cover all short-term debt and still have cash remaining.

2.1.14 Debt Ratio

Debt ratio is a financial ratio that measures the extent of a company's or consumer's [leverage](#). The debt ratio is defined as the ratio of total long-term and short-term debt to total assets, expressed as a decimal or percentage. It can be interpreted as the proportion of a company's assets that are financed by debt.

The higher this ratio, the more [leveraged](#) the company is, implying greater [financial risk](#). At the same time, leverage is an important tool that companies use to grow, and many businesses find sustainable uses for debt.

Debt ratios vary widely across industries, with capital-intensive businesses such as [utilities](#) and pipelines having much higher debt ratios than other industries like technology. For example, if a

company has total assets of \$100 million and total debt of \$30 million, its debt ratio is 30% or 0.30. Is this company in a better financial situation than one with a debt ratio of 40%? The answer depends on the industry.

The debt ratio compares a company's total debt to its total assets. This provides creditors and investors with a general idea as to the amount of leverage being used by a company. The lower the percentage, the less leverage a company is using and the stronger its equity position. In general, the higher the ratio, the more risk that company is considered to have taken on.

2.1.15 The Management of Liquidity in Deposit Money Banks

According to Olagunju, Adeyanju and Olabode (2013) stated that bank liquidity refers to the ability of the bank to ensure the availability of funds to meet financial commitments or maturing obligations at a reasonable price at all times. Put tersely, bank liquidity means a bank having money where they need it particularly to satisfy the withdrawal needs of the customers. The survival of deposit money banks depends greatly on how liquid they are since illiquidity being a sign of imminent distress can easily erode the confidence of the public in the banking sector and results to deposit.

Equally important is the need for adequate income through interest on loan to ensure continued provision of productive resources and survival. It therefore becomes uneconomic and financially unreasonable for banks to allow excess idle cash in the vault or excess liquidity.

Hence, a need for effective liquidity management to maximize revenues while holding risks of insolvency to desired level.

Liquidity management refers to the planning and control necessary to ensure that the organization maintains enough liquid assets either as an obligation to the customers of the

organization so as to meet some obligations incidental to survival of the business or as a measure to adhere to the monetary policies of the central bank. For a deposit money bank to plan for or manage its liquidity position, it first manages its money position by complying with the legal requirement. Actually, management of money position is essential if a bank must avoid excesses or deficiencies of required primary reserves. Where there is a decline in market price of securities or where additional funds needed to correct the bank reserve position are for a very short time, it will be definitely expensive to sell securities than to borrow from another bank.

Moreover, it may be more desirable to borrow for bank's liquidity needs than to call back outstanding loans or to cancel or place embargo on new loans, a situation that will reduce the existing and potential customers of a bank. Deposit money banks are expected to maintain certain levels of reserves. These reserves are statutory requirements stipulated by the central bank specifying the cash reserves equal to certain fraction of the banks' deposits or loans and advances which bank must maintain.

Originally, the purpose of the reserve requirement is to compel banks to maintain a reasonable degree of liquidity in order to be able to meet cash demands. But currently, these reserves are used as control device through which the federal government can influence the monetary system.

Most deposit money banks in their bid not to contravene the regulation specifying legal minimum reserve requirement and in order to provide against unforeseen large withdrawals, resolve to maintain reserves in excess of their legal requirements. For the fact that keeping excess reserve for the purpose of short run safety means to forgo income or earnings, deposit money banks need to manage their reserves adequately.

Effective liquidity management therefore involves obtaining full utilization of all reserves. The primary reserves composed of vault cash, cash balances or excess reserves with the CBN, deposits with other banks both locally and abroad. They are maintained so as to satisfy legal and operational requirements and so do not yield any income.

The secondary reserves are those assets of the bank that can quickly be converted into cash on very short notice without risk of loss or material impairment of the principal sum invested.

Secondary reserves are characterized by short maturity, high credit quality and high marketability. The primary motive of holding secondary reserves is liquidity since they are used to meet both anticipated and unanticipated short term and seasonal cash needs from deposits withdrawals and loan requests.

Secondary reserve contributes to the attainment of both profitability and liquidity objectives.

2.1.16 Deposit Money Banks Profitability

The issue of profitability is a contentious subject that a bank has to consistently face. Profit is the disparity between expenses and revenue over a period of time, normally one year. As explained by Heibati, Nourani and Dadkhah (2012), a business is organic; it survives and grows. Therefore, it is important that a bank earns profit for its long term survival and growth. It is also necessary that enough profit must be earned to maintain the activities of the business to be able to obtain funds for expansion and growth of the bank.

Agbada and Osuji (2013) argued that corporate profit planning remains one of the most difficult and time consuming aspects of bank management because of the many variables involved in the

decision, which are outside the control of the bank. It is even more difficult if the bank is operating in a highly competitive economic environment, such as that of Nigeria.

According to Tabari, Ahmadi and Emami (2013) the profitability variable is represented by two alternative measures: the ratio of profits to assets, i.e., the return on assets (ROA) and the returns to equity ratio (ROE). In principle, return on assets ROA reflects the ability of a bank's asset to generate profit, although it may be biased due to off-balance-sheet activities. ROE indicates the returns to shareholders on their equity and equals ROA times the total assets-to-equity ratio.

Return on equity (ROE) is the amount of [net income](#) returned as a percentage of [shareholders](#) equity. Return on [equity](#) measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested.

Return on Equity = Net Income/Shareholder's Equity

2.2 Theoretical Review

2.2.1 Asset Theory

The theory of asset management states that banks must seek high returns, reduce risk and make adequate provisions by holding liquid assets. This theory is in support of the need for holding short term assets to cushion the effect of uncertainties in the banking operations and various needs for liquidity. Banks must lend to borrowers who are willing to pay high interest and unlikely to default on their loans, and raise liquidity required without bearing huge costs. Banks are not only funded by assets but they are largely financed by collateralised borrowing which cannot be relied on during financial distress (Brunnermeier and Pedersen, 2013). This refers to loans that provide the lender with a priority claim on specific asset and a general claim on the debtors' other

assets. The amounts of liquid assets to be held depend on the bank's apparent need for liquidity and deposits flow, financial market conditions and monetary policy directions. The concept of asset management has some shortcomings. It focuses on asset side of the balance sheet which makes the theory grossly deficient in the active money markets. The bank and the rate of changes in purchased funding are dependent on the market (Nwankwo, 2012). It also fails to consider that high returns are associated with high risks. According to Dietrich and Wanzenried, (2012) achieving high returns while holding a large portion of liquid assets at a low risk can be difficult as liquid assets are costly and have the tendency of reducing profits. In addition, the assets have to be attractive and easily marketable. Failure to do so has been proven to lead to bankruptcy or the need for an emergency loan. Cash asset is presumed to have no unique role in the process of acquisition and disposal of financial assets but the easiness of exchange for cash balance.

The easiness is defined as ratio of stock of cash balances to meeting financial obligations on maturity. The closer assets to maturity, the greater in general are the possibilities of realising them before maturity without risk of significant capital loss. The more liquid a bank is in this sense the greater is its capability to meet its obligations as they fall due. Higher ratio implies better performance, while lower ratio is an indicator of threat to the bank and would tend to inhibit bank performance.

Financial assets such as treasury bills have low risk: the risk of loss of value due to changes in interest rate policies is always very low since they are held in short term bases.

Financial assets can be categorised into: running assets, reserve assets along with other liquid assets which are mostly short-term claim e.g. treasury bills and investment assets including long-term claims e.g. bonds; money (cash), stock and bonds; and assets 'held for trading', 'held to

maturity investment', 'loans and receivables' and 'available for sale' for treatment purposes (Hicks, 1967). Keney's (1937) explained the three motives of holding financial assets to include the transactional, precautionary and speculative motives.

The economics and finance literature in support of Keney's assertion analyse four possible reasons for firms to hold liquid assets: the transaction motive (Miller and Orr, 2006); the precautionary motive (Oppler, Pinkowitz, Stulz, and Williamson, 2016); the agency motive (Michael, 1986); and the tax motive (Foley, Titman, and Twite, 2007).

2.2.2 Trade-Off Theory of Liquidity

This theory has had a great effect on holding liquid assets. Under perfect capital market assumptions holding cash asset neither creates nor destroys value. The bank can always raise funds from capital markets when need arises, there are no transaction costs in raising these funds, and the funds can be raised at a fair price because the capital markets are assumed to be fully informed about the prospects of the bank.

According to the Tradeoff theory, banks target an optimal level of liquidity to balance the benefit and cost of holding cash. The cost of holding cash includes low rate of return due to liquidity premium and tax disadvantage. The benefits of holding cash are saving of transaction costs to raise funds in which assets are liquidated to make payments and using of liquid assets to finance its activities and investment where other sources of funding are not available or very expensive (Abuzar, 2014). Trade off model explains that, firms with high leverage attracts high cost of servicing the debt thereby affecting its profitability and it becomes difficult for them to raise funds through other sources. Holding cash on that point is not only maintained by the smaller

firm but also larger firms. So firm size does not matter when the question of bankruptcy interrupt the capital structure decision.

2.2.3 Shiftability Theory

This theory posits that a bank's liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. This point of view contends that a bank's liquidity could be enhanced if it always has assets to sell and provided the Central Bank and the discount Market stands ready to purchase the asset offered for discount. Thus this theory recognizes and contends that shiftability, marketability or transferability of a bank's assets is a basis for ensuring liquidity.

This theory further contends that highly marketable security held by a bank is an excellent source of liquidity. Dodds (1982) contends that to ensure convertibility without delay and appreciable loss, such assets must meet three requisites. Liability Management Theory Liquidity management theory according to Dodds (1982) consists of the activities involved in obtaining funds from depositors and other creditors (from the market especially) and determining the appropriate mix of funds for a particular bank. This point of view contends that liability management must seek to answer the following questions:

- i. How do we obtain funds from depositors?
- ii. How do we obtain funds from other creditors?
- iii. What is the appropriate mix of the funds for any bank?

Management examines the activities involved in supplementing the liquidity needs of the bank through the use of borrowed funds.

The liquidity management theory focuses on the liability side of bank balance sheet. This theory contends that supplementary liquidity could be derived from the liabilities of a bank. According to Nwankwo (2012) the theory argues that since banks can buy all the funds they need, there is no need to store liquidity on the asset side (liquidity asset) of the balance sheet.

Liquidity theory has been subjected to critical review by various authors. The general consensus is that during the period of distress, a bank may find it difficult to obtain the desired liquidity since the confidence of the market may have seriously affected and credit worthiness would invariably be lacking. However, for a healthy bank, the liabilities (deposits, market funds and other creditors) constitute an important source of liquidity.

2.2.4 Commercial Loan Theory

This theory has been subjected to various criticisms by Dodds (1982) and Nwankwo (2012). From the various points of view, the major limitation is that the theory is inconsistent with the demands of economic development especially for developing countries since it excludes long term loans which are the engine of growth. The theory also emphasizes the maturity structure of bank assets (loan and investments) and not necessarily the marketability or the shiftability of the assets.

Also, the theory assumes that repayment from the self-liquidating assets of the bank would be sufficient to provide for liquidity. This ignores the fact that seasonal deposit withdrawals and meeting credit request could affect the liquidity position adversely. Moreover, the theory fails to reflect in the normal stability of demand deposits in the liquidity consideration.

This obvious view may eventually impact on the liquidity position of the bank. Also the theory assumes that repayment from the self-liquidating assets of a bank would be sufficient to provide

for liquidity. This ignores the fact that seasonal deposit withdrawals and meeting credit request could affect the liquidity position adversely.

2.2.5 Anticipated Income Theory

This theory holds that a bank's liquidity can be managed through the proper phasing and structuring of the loan commitments made by a bank to the customers. Here the liquidity can be planned if the scheduled loan payments by a customer are based on the future of the borrower. According to Nzotta (2012) the theory emphasizes the earning potential and the credit worthiness of a borrower as the ultimate guarantee for ensuring adequate liquidity. Nwankwo (2012) posits that the theory points to the movement towards self-liquidating commitments by banks.

This theory has encouraged many deposit money banks to adopt a ladder effects in investment portfolio.

2.3 Empirical Review

In attempt to strike a balance between the quantum of liquidity and returns, and scholars have made various efforts to provide a solution to the problem regarding the level of liquidity to hold. An optimal liquidity hypothesis holds that market responses to liquidity changing events are conditioned by the observed changing levels of the firm's liquidity. There are many liquidity enhancing events or situations that impact on the firm's value: debt/equity issues, sales of assets and loans from interbank markets. The choice of any of these variables affects the level of liquidity.

Therefore, dilemma in liquidity management is to achieve desired tradeoff between liquidity and profitability. Liquidity status is very important for investors and managers as it helps to evaluate a firm's future, estimate investment risk and return and stock price.

Some scholars believe that liquidity is more important because firms with low profitability or even without profitability can serve economy more than companies without liquidity.

Edem, (2017) carried out a study on liquidity management and performance of deposit money banks in Nigeria. The proxies used were returns on equity as the dependent variable, while liquidity ratio, loan to total deposit ratio, cash reserve ratio as independent variables. 24 banks were surveyed which constitute the entire deposit money banking industry in Nigeria between 1986 and 2011. Secondary data were collected and analysed using SPSS. The study uses descriptive, correlations and inferential statistics. Regression Analysis. Findings from the empirical analysis show that there is a significant relationship between liquidity management and the performance of Deposit Money Banks in Nigeria. The correlation results reveal positive impacts between return on equity and liquidity management variables: liquidity and cash reserve ratios, whereas loan to deposit ratio shows negative impact. However, the key results indicate that only the banks with optimum liquidity were able to maximize returns. The study concludes that illiquidity and excess liquidity pose problem to bank management operations and recommends that bank should adopt optimum liquidity model for efficiency and effectiveness.

Bassey and Moses (2015) carried out a study on bank profitability and liquidity management: a case study of selected Nigerian deposit money banks. The study was carried on fifteen deposit money banks in Nigeria and covered a panel data of 2010 to 2012. Two models were specified and estimated using Ordinary Least Squares (OLS) technique. The empirical results revealed that

there is a statistically significant relationship between bank liquidity measures-current ratio, liquid ratio, cash ratio, loans to deposit ratio, loans to asset ratio- and return on equity. However, when return on asset was used as proxy for profitability, the relationship became statistically insignificant. It was suggested that the banks should evaluate and redesign their liquidity management strategy so that it will not only optimize returns to shareholders equity but also optimize the use of the assets.

Ibe (2013) investigated that impact of liquidity management on the profitability of banks in Nigeria. Three banks were randomly selected to represent the entire banking industry in Nigeria. The proxies for liquidity management include cash and short-term fund, bank balances and treasury bills and certificates, while profit after tax was the proxy for profitability. Elliot Rosenberg Stock (ERS) stationary test model was used to test the association of the variables under study, while regression analysis was used to test the hypothesis. The result showed that there is a statistically significant relationship between the variables of liquidity management and profitability of the selected banks.

The study by Kehinde (2013) critically examined the relationship between credit management, liquidity position and profitability of selected banks in Nigeria using annual data of ten banks over the period of 2006 and 2010. The results from ordinary least squares estimate found that liquidity has significant positive effect on Return on Asset (ROA).

Agbada and Osuji (2013) explored the efficacy of liquidity management and banking profitability performance in Nigeria. Profitability and Return on Capital Employed (ROCE) were adopted as proxy variables. Findings from the empirical analysis were quite robust and clearly indicated that there was a statistically significant relationship between efficient liquidity management and

banking performance, and that efficient liquidity management enhances the soundness of the banks.

Adeyinka (2013) examined the effect of capital adequacy on profitability of deposit-taking banks in Nigeria. It sought to assess the effect of capital adequacy of both foreign and domestic banks in Nigeria and their profitability. The study presented primary data collected by questionnaires involving a sample of five hundred and eighteen (518) distributed to staff of banks with a response rate of seventy six percent. Also, published financial statements of banks were used from 2006 to 2010. The finding from the primary data analysis revealed a non-significant relationship but the secondary data analysis showed a positive and significant relationship between liquidity adequacy and profitability of bank. This implies that for deposit-taking banks in Nigeria, liquidity adequacy plays a key role in the determination of profitability. It was discovered that liquidity and profitability are indicators of bank risk management efficiency and cushion against losses not covered by current earnings.

Uremadu (2012) carried out a study on the effect of capital structure and liquidity on the profitability of selected Nigerians banks. Time series data for the 1980 to 2006 period was used for the study. The data was analyzed using descriptive statistics and regressive distributed lag (ARDL) model. The empirical results indicated a positive and significant relationship between cash reserve ratio, liquidity ratio, corporate income tax and banks' profitability. On the other hand, there was negative and significant relationship between savings deposit rate, gross national savings, balances with the central bank, inflation rate, foreign private investment and bank profitability.

Olagunju, Adeyanju and Olabode (2013), the study examined liquidity management and commercial banks' profitability in Nigeria. The major aims of the study were to find empirical evidence of the degree to which effective liquidity management affects profitability in commercial banks and how commercial banks can enhance their liquidity and profitability positions. Considering the nature of the survey, quantitative methods of research were applied. In attempt to achieve the objectives of the study, several findings were made through the analysis of both the structured and unstructured questionnaire on the management of banks and the financial reports of the sampled banks. The data obtained from the Primary and Secondary sources were analyzed through collection, sorting and grouping of the data in tables of percentages and frequency distribution. We formulated a hypothesis, which were statistically tested through Pearson correlation data analysis. Findings from the testing of this hypothesis indicate that there is significant relationship between liquidity and profitability. That means profitability in commercial banks is significantly influenced by liquidity and vice versa.

Obiakor and Okwu (2013) examined the nature and extent of the relationship between liquidity and profitability and also to determine whether any cause and effect relationship existed between the two performance measures. Analysis was based on accounts of the banks and the companies for the relevant period. A model of perceived functional relationship was specified and estimated using correlation and regression analysis. The results indicated that while a trade-off existed between liquidity and profitability in the banks with a negative but insignificant impact, the two variables were positively correlated.

Fang, Noe, and Tice (2013) in their study find that there exists a positive relationship between liquidity and corporate performance. Gruszczynski, (2012) in his study finds that the degree of success of corporate governance is positively related to firm's financial performance and liquidity. Empirical research on the relationship between liquidity and bank performance of South African banks (1998-2014) was conducted. The study employed the Autoregressive Distributed Lag (ARDL) bound testing approach and the Ordinary Least Squares (OLS) to examine the connection between net interest margin and liquidity. Two liquidity indicators were used: market liquidity risk and funding liquidity risk. The results reveal a negative significant deterministic relationship between net interest margin and funding liquidity risk. Nevertheless, there is an insignificant co-integrating relationship between net interest margin and the two measures of liquidity, (Godfrey, 2015).

Ali (2015) studied the effect of liquidity management on profitability in Thirteen Jordanian deposit money banks from (2005–2012). The liquidity indicators used are investment ratio, quick ratio, capital ratio, net credit facilities/ total assets and liquid assets ratio, while return on equity (ROE) and return on assets (ROA) are the proxies for profitability. The study adopted Augmented Dickey Fuller (ADF) stationary test model to test for a unit root in a time series of the research variables and regression analysis for test of hypothesis. The empirical results show that quick ratio and investment ratio of the available funds have a direct relationship, while capital ratio and liquid assets ratio show an inverse relationship with the banks' profitability.

Raddatz (2010) also examined liquidity management and the performance of banks in Nigeria from 2000-2010. The study applied bank deposit and bank investment variables as proxies for bank performance while cash reserves requirement and cash ratio were used as liquidity

management variables. Data were mainly collected from CBN's statistical bulletin and analysed using simple percentages and simple regression model. The results indicate that a strong relationship exists between bank deposit and bank reserve requirement, and bank investment and cash ratio, meaning that successful operations and survival of banks anchored on efficient and effective liquidity management and suggested that banks should devise other measures to reduce illiquidity rather than concentrate purely on deposits, (Bassey and Moses 2015).

Owolabi & Obida (2012) studied the relationship between Liquidity Management and Corporate Profitability in manufacturing firms listed in the Nigerian Stock Exchange was investigated using descriptive statistics. The result shows that liquidity management measured in terms of the companies' Credit Policies, Cash Flow Management and Cash Conversion Cycle has significant impact on corporate profitability and concluded that managers can increase profitability by putting in place good credit policy, short cash conversion cycle and by effective cash flow management procedures.

Bordeleau and Graham (2013) in their study investigated the relationship between liquidity and bank profitability by applying Quadratic model in determining the optimum liquidity level of banks in Canada. The results show nonlinear relationship between liquidity and bank profitability. Gonzalez and Gonzalo (2011) in portfolio choice and effects on liquidity applied econometric model in determining the appropriate liquidity level. Another researcher developed optimum liquidity model to accommodate a multi-stage liquidity need where the liquidity gap and execution cost can be differentiated across stage, (Chen, Skoglund, and Cai 2012).

Understanding the effect of bank's optimum liquidity level on return on investment is not only significant but crucial in banking while monitoring adequate liquidity to satisfy the regulatory authorities. Banks holding optimum liquid assets benefit from a superior sensitivity in funding markets, reduction in financing costs and increased profitability.

However, holding liquid assets involves an opportunity cost because of their low return relative to other assets. This can have negative effect on profitability hence poor corporate performance.

2.4 Literature Gap

Series of empirical evidences have been presented by researchers to explain the effect of liquidity management on deposit money banks in Nigeria. Prior studies have considered variables such as returns on equity, liquidity ratio, loan to total deposit ratio, cash reserve ratio (Edem, 2017), current ratio, liquidity ratio, cash ratio, loan to deposit ratio, loan to asset ratio and returns on equity (Bassey and Moses 2015), cash and short term fund, bank balances, treasury bills and certificate, profit after tax (Ibe, 2013). Also from the empirical literature, to the best of my knowledge no study have been carried out with a data that ends in 2016 but this study intends to cover the gap by extending the study to 2016 including variables like quick ratio, net working capital, cash ratio, debt ratio during the period 2000-2016.

2.5 Summary

Liquidity management has assumed strategic position in bank management hierarchy due to its critical nature highlighted by recent market turmoil. It is the core function of revenue generation, lending and payment. Success of any bank depends on level of liquidity that is sufficient for its operation. Inefficient management of liquidity results in serious impairment of banking functions and contagious effect on the economy.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology refers to the systematic rules and procedure upon which a research is based against which claims for knowledge and assumptions are proved in favour of a decision (Asika, 2004).

This chapter basically focuses on all the procedures adopted for data collection and analysis of the study it explains the research design, population and sample size, sampling techniques, method of data collection and techniques of data analysis.

3.2 Research Design

A research design refers to the approaches, framework or plans of carrying out research studies. It is used as a guide in collecting and analyzing data (Olannye, 2006). A research design is aimed at identifying variables and their relationship to one another. This is used for the purpose of data collection, to enable the researcher answer research questions and test hypotheses.

It is of importance for the researcher to specify the type of design or method suitable for the problem to be investigated. The nature of the problem under investigation will influence and determine the choice of the research design to be used. The purpose of the study also plays a dominant role in determining the choice of research. Baridam (2001) asserts that research designs does not mean the specific method of collecting data e.g. questionnaire, interview or direct observation but the more fundamental question of how the study subjects will be brought into the scope of the research and how they will be adopted within the research setting to obtain the required data.

In view of the above, the study intends to use the ex-post-facto research design. According to Anyiwe, Idahosa and Ibeh (2013), ex-post-facto research design is a design measuring or ascertaining the impact of one variable on another or the relationship between one variable and another.

3.3 Population and Sample Size

The intended population of this study covers all the twenty-two (22) deposit money banks in Nigeria. Thus the proposed sample size of the study covers ten (10) Deposit Money Banks in Nigeria: First Bank of Nigeria, Zenith Bank, Guaranty Trust Bank, Fidelity Bank, Access Bank, Diamond Bank, Eco Bank, United Bank for Africa, Skye Bank, and Wema Bank. Additionally the sample size of only ten (10) deposit money banks were chosen on the basis of their high performance over time.

3.4 Sampling Technique

The study used the non-probability sampling technique due to the fact that the selection of the items in the sample is based on judgement of the researcher. Further the judgement was based on profitability turnover of deposit money banks in Nigeria.

3.5 Method and Sources of Data Collection

According to Shokan, (2011), it refers to how data were collected for the study. The study intends to use the secondary source of data collection. However, the intended data for this research work will be obtained from annual reports of the banks under study.

3.6 Technique of Data Analysis

The proposed technique for analysis of the study will be ordinary least square (OLS) and diagnostic test regression estimation technique through econometric views (E-views) 7.0 statistical model. Brooks (2010) opined that E-View is encouraged and justified for such time series regression analysis because of wider scope and sufficient observation.

3.7 Model Specification

Mathematically, the model is presented as:

$$Y = F (X_1, X_2, X_3, X_4, X_5)$$

$$ROE = f(CR, QR, NWC, CHR, DBTR) \dots\dots\dots (1)$$

Thus, the econometric model is:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + U_t \dots\dots\dots(2)$$

Where:

- Y = Dependent variable
- a₀ = Intercept Term
- a₁- a₅ = The coefficient/slope of the independent variables
- x₁ – x₅ = Independent variables
- U_t = Error term or stochastic term

The functional form of the model is represented as:

$$ROE = a_0 + a_1CR + a_2QR + a_3NWC + a_4 CHR + a_5 DBTR + U_t\dots\dots (3)$$

Where:

ROE = Returns on Equity = Net income / Shareholder's equity

CR = Current Ratio = Current assets/Current liabilities

QR = Quick Ratio = Cash + marketable securities + receivables/current liabilities

NWC = Net Working Capital = Current assets – Current Liabilities

CHR = Cash Ratio = Cash + Cash equivalents / Current Liabilities

DBTR = Debt Ratio = Total liabilities / Total Assets

In the case of log transformation for econometric problem, we rewrite the equation as:

$$\ln ROE = a_0 + a_1 \ln CR + a_2 \ln QR + a_3 \ln NWC + a_4 \ln CHR + a_5 \ln DBTR + U_t \dots (4)$$

Apriori Expectations

CR > 0

The expectation of the result is proposed as current ratio (CR) will have positive impact on returns on equity of deposit money banks in Nigeria.

QR > 0

The expectation of the result is proposed as quick ratio (QR) will have positive impact on returns on equity of deposit money banks in Nigeria.

NWC > 0

The expectation of the result is proposed as net-working capital (NWC) will have positive impact on returns on equity of deposit money banks in Nigeria.

CHR > 0

The expectation of the result is proposed as cash ratio (CHR) will have positive impact on returns on equity of deposit money banks in Nigeria.

DBTR < 0

The expectation of the result is proposed as debt ratio (DBTR) will have negative impact on returns on equity of deposit money banks in Nigeria.

3.8 Summary

This chapter discusses the methodology used to analyse the intended data in chapter four. The issues discussed includes the research design, population and sample size, sample techniques, method of data collection, techniques of data analysis, model specification, apriori expectations.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter focuses on presentation and analysis of data sourced from annual report of the banks under study. The data represents each of the samples, and the analysis hinges on the relationship among the variables and their effects constructed in the model specified in chapter three.

4.2 Data Presentation

Table 4.2.1: First Bank of Nigeria

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	0.00358	0.708	1.035	2328	0.13	0.14
2001	-0.09274	0.593	1.052	-4706	0.38	0.22
2002	0.13963	0.604	1.044	-6081	0.39	0.23
2003	-0.31064	0.761	1.042	4747	0.27	0.23
2004	-0.06420	0.733	1.049	2918	0.28	0.23
2005	0.02727	0.745	1.052	3492	0.29	0.15
2006	0.01956	1.116	0.439	54957	0.28	0.15
2007	0.02354	5.440	1.916	608913	0.25	0.18

2008	0.02107	1.439	0.516	346808	0.26	0.22
2009	0.02003	1.250	0.263	326210	0.27	0.22
2010	0.01717	1.219	0.199	353925	0.27	0.22
2011	0.02343	1.155	0.418	323810	1.23	0.10
2012	0.02354	1.132	0.380	314183	1.43	0.07
2013	0.00358	8.280	7.160	27029	2.00	0.09
2014	-0.09274	0.938	0.416	-188561	3.34	0.11
2015	0.13963	18.05	4.29	2147981	5.39	0.17
2016	-0.31064	5.86	5.86	2685357	1.12	0.122

Source: Annual Report and Account of First Bank of Nigeria Plc.

Table 4.2.2: Zenith Bank of Nigeria

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio%
2000	-0.09274	0.56	0.03	176082	0.07	0.98
2001	0.13963	0.99	0.09	181029	0.12	0.98
2002	-0.31064	0.98	0.12	190292	0.14	0.97
2003	-0.06420	1.14	0.21	189202	0.15	0.93
2004	0.02727	1.16	0.32	210344	0.18	0.83
2005	0.01956	1.18	0.44	232843	0.22	0.81
2006	0.02354	1.18	0.75	904982	0.29	0.83
2007	0.02107	1.14	0.81	106035	0.18	0.87
2008	0.02003	1.25	0.90	326869	0.17	0.79
2009	0.01717	1.19	0.88	192191	0.09	0.79
2010	0.02343	1.27	0.09	364174	0.04	0.80
2011	0.02354	1.21	0.29	348723	0.09	0.81
2012	0.00358	1.29	0.31	531204	0.17	0.82
2013	-0.09274	1.29	0.37	634636	0.28	0.83
2014	0.13963	1.35	0.33	857785	0.31	0.85
2015	-0.31064	0.68	0.38	729394	0.32	0.85
2016	0.193	0.70	0.41	772712	0.23	0.85

Source: Annual Report and Account of Zenith Bank of Nigeria Plc.

Table 4.2.3: Guaranty Trust Bank

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	3.38878	1.343	0.010	13291012	0.59	0.87
2001	0.33755	1.545	0.021	15425605	0.62	0.90
2002	0.38758	1.422	0.056	25871978	0.64	0.83
2003	0.33240	1.338	0.076	17270894	0.60	0.88
2004	0.34916	1.329	0.090	24429473	0.42	0.90
2005	0.15928	1.201	0.100	48098251	0.48	0.82
2006	0.23810	0.679	0.103	-138079925	0.48	0.98
2007	0.03008	0.828	0.132	-94678712	0.45	0.93
2008	0.03057	1.194	0.201	143519733	0.43	0.95
2009	0.12653	1.177	0.172	147190309	0.48	1.10
2010	0.17796	1.194	0.303	164721971	0.32	1.02
2011	0.22111	1.372	0.451	395099465	0.27	1.08
2012	0.29590	1.342	0.291	398697344	0.32	0.98
2013	0.03440	1.371	0.476	499010338	0.60	1.11
2014	0.24776	1.341	0.321	514188839	0.58	0.99
2015	0.23251	1.443	0.324	654928191	0.55	1.01
2016	0.26595	1.445	0.355	689392214	0.56	1.04

Source: Annual Report and Account of Guaranty Trust Bank Plc.

Table 4.2.4: Fidelity Bank

	Dependent Variable	Independent Variables				
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Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	0.07846	0.087	0.828	5604923	0.110	0.67
2001	0.08252	0.230	0.910	6049221	0.123	0.76
2002	0.12089	0.234	0.112	7659839	0.213	0.86
2003	0.15063	0.356	0.104	8604104	0.303	0.88
2004	0.17396	0.275	0.025	9195086	0.222	0.87
2005	0.12387	0.253	0.148	11071335	0.208	0.72
2006	0.11278	0.149	0.008	44583677	0.130	0.78
2007	0.10888	0.150	0.010	12127924	0.105	0.86
2008	0.14696	0.152	0.014	13291011	0.108	0.87
2009	0.17418	0.176	0.052	13930195	0.121	0.98
2010	0.13866	0.162	0.093	14049201	0.128	0.99
2011	0.12801	0.166	0.991	15059003	0.129	1.04
2012	0.12089	0.167	1.019	16794821	0.311	1.06
2013	0.15063	1.09	1.033	17829214	0.314	1.09
2014	0.17396	1.12	0.191	19820930	0.333	1.13
2015	0.12387	1.13	1.231	20293904	0.323	1.16
2016	0.11278	1.18	1.450	22383921	0.329	1.23

Source: Annual Report and Account of Fidelity Bank.

Table 4.2.5: Access Bank

Dependent Variable	Independent Variables

Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	0.15453	0.852	0.609	2476893	0.706	0.90
2001	0.08455	1.329	0.123	1601659	0.393	0.88
2002	-0.02842	1.499	0.328	3237437	0.586	0.82
2003	0.23530	1.723	0.625	6739099	0.825	0.89
2004	0.23585	0.243	0.099	2042653	0.243	0.91
2005	0.03564	0.241	0.021	2059583	0.291	0.99
2006	0.02551	0.244	1.091	2069493	0.011	1.02
2007	0.21432	0.250	1.210	2073821	0.910	1.13
2008	1.00000	0.253	1.221	2098104	1.101	1.19
2009	0.12382	0.254	0.989	3029101	1.122	0.98
2010	0.07086	0.259	1.001	3049465	1.029	0.94
2011	0.07351	1.200	1.122	3958696	0.991	1.10
2012	0.15299	1.239	1.320	4093911	1.029	1.32
2013	0.10691	1.232	1.401	5678992	1.023	1.42
2014	0.14569	1.290	1.431	6789454	1.043	1.45
2015	0.16349	1.301	1.081	7664545	1.148	1.49
2016	0.15184	1.403	1.996	8744423	1.165	1.56

Source: Annual Report and Account of Access Bank.

Table 4.2.6: Diamond Bank

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %

2000	3.49377	0.001	0.250	2009480	0.084	0.504
2001	3.38878	0.019	0.253	2102928	0.091	0.454
2002	0.33755	0.012	0.254	2312104	0.096	0.895
2003	0.06642	0.032	0.259	8257535	0.206	0.912
2004	0.12346	0.078	0.019	3027369	0.102	0.902
2005	0.12200	0.087	0.998	2799057	0.090	0.906
2006	0.11008	0.230	1.019	2226440	0.092	0.891
2007	0.12861	0.234	1.035	2928392	0.098	0.919
2008	0.10106	0.356	1.052	2839291	1.020	1.019
2009	-0.08206	0.275	1.044	3029383	1.011	1.023
2010	0.05580	0.253	1.042	3192839	0.082	0.981
2011	-0.26597	0.149	1.049	4029282	0.406	0.983
2012	0.21196	0.150	1.052	9403391	0.958	0.782
2013	0.21514	0.152	0.439	9489485	1.018	0.631
2014	0.10725	0.176	1.916	8948382	1.051	1.015
2015	0.18425	0.162	0.516	8573853	1.129	1.128
2016	0.09322	0.166	0.263	4833892	1.302s	1.329

Source: Annual Report and Account of Diamond Bank.

Table 4.2.7: Eco Bank

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	0.30626	1.011	0.102	1120494	1.55	0.45

2001	0.29174	1.013	0.230	1204955	1.61	0.76
2002	0.10513	0.981	0.231	1150695	1.64	2.17
2003	0.12873	0.994	0.205	1190294	1.46	1.64
2004	0.08435	1.049	0.222	1209328	0.76	2.06
2005	0.26692	1.022	0.427	1280120	0.71	2.15
2006	0.11880	1.060	0.717	1280522	0.73	1.82
2007	0.09455	1.076	0.775	1614680	0.81	1.23
2008	0.02503	1.094	0.703	2227193	0.93	1.89
2009	0.01466	1.086	0.641	2852272	0.89	1.93
2010	-0.04017	1.576	1.063	23880843	1.10	0.98
2011	-0.04940	1.240	1.011	21082112	1.23	0.09
2012	0.25479	0.385	1.210	-658789	1.16	1.03
2013	0.30626	0.346	1.321	-795756	1.19	1.06
2014	0.29174	0.351	1.323	81101811	0.99	1.11
2015	0.10513	0.362	1.325	89193392	1.34	1.15
2016	0.12873	0.344	1.403	90494585	1.23	1.20

Source: Annual Report and Account of Eco Bank.

Table 4.2.8: United Bank for Africa

Year	Dependent Variable	Independent Variables				
		Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %
2000	0.13928	0.176	0.828	176082	0.004	0.87
2001	0.12583	0.162	0.910	181029	0.120	0.98

2002	0.13913	0.166	0.112	190292	0.110	0.99
2003	0.21711	0.167	0.104	189202	0.123	1.04
2004	0.23174	1.09	0.025	210344	0.213	1.06
2005	0.26285	1.12	0.148	232843	0.303	1.09
2006	0.24082	1.13	0.008	-181036	0.222	1.13
2007	0.12032	1.18	0.153	112929	0.208	1.16
2008	0.21260	1.063	0.148	82398	0.130	1.23
2009	0.06866	1.067	0.160	79812	0.105	0.79
2010	0.01154	1.142	0.638	160767	0.108	0.79
2011	-0.09635	1.213	0.735	265435	0.121	0.80
2012	0.21503	1.184	0.779	274333	0.128	0.81
2013	0.17910	1.130	0.670	234097	0.129	0.82
2014	0.14217	1.174	0.656	317232	0.311	0.83
2015	0.14086	1.801	0.782	329282	0.314	0.85
2016	0.12162	1.922	0.891	428222	0.333	0.85

Source: Annual Report and Account of UBA Bank.

Table 4.2.9: Sky Bank

	Dependent Variable	Independent Variables				
Year	Return on equity %	Current ratio %	Quick ratio %	Net working capital N	Cash ratio %	Debt ratio %
2000	0.04302	0.150	1.001	1120494	0.14	0.545
2001	1.99064	0.152	1.122	1204955	0.22	0.431
2002	1.53253	0.176	1.320	1150695	0.23	0.706

2003	0.85479	0.162	0.045	1190294	0.23	0.393
2004	0.90626	0.166	0.982	1209328	0.23	0.586
2005	0.89174	0.167	0.828	1280120	0.15	0.825
2006	0.70513	1.09	1.194	1280522	0.15	0.243
2007	0.72873	1.12	0.609	1614680	0.18	0.291
2008	0.68435	1.13	0.123	-138079925	0.22	0.011
2009	0.86692	1.18	0.328	-94678712	0.22	0.910
2010	0.71880	1.342	0.625	143519733	0.22	1.101
2011	0.69455	1.371	0.099	147190309	0.10	1.122
2012	0.62503	1.341	0.021	164721971	0.07	1.210
2013	0.61466	1.443	1.091	395099465	0.09	1.123
2014	0.55983	1.177	1.210	398697344	0.11	1.198
2015	0.55060	1.194	1.221	499010338	0.17	0.091
2016	0.85479	1.372	0.989	514188839	0.122	1.109

Source: Annual Report and Account of Sky Bank.

Table 4.2.10: Wema Bank

	Dependent Variable	Independent Variables				
Year	Return on equity	Current ratio	Quick ratio	Net working capital	Cash ratio	Debt ratio
2000	0.06816	0.093	0.109	654928	0.02	0.99
2001	0.07600	0.398	0.201	689392	0.25	1.00
2002	0.07846	1.194	0.303	164721	0.32	1.02
2003	0.08252	0.166	0.112	190292	0.11	0.99

2004	0.12089	0.167	0.104	189202	0.12	1.04
2005	0.15063	1.09	0.025	210344	0.21	1.06
2006	0.17396	1.12	0.148	232843	0.30	1.09
2007	0.12387	1.343	0.010	13291012	0.59	0.87
2008	0.11278	1.545	0.021	15425605	0.62	0.90
2009	0.10888	1.422	0.056	25871978	0.64	0.83
2010	0.14696	1.338	0.076	17270894	0.60	0.88
2011	0.17418	1.329	0.090	24429473	0.42	0.90
2012	0.13866	1.201	0.100	48098251	0.48	0.82
2013	0.12801	0.679	0.103	-138079925	0.48	0.98
2014	0.12089	0.828	0.132	-94678712	0.45	0.93
2015	0.15063	1.194	0.201	143519733	0.43	0.95
2016	0.17396	1.177	0.172	147190309	0.48	1.10

Source: Annual Report and Account of Wema Bank.

4.3 Discussion of Data

Table 4.2.1 – table 4.2.10 above comprise of data for the ten deposit money banks in Nigeria under study, which are First Bank of Nigeria, Zenith Bank, Guaranty Trust Bank, Fidelity Bank, Access Bank, Diamond Bank, Eco Bank, United Bank for Africa, Skye Bank, and Wema Bank. The independent variables are current ratio, quick ratio, net-working capital, cash ratio and debt ratio while the dependent variable is returns on equity. The aggregate of the data for the ten deposit banks under study were used for the regression, due to the fact that if attempt were made to regress them per bank, the work would have been too bulky and difficult to effectively digest. So

therefore effort were made to use average of all the variables as to represent the entire population.

4.4 Analysis of Data Techniques

4.4.1 Ordinary Least Square (OLS)

Table 4.2.11: Ordinary Least Square (OLS) Result

Dependent Variable: ROE
 Method: Least Squares
 Date: 12/03/17 Time: 19:10
 Sample: 2000 2016
 Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6505.219	27762.42	0.234317	0.8190
CR	-43232.02	3492.372	-12.37899	0.0000
QR	50263.58	4813.544	10.44212	0.0000
NWC	0.228953	0.010682	21.43308	0.0000
CHR	26829.54	8329.411	3.221060	0.0081
DBTR	-3031.087	134731.5	-0.022497	0.9825

R-squared	0.985148	Mean dependent var	84314.20
Adjusted R-squared	0.978397	S.D. dependent var	159570.5
S.E. of regression	23453.77	Akaike info criterion	23.23401
Sum squared resid	6.05E+09	Schwarz criterion	23.52809
Log likelihood	-191.4891	Hannan-Quinn criter.	23.26325
F-statistic	145.9256	Durbin-Watson stat	2.029630
Prob(F-statistic)	0.000000		

Estimation Command:

```
=====
LS ROE C CR QR NWC CHR DBTR
```

Estimation Equation:

```
=====
ROE = C(1) + C(2)*CR + C(3)*QR + C(4)*NWC + C(5)*CHR + C(6)*DBTR
```

Substituted Coefficients:

```
=====
ROE = 6505.21934178 - 43232.0233029*CR + 50263.5835283*QR + 0.228952501817*NWC + 26829.5357346*CHR
- 3031.08707974*DBTR
```

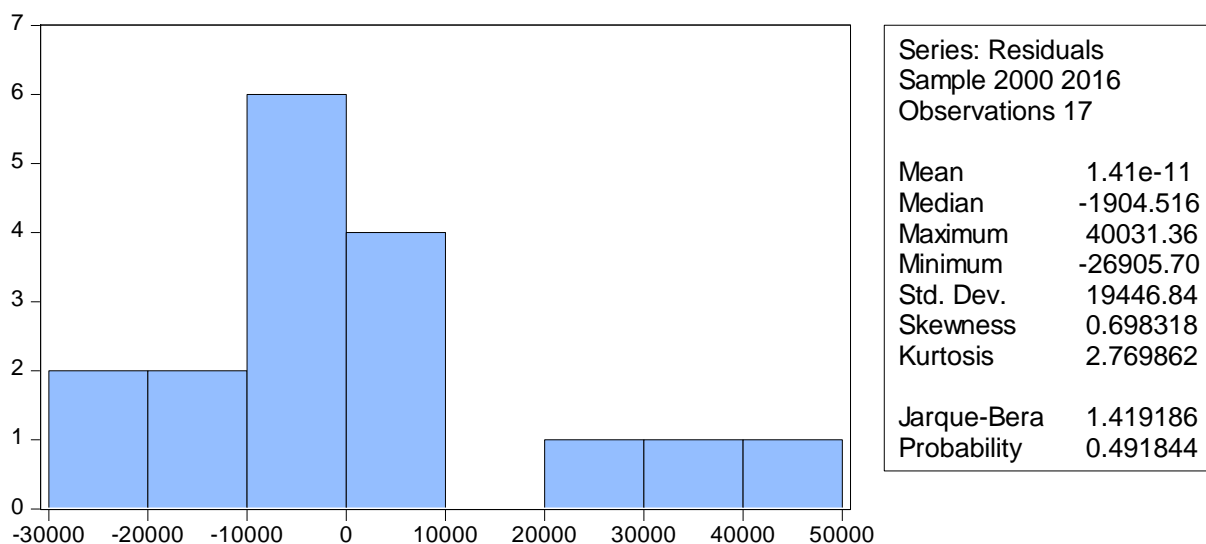
Source: E-view 7.0

Table 4.2.11 shows the result for ordinary least square. Current ratio (CR) is negative in the coefficient column which connotes that a unit increase in current ratio can lead to 43232 decrease in returns on equity of deposit money banks in Nigeria. Quick ratio (QR) is positive in the coefficient column and signifies that a unit increase in quick ratio can lead to 50263 increase in returns on equity of deposit money banks in Nigeria. Net-working capital (NWC) and cash ratio are positive also a unit increase can lead to 22% and 26829 increase in returns on equity of deposit money banks respectively. Debt ratio (DBTR) is negative and a unit increase can lead to 303 decrease in returns on equity of DMB's in Nigeria.

All the independent variables have significant impact on returns on equity of DMB's except debt ratio.

4.4.2 Diagnostic Test

Table 4.2.12: Normality test



Source: E-view 7.0

The series distribution is normal as the p-value associated with JB- Jarque Bera statistics is 0.491 which is greater than the critical value of 0.05.

Table 4.2.13: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.031749	Prob. F(2,9)	0.1870
Obs*R-squared	5.287976	Prob. Chi-Square(2)	0.0711

Source: E-view 7.0

The p-value of the f-statistics is 0.187 which is greater than the critical value of 5%, we conclude by accepting H0 that there is no presence of serial correlation.

Table 4.2.14: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.781474	Prob. F(5,11)	0.5835
Obs*R-squared	4.455870	Prob. Chi-Square(5)	0.4858
Scaled explained SS	5.617444	Prob. Chi-Square(5)	0.3452

Source: E-view 7.0

The p-value of the observed R-squared is 0.485 which is greater than the critical value of 5%, meaning that we accept null hypothesis that the residuals are not heteroscedastic in nature.

Table 4.2.15: Stability Test

Ramsey RESET Test
Equation: UNTITLED
Specification: ROE C CR QR NWC CHR DBTR
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.873681	10	0.4028
F-statistic	0.763319	(1, 10)	0.4028
Likelihood ratio	1.250501	1	0.2635

Source: E-view 7.0

The p-value of the f-stat of ramsey reset test is 0.402 which is greater than critical value of 5%, we conclude by accepting H0 that the series are in functional form and it is structurally stable.

4.4.3 Unit Root Test

Table 4.2.16: Unit root test for ROE

Null Hypothesis: ROE has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.444660	0.0006
Test critical values:		
1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at level I(0) for ROE is -5.444 > -3.065 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 4.2.17: Unit root test for CR

Null Hypothesis: D(CR) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-10.96815	0.0000
Test critical values:		
1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 15

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at first difference I(1) for current ratio (CR) is -10.958 > -3.081 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 4.2.18: Unit root test for QR

Null Hypothesis: D(QR) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.792904	0.0025
Test critical values:		
1% level	-4.004425	
5% level	-3.098896	
10% level	-2.690439	

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at first difference I(1) for quick ratio (QR) is -4.792 > -3.098 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 4.2.19: Unit root test for NWC

Null Hypothesis: D(NWC,2) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.924084	0.0004
Test critical values:		
1% level	-4.004425	
5% level	-3.098896	
10% level	-2.690439	

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at second difference I(2) for quick ratio (QR) is -5.924 > -3.098 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 4.2.20: Unit root test for CHR

Null Hypothesis: D(CHR,2) has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.613729	0.4433
Test critical values:		
1% level	-4.200056	
5% level	-3.175352	
10% level	-2.728985	

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at second difference I(2) for cash ratio (QR) is -1.613 < -3.175 at 0.05 level of significance, this shows unit root and that the series is not stationary.

Table 4.2.21: Unit root test for DBTR

Null Hypothesis: D(DBTR) has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.619514	0.0010
Test critical values:		
1% level	-4.121990	
5% level	-3.144920	
10% level	-2.713751	

Source: E-view 7.0

The Augmented Dicker Fuller test (ADF) at first difference I(1) for debt ratio (DBTR) is -5.619 > -3.144 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 4.2.22: Granger Causality Test

Diagnostic Check	F-stat	Prob.	Conclusion
CR and ROE	2.73461	0.11299	CR does not granger cause ROE
ROE and CR	0.00405	0.9960	ROE does not granger cause CR
QR and ROE	1.46568	0.2766	QR does not granger cause ROE
ROE and QR	0.27355	0.7662	ROE does not granger cause QR
NWC and ROE	1.72415	0.2273	NWC does not granger cause ROE
ROE and NWC	0.05798	0.9440	ROE does not granger cause NWC
CHR and ROE	1.37212	0.2975	CHR des not granger cause ROE
ROE and CHR	0.65946	0.5382	ROE does not granger cause CHR
DEBTR and ROE	0.34412	0.7169	DEBTR des not granger cause ROE
ROE and DEBTR	0.95300	0.4180	ROE does not granger cause DEBTR

Prob. Value < 0.05, Sig. at 5% for granger causality test, vice versa.

Source: Author's Computation using E-view 7.0 (2017)

Table 4.2.23: Johansen Co integration

Date: 12/03/17 Time: 18:37
 Sample (adjusted): 2001 2016
 Included observations: 16 after adjustments
 Trend assumption: Linear deterministic trend
 Series: ROE CR QR NWC CHR DBTR
 Lags interval (in first differences):

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.992170	183.6215	95.75366	0.0000
At most 1 *	0.960643	106.0241	69.81889	0.0000
At most 2 *	0.791283	54.26303	47.85613	0.0111
At most 3	0.666618	29.19458	29.79707	0.0586
At most 4	0.411106	11.61914	15.49471	0.1761
At most 5	0.178553	3.147003	3.841466	0.0761

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Source: E-view 7.0

The co integration result shows that the trace statistics of ROE (None *), current ratio (CR) (At most 1*) and quick ratio (QR) (At most 2*) are greater than 5% critical value, while the trace statistics of net-working capital (NWC) (At most 3), cash ratio (CHR) (At most 4) and debt ratio (At most 5) are less than 5% critical value.

4.5 Discussion of Findings

The ordinary least square test reveals the individual significance of each independent variable using the t-stat and their respective p-values. The p-value of current ratio (CR) is 0.0000, quick ratio (QR) is 0.000, net-working capital (NWC) 0.000, cash ratio (CR) 0.008, debt ratio (DR) 0.982. The result reveals that all the independent variables except debt ratio have significant impact on returns on equity of deposit money banks in Nigeria because their p-values are all less than 5% significant level except the p-value of debt ratio which is greater than 5% significant level.

The model has high explanatory and predictive power as suggested by the R-squared and adjusted R-squared respectively. The R^2 is 0.985 and $AdjR^2$ is 0.978, this further shows that (CR, QR, NWC, CHR and DEBT) have 97% positive impact to ROE of deposit money banks in Nigeria, more so ($AdjR^2$) is 0.978 which suggest that 97% of the independent variables could be explained by the changes in returns on equity and the remaining 3% could not be explained due to some error in the financial system.

The Durbin Watson test is 2.029 which revealed no presence of serial correlation and good for prediction. Globally, the p-value of the F-stat is $0.000 < 0.05$ which suggest that the whole independent variables (CR, QR, NWC, CHR and DEBT) are statistically significant.

Table 4.2.12 shows the normality test and suggest that the series distribution is normal as the p-value is 0.491 which is greater than 5% significant level, we accept H_0 which states that the residuals are normally distributed and it is desirable and further connote that the influence of other omitted and neglected variables is small and at best random. While table 4.2.13 is serial correlation test and shows that the p-value of the f-statistics is 0.071 which is greater than the critical value of 5%, we conclude by accepting H_0 that there is no presence of serial correlation which is desirable and implies that the variables are independently distributed.

Table 4.2.14 unveils the result for heteroskedasticity test, the p-value of the observed R-squared is 0.485 which is greater than the critical value of 5%, therefore we accept null hypothesis that the residuals are not heteroskedastic meaning residuals are homoscedastic and it's desirable. Also the p-value of the f-stat in functionality test is 0.402 which implies that the series is in functional form.

The Augmented Dicker Fuller (ADF) test for unit root for ROE is $5.444 > 3.065$ at 5% significant level, this shows no unit root and that the series is stationary. CR is $1.968 > 3.081$ at 5% significant level, this shows no unit root and that the series is stationary. QR is $4.792 > 3.098$ at 5% significant level, this shows no unit root and that the series is stationary. NWC is $5.924 > 3.098$ at 5% significant level, this shows no unit root and that the series is stationary. CHR is $1.613 < 3.175$ at 5% significant level, this shows presence of unit root. DBTR is $5.619 > 3.144$ at 0.05 significant

level, this shows no unit root and that the series is stationary. The result for unit root suggests that there is no presence of unit root as the ADF values are greater than the critical value at 5% except for CHR. Hence, the variables are stationary which informs granger causality and co integration test.

Causality test is employed at this stage to know the causal relationship between the variables under study, the basis for conducting this test is to enable us know whether the independent variables can actually cause variations in the dependent variable or vice versa. From the results in table 4.2.22, the p-value of CR and ROE is 0.112 is greater than 5% and implies that CR does not granger cause ROE and the p-value of ROE and CR is 0.996 also greater than 5% which signify that ROE in return does not granger cause CR which further implies that there is a short run effect and unidirectional causality exist between CR and ROE.

The p-value of QR and ROE is 0.276 which is greater than 5% and connote that QR does not granger cause ROE while ROE and QR is 0.766 is also greater than 5% significant level which connotes that ROE does not also granger cause QR and signify a short run and unidirectional effect. The p-value of NWC and ROE is 0.227 which is greater than 5% significant level and connote that NWC does not granger cause ROE while ROE and NWC is 0.944 which connote that ROE does not granger cause NWC and signify a short run and unidirectional effect. The p-value of CHR and ROE is 0.297 which connote that CHR does not granger cause ROE while ROE and CHR is 0.538 which connote that ROE does not granger cause CHR and signify a short run and unidirectional effect. The p-value of DBTR and ROE is 0.716 which connote that DBTR does not

granger cause ROE while ROE and DBTR is 0.418 which connote that ROE does not granger cause DBTR and shows short run effect and unidirectional causality exist between DBTR and ROE.

The Johansen co-integration result shows that the trace statistics of ROE (None *), current ratio (CR) (At most 1*) and quick ratio (QR) (At most 2*) are greater than 5% critical value, this is enough evidence to accept H1 and conclude that ROE, CR and QR are co-integrated. While the trace statistics of net-working capital (At most 3), cash ratio (At most 4), and debt ratio (At most 5) are less than 5% critical value, this is enough evidence to reject H1 and conclude that the variables are not co-integrated. Also the probability associated with the trace statistic for (At most 3) - (At most 5) are greater than 5% which connote non-existence of long term relationship.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

Liquidity management is a concept that is receiving serious attention all over the world especially with the current financial situations and the state of the world economy. Some of the striking corporate goals include the need to maximize profit, maintain high level of liquidity in order to guarantee safety, attain the highest level of owner's net worth coupled with the attainment of other corporate objectives. The importance of liquidity management as it affects corporate profitability in today's business cannot be over emphasized. A firm should ensure that it does not suffer from lack-of or excess liquidity to meet its short-term obligations.

5.2 Conclusion

The study is in conformity with the works of Edem, (2017), Ibe (2013), Agbada and Osuji (2013) and Kehinde (2013). The study concluded on the following:

- i. The Ordinary least square test conclude that holistically all the independent variables (current ratio, quick ratio, net-working capital, cash ratio and debt ratio) have significant impact on the performance of deposit money banks in Nigeria, we reject the null hypothesis H_0 .
- ii. The diagnostic test suggests we accept H_0 that the series distribution is normal, which is desirable. For serial correlation test, we accept H_0 that the residuals are not serially correlated and it connotes that each of the observation are independent of one another.

In Heteroskedasticity test we accept the null hypothesis H_0 that the residuals are homoscedastic which signify that they are of equal variance and desirable.

- iii. For unit root test, all the variables were stationary except for cash ratio.
- iv. Granger causality test shows that there exist a uni-directional relationship among all the variables.

5.3 Recommendations

Based on the critical evaluation of the above findings, I hereby make the following recommendations with the sincere conviction that they will help to reduce if not totally eradicate the problems associated with liquidity management and profitability in deposit money banks in Nigeria:

1. There is need for banks to engage competent and qualified personnel. The right personnel will ensure that the right decisions are made especially with the optimal level of cash and to keep.
2. Deposit money banks need to be more aggressive in the area of profit enhancement. Aggressive approach to investing idle cash, should be paid attention to because of the need for proper investment analysis, which has the benefit of sieving out unprofitable investments and even avoiding unnecessary taking of risk.
3. Instead of keeping excessive liquidity as a provision for unexpected withdrawal demands of the customers, the commercial banks should find it reasonable to adopt other measures of meeting such requirements, which can include borrowing and discounting bills. In addition, the surplus funds of the commercial banks should be seasonally invested in short-term instruments of the money market.

4. Bank officials should be trained in the areas of liquidity management and liquidity changing conditions should not be handled with levity.
5. High quality liquidity assets buffer sufficient to hedge sudden liquidity outflows should be maintained and there should be regular review of prudential guidelines for efficiency.
6. Banks should adopt optimum liquidity model for maximum return on equity, survival, stability, growth and development of banking system in Nigeria

5.4 Contribution to Knowledge

1. This study took a step further to empirically cover the gap by extending the scope to 2016 and including variables like quick ratio, net working capital, cash ratio, debt ratio during the period 2000-2016.
2. The results served as an eye opener to those variables that have the most significant impact on liquidity management in deposit money banks in Nigeria. And the following prediction model evolve in this study for explaining the effect of liquidity management on deposit money banks performance. The model is stated thus: $ROE = 6505.21934178 - 43232.0233029*CR + 50263.5835283*QR + 0.228952501817*NWC + 26829.5357346*CHR - 3031.08707974*DBTR$

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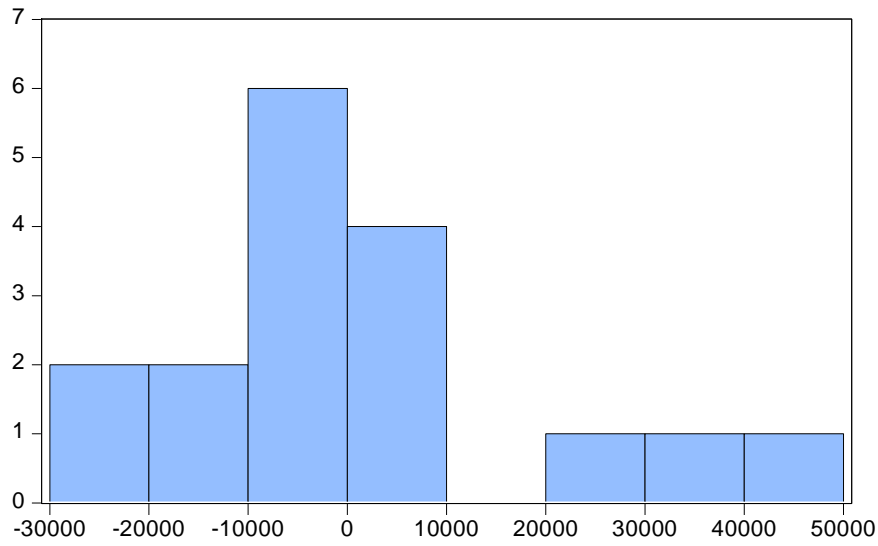
APPENDIX

ORDINARY LEAST SQUARE (OLS) RESULT

Dependent Variable: ROE
 Method: Least Squares
 Date: 12/03/17 Time: 19:10
 Sample: 2000 2016
 Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6505.219	27762.42	0.234317	0.8190
CR	-43232.02	3492.372	-12.37899	0.0000
QR	50263.58	4813.544	10.44212	0.0000
NWC	0.228953	0.010682	21.43308	0.0000
CHR	26829.54	8329.411	3.221060	0.0081
DBTR	-3031.087	134731.5	-0.022497	0.9825
R-squared	0.985148	Mean dependent var	84314.20	
Adjusted R-squared	0.978397	S.D. dependent var	159570.5	
S.E. of regression	23453.77	Akaike info criterion	23.23401	
Sum squared resid	6.05E+09	Schwarz criterion	23.52809	
Log likelihood	-191.4891	Hannan-Quinn criter.	23.26325	
F-statistic	145.9256	Durbin-Watson stat	2.029630	
Prob(F-statistic)	0.000000			

NORMALITY TEST



Series: Residuals	
Sample 2000 2016	
Observations 17	
Mean	1.41e-11
Median	-1904.516
Maximum	40031.36
Minimum	-26905.70
Std. Dev.	19446.84
Skewness	0.698318
Kurtosis	2.769862
Jarque-Bera	1.419186
Probability	0.491844

SERIAL CORRELATION TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.031749	Prob. F(2,9)	0.1870
Obs*R-squared	5.287976	Prob. Chi-Square(2)	0.0711

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/03/17 Time: 18:33

Sample: 2000 2016

Included observations: 17

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016773	0.115536	0.145178	0.8878
CR	-0.001344	0.014352	-0.093670	0.9274
QR	-0.001839	0.019770	-0.093016	0.9279
NWC	1.19E-10	4.39E-08	0.002716	0.9979
CHR	0.004500	0.034461	0.130580	0.8990
DBTR	-0.082944	0.560711	-0.147926	0.8857
RESID(-1)	-0.640111	0.318082	-2.012405	0.0750
RESID(-2)	-0.329204	0.318965	-1.032099	0.3290

R-squared	0.311057	Mean dependent var	6.02E-18
Adjusted R-squared	-0.224787	S.D. dependent var	0.086939
S.E. of regression	0.096216	Akaike info criterion	-1.539257
Sum squared resid	0.083317	Schwarz criterion	-1.147157
Log likelihood	21.08369	Hannan-Quinn criter.	-1.500282
F-statistic	0.580500	Durbin-Watson stat	2.090038
Prob(F-statistic)	0.757141		

HETEROSKEDASTICITY TEST

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.781474	Prob. F(5,11)	0.5835
Obs*R-squared	4.455870	Prob. Chi-Square(5)	0.4858
Scaled explained SS	5.617444	Prob. Chi-Square(5)	0.3452

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 12/03/17 Time: 18:34

Sample: 2000 2016

Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.026872	0.022071	-1.217548	0.2489
CR	-0.002125	0.002778	-0.765136	0.4603
QR	0.003376	0.003826	0.882547	0.3964
NWC	-2.89E-09	8.49E-09	-0.340444	0.7399
CHR	0.004260	0.006622	0.643325	0.5332
DBTR	0.187393	0.107111	1.749528	0.1080

R-squared	0.262110	Mean dependent var	0.007114
Adjusted R-squared	-0.073295	S.D. dependent var	0.017995
S.E. of regression	0.018642	Akaike info criterion	-4.856190
Sum squared resid	0.003823	Schwarz criterion	-4.562115
Log likelihood	47.27761	Hannan-Quinn criter.	-4.826958
F-statistic	0.781474	Durbin-Watson stat	1.970773
Prob(F-statistic)	0.583481		

STABILITY TEST

Ramsey RESET Test

Equation: UNTITLED

Specification: ROE C CR QR NWC CHR DBTR

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.873681	10	0.4028
F-statistic	0.763319	(1, 10)	0.4028
Likelihood ratio	1.250501	1	0.2635

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.008577	1	0.008577
Restricted SSR	0.120935	11	0.010994
Unrestricted SSR	0.112359	10	0.011236
Unrestricted SSR	0.112359	10	0.011236

LR test summary:

	Value	df
Restricted LogL	17.91661	11
Unrestricted LogL	18.54186	10

Unrestricted Test Equation:

Dependent Variable: ROE

Method: Least Squares

Date: 12/03/17 Time: 18:35

Sample: 2000 2016

Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.063414	0.148340	0.427491	0.6781
CR	0.011591	0.039866	0.290754	0.7772
QR	-0.011086	0.049796	-0.222632	0.8283
NWC	9.69E-08	2.26E-07	0.428940	0.6771
CHR	-0.020941	0.047204	-0.443629	0.6668
DBTR	-0.424157	0.677808	-0.625778	0.5455
FITTED^2	-6.279355	7.187237	-0.873681	0.4028

R-squared	0.545884	Mean dependent var	-0.024055
Adjusted R-squared	0.273414	S.D. dependent var	0.124354
S.E. of regression	0.105999	Akaike info criterion	-1.357866
Sum squared resid	0.112359	Schwarz criterion	-1.014778
Log likelihood	18.54186	Hannan-Quinn criter.	-1.323762
F-statistic	2.003468	Durbin-Watson stat	3.050338
Prob(F-statistic)	0.158347		

UNIT ROOT

RETURNS ON EQUITY

Null Hypothesis: ROE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.444660	0.0006
Test critical values:		
1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 16

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROE)
Method: Least Squares
Date: 12/03/17 Time: 18:38
Sample (adjusted): 2001 2016
Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE(-1)	-1.589165	0.291876	-5.444660	0.0001
C	-0.029401	0.029257	-1.004927	0.3320
R-squared	0.679225	Mean dependent var		-0.019639
Adjusted R-squared	0.656313	S.D. dependent var		0.199247
S.E. of regression	0.116808	Akaike info criterion		-1.340099
Sum squared resid	0.191018	Schwarz criterion		-1.243525
Log likelihood	12.72079	Hannan-Quinn criter.		-1.335154
F-statistic	29.64433	Durbin-Watson stat		1.720836
Prob(F-statistic)	0.000086			

CURRENT RATIO

Null Hypothesis: D(CR) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-10.96815	0.0000
Test critical values:		
1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(CR,2)
 Method: Least Squares
 Date: 12/03/17 Time: 18:39
 Sample (adjusted): 2002 2016
 Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CR(-1))	-1.988378	0.181287	-10.96815	0.0000
C	1.493830	0.973721	1.534146	0.1490
R-squared	0.902476	Mean dependent var		-0.805000
Adjusted R-squared	0.894974	S.D. dependent var		11.36398
S.E. of regression	3.682806	Akaike info criterion		5.568793
Sum squared resid	176.3198	Schwarz criterion		5.663200
Log likelihood	-39.76595	Hannan-Quinn criter.		5.567787
F-statistic	120.3004	Durbin-Watson stat		1.752866
Prob(F-statistic)	0.000000			

QUICK RATIO

Null Hypothesis: D(QR) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.792904	0.0025
Test critical values:		
1% level	-4.004425	
5% level	-3.098896	
10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(QR,2)

Method: Least Squares

Date: 12/03/17 Time: 18:41

Sample (adjusted): 2003 2016

Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(QR(-1))	-2.697700	0.562853	-4.792904	0.0006
D(QR(-1),2)	0.635701	0.313543	2.027477	0.0675
C	0.561518	0.569082	0.986709	0.3450
R-squared	0.863595	Mean dependent var		0.112714
Adjusted R-squared	0.838795	S.D. dependent var		5.275331
S.E. of regression	2.118066	Akaike info criterion		4.526294
Sum squared resid	49.34825	Schwarz criterion		4.663234
Log likelihood	-28.68405	Hannan-Quinn criter.		4.513617
F-statistic	34.82122	Durbin-Watson stat		1.880865
Prob(F-statistic)	0.000017			

NET-WORKING CAPITAL

Null Hypothesis: D(NWC,2) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.924084	0.0004
Test critical values:		
1% level	-4.004425	
5% level	-3.098896	
10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(NWC,3)
 Method: Least Squares
 Date: 12/03/17 Time: 18:43
 Sample (adjusted): 2003 2016
 Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NWC(-1),2)	-1.709231	0.288523	-5.924084	0.0001
C	157206.3	212318.8	0.740426	0.4733
R-squared	0.745195	Mean dependent var		-128916.1
Adjusted R-squared	0.723961	S.D. dependent var		1472412.
S.E. of regression	773596.7	Akaike info criterion		30.08705
Sum squared resid	7.18E+12	Schwarz criterion		30.17835
Log likelihood	-208.6094	Hannan-Quinn criter.		30.07860
F-statistic	35.09477	Durbin-Watson stat		2.208463
Prob(F-statistic)	0.000070			

CASH RATIO

Null Hypothesis: D(CHR,2) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.613729	0.4433
Test critical values:		
1% level	-4.200056	
5% level	-3.175352	
10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(CHR,3)

Method: Least Squares

Date: 12/03/17 Time: 18:44

Sample (adjusted): 2006 2016

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CHR(-1),2)	-4.042580	2.505117	-1.613729	0.1577
D(CHR(-1),3)	0.567792	2.395816	0.236993	0.8205
D(CHR(-2),3)	-2.040464	1.832598	-1.113427	0.3081
D(CHR(-3),3)	-2.856797	0.928454	-3.076938	0.0217
C	0.470601	0.285072	1.650814	0.1499
R-squared	0.936206	Mean dependent var		-0.574545
Adjusted R-squared	0.893676	S.D. dependent var		2.261311
S.E. of regression	0.737353	Akaike info criterion		2.531456
Sum squared resid	3.262140	Schwarz criterion		2.712317
Log likelihood	-8.923008	Hannan-Quinn criter.		2.417448
F-statistic	22.01307	Durbin-Watson stat		0.860682

DEBT RATIO

Null Hypothesis: D(DBTR) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.619514	0.0010
Test critical values:		
1% level	-4.121990	
5% level	-3.144920	
10% level	-2.713751	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(DBTR,2)

Method: Least Squares

Date: 12/03/17 Time: 18:46

Sample (adjusted): 2005 2016

Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DBTR(-1))	-2.808160	0.499716	-5.619514	0.0008
D(DBTR(-1),2)	1.530828	0.385338	3.972693	0.0054
D(DBTR(-2),2)	1.227498	0.309605	3.964717	0.0054
D(DBTR(-3),2)	0.688525	0.228401	3.014544	0.0195
C	-0.023275	0.010728	-2.169485	0.0667
R-squared	0.842283	Mean dependent var		-0.004000
Adjusted R-squared	0.752158	S.D. dependent var		0.069722
S.E. of regression	0.034710	Akaike info criterion		-3.589244
Sum squared resid	0.008433	Schwarz criterion		-3.387200
Log likelihood	26.53547	Hannan-Quinn criter.		-3.664048
F-statistic	9.345801	Durbin-Watson stat		2.402893
Prob(F-statistic)	0.006151			

GRANGER CAUSALITY

Pairwise Granger Causality Tests

Date: 12/03/17 Time: 18:37

Sample: 2000 2016

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CR does not Granger Cause ROE	15	2.73461	0.1129
ROE does not Granger Cause CR		0.00405	0.9960
QR does not Granger Cause ROE	15	1.46568	0.2766
ROE does not Granger Cause QR		0.27355	0.7662
NWC does not Granger Cause ROE	15	1.72415	0.2273
ROE does not Granger Cause NWC		0.05798	0.9440
CHR does not Granger Cause ROE	15	1.37212	0.2975
ROE does not Granger Cause CHR		0.65946	0.5382
DBTR does not Granger Cause ROE	15	0.34412	0.7169
ROE does not Granger Cause DBTR		0.95300	0.4180
QR does not Granger Cause CR	15	4.37627	0.0431
CR does not Granger Cause QR		2.56145	0.1264
NWC does not Granger Cause CR	15	1.77028	0.2197
CR does not Granger Cause NWC		24.9326	0.0001
CHR does not Granger Cause CR	15	11.1325	0.0029
CR does not Granger Cause CHR		5.21461	0.0281
DBTR does not Granger Cause CR	15	2.53356	0.1288
CR does not Granger Cause DBTR		1.35508	0.3015
NWC does not Granger Cause QR	15	2.25858	0.1551
QR does not Granger Cause NWC		42.4331	1.E-05
CHR does not Granger Cause QR	15	19.8540	0.0003
QR does not Granger Cause CHR		5.23499	0.0278
DBTR does not Granger Cause QR	15	4.13855	0.0490
QR does not Granger Cause DBTR		0.77318	0.4873
CHR does not Granger Cause NWC	15	6.32499	0.0168
NWC does not Granger Cause CHR		25.4054	0.0001
DBTR does not Granger Cause NWC	15	0.91835	0.4304
NWC does not Granger Cause DBTR		1.62538	0.2448
DBTR does not Granger Cause CHR	15	2.83388	0.1059
CHR does not Granger Cause DBTR		1.07987	0.3762

JOHANSEN CO INTEGRATION

Date: 12/03/17 Time: 18:37
 Sample (adjusted): 2001 2016
 Included observations: 16 after adjustments
 Trend assumption: Linear deterministic trend
 Series: ROE CR QR NWC CHR DBTR
 Lags interval (in first differences):

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.992170	183.6215	95.75366	0.0000
At most 1 *	0.960643	106.0241	69.81889	0.0000
At most 2 *	0.791283	54.26303	47.85613	0.0111
At most 3	0.666618	29.19458	29.79707	0.0586
At most 4	0.411106	11.61914	15.49471	0.1761
At most 5	0.178553	3.147003	3.841466	0.0761

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.992170	77.59739	40.07757	0.0000
At most 1 *	0.960643	51.76110	33.87687	0.0002
At most 2	0.791283	25.06845	27.58434	0.1015
At most 3	0.666618	17.57544	21.13162	0.1466
At most 4	0.411106	8.472135	14.26460	0.3327
At most 5	0.178553	3.147003	3.841466	0.0761

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b*S11*b=l):

ROE	CR	QR	NWC	CHR	DBTR
0.385639	0.695313	-1.159258	-4.08E-06	0.542851	1.733535
-1.221607	-0.111563	0.408529	2.49E-06	-0.191162	1.437282
10.44604	0.206754	0.006071	-3.08E-06	0.294664	7.191690
5.294411	-0.990785	0.754477	5.49E-06	0.501190	5.208063
0.121343	-0.118492	0.070036	1.54E-06	-0.290663	-21.05712
1.986458	1.851197	-2.232546	-8.26E-06	-1.551132	-8.293908

Unrestricted Adjustment Coefficients (alpha):

D(ROE)	-0.010091	-0.105054	-0.115409	-0.065318	-0.019751
D(CR)	2.378873	-5.231489	-0.713956	0.090897	0.673614

D(QR)	1.573120	-0.745960	-0.915290	1.133213	0.610975
D(NWC)	528488.5	-194991.9	68012.86	-143574.9	-31825.18
D(CHR)	-0.334172	-1.006103	0.073173	-0.312603	0.138099
D(DBTR)	0.003886	-0.015700	0.004184	-0.020336	0.015674

1 Cointegrating Equation(s): Log likelihood -251.0196

Normalized cointegrating coefficients (standard error in parentheses)

ROE	CR	QR	NWC	CHR	DBTR
1.000000	1.803017	-3.006073	-1.06E-05	1.407669	4.495234
	(0.13704)	(0.16355)	(7.0E-07)	(0.10830)	(1.44164)

Adjustment coefficients (standard error in parentheses)

D(ROE)	-0.003892
	(0.01986)
D(CR)	0.917385
	(0.56986)
D(QR)	0.606656
	(0.21941)
D(NWC)	203805.5
	(29815.8)
D(CHR)	-0.128870
	(0.12557)
D(DBTR)	0.001498
	(0.00497)

2 Cointegrating Equation(s): Log likelihood -225.1391

Normalized cointegrating coefficients (standard error in parentheses)

ROE	CR	QR	NWC	CHR	DBTR
1.000000	0.000000	-0.191877	-1.58E-06	0.089729	-1.479161
		(0.03067)	(1.3E-07)	(0.05538)	(1.04175)
0.000000	1.000000	-1.560827	-4.99E-06	0.730964	3.313555
		(0.02906)	(1.2E-07)	(0.05247)	(0.98703)

Adjustment coefficients (standard error in parentheses)

D(ROE)	0.124443	0.004704
	(0.05529)	(0.03039)
D(CR)	7.308209	2.237703
	(0.61268)	(0.33680)
D(QR)	1.517926	1.177032
	(0.68262)	(0.37525)
D(NWC)	442009.0	389218.7
	(73162.9)	(40219.0)
D(CHR)	1.100193	-0.120110
	(0.23522)	(0.12930)
D(DBTR)	0.020678	0.004453
	(0.01560)	(0.00857)

3 Cointegrating Equation(s): Log likelihood -212.6048

Normalized cointegrating coefficients (standard error in parentheses)

ROE	CR	QR	NWC	CHR	DBTR
1.000000	0.000000	0.000000	-3.91E-07	0.024449	0.326664

			(3.7E-08)	(0.01523)	(0.29480)
0.000000	1.000000	0.000000	4.68E-06	0.199942	18.00308
			(1.0E-06)	(0.41608)	(8.05251)
0.000000	0.000000	1.000000	6.19E-06	-0.340218	9.411376
			(6.0E-07)	(0.24573)	(4.75558)

Adjustment coefficients (standard error in parentheses)

D(ROE)	-1.081127 (0.31773)	-0.019158 (0.02216)	-0.031920 (0.03711)
D(CR)	-0.149801 (4.61556)	2.090089 (0.32187)	-4.899276 (0.53906)
D(QR)	-8.043225 (4.98221)	0.987792 (0.34744)	-2.133954 (0.58188)
D(NWC)	1152474. (569813.)	403280.6 (39736.9)	-691901.2 (66549.5)
D(CHR)	1.864562 (1.92142)	-0.104981 (0.13399)	-0.023187 (0.22441)
D(DBTR)	0.064382 (0.12758)	0.005318 (0.00890)	-0.010893 (0.01490)

4 Cointegrating Equation(s): Log likelihood -203.8171

Normalized cointegrating coefficients (standard error in parentheses)

ROE	CR	QR	NWC	CHR	DBTR
1.000000	0.000000	0.000000	0.000000	0.067436 (0.01188)	1.065983 (0.30715)
0.000000	1.000000	0.000000	0.000000	-0.313975 (0.20160)	9.164533 (5.21125)
0.000000	0.000000	1.000000	0.000000	-1.021030 (0.13540)	-2.297484 (3.49999)
0.000000	0.000000	0.000000	1.000000	109927.9 (30928.8)	1890583. (799497.)

Adjustment coefficients (standard error in parentheses)

D(ROE)	-1.426949 (0.29019)	0.045559 (0.03037)	-0.081201 (0.03552)	-2.23E-07 (1.9E-07)
D(CR)	0.331445 (5.15877)	2.000030 (0.53992)	-4.830696 (0.63154)	-2.00E-05 (3.5E-06)
D(QR)	-2.043531 (4.28643)	-0.134978 (0.44862)	-1.278971 (0.52475)	7.68E-07 (2.9E-06)
D(NWC)	392329.0 (449999.)	545532.5 (47097.2)	-800225.3 (55089.2)	-3.638558 (0.30185)
D(CHR)	0.209512 (1.91244)	0.204741 (0.20016)	-0.259039 (0.23412)	-3.08E-06 (1.3E-06)
D(DBTR)	-0.043287 (0.12766)	0.025467 (0.01336)	-0.026236 (0.01563)	-1.79E-07 (8.6E-08)

5 Cointegrating Equation(s): Log likelihood -199.5810

Normalized cointegrating coefficients (standard error in parentheses)

ROE	CR	QR	NWC	CHR	DBTR
1.000000	0.000000	0.000000	0.000000	0.000000	-2.485320 (0.94021)
0.000000	1.000000	0.000000	0.000000	0.000000	25.69897 (6.38674)

0.000000	0.000000	1.000000	0.000000	0.000000	51.47160 (13.9534)
0.000000	0.000000	0.000000	1.000000	0.000000	-3898399. (1576339)
0.000000	0.000000	0.000000	0.000000	1.000000	52.66162 (13.6941)

Adjustment coefficients (standard error in parentheses)

D(ROE)	-1.429346 (0.28346)	0.047899 (0.02980)	-0.082585 (0.03474)	-2.53E-07 (1.9E-07)	-0.046399 (0.02089)
D(CR)	0.413184 (4.70285)	1.920212 (0.49445)	-4.783519 (0.57637)	-1.90E-05 (3.2E-06)	1.930820 (0.34655)
D(QR)	-1.969394 (3.83071)	-0.207374 (0.40275)	-1.236181 (0.46949)	1.71E-06 (2.6E-06)	1.117233 (0.28228)
D(NWC)	388467.3 (438723.)	549303.5 (46126.3)	-802454.2 (53769.3)	-3.687609 (0.29982)	281498.8 (32329.2)
D(CHR)	0.226270 (1.86245)	0.188378 (0.19581)	-0.249367 (0.22826)	-2.87E-06 (1.3E-06)	-0.164329 (0.13724)
D(DBTR)	-0.041385 (0.11774)	0.023610 (0.01238)	-0.025138 (0.01443)	-1.55E-07 (8.0E-08)	-0.008405 (0.00868)
