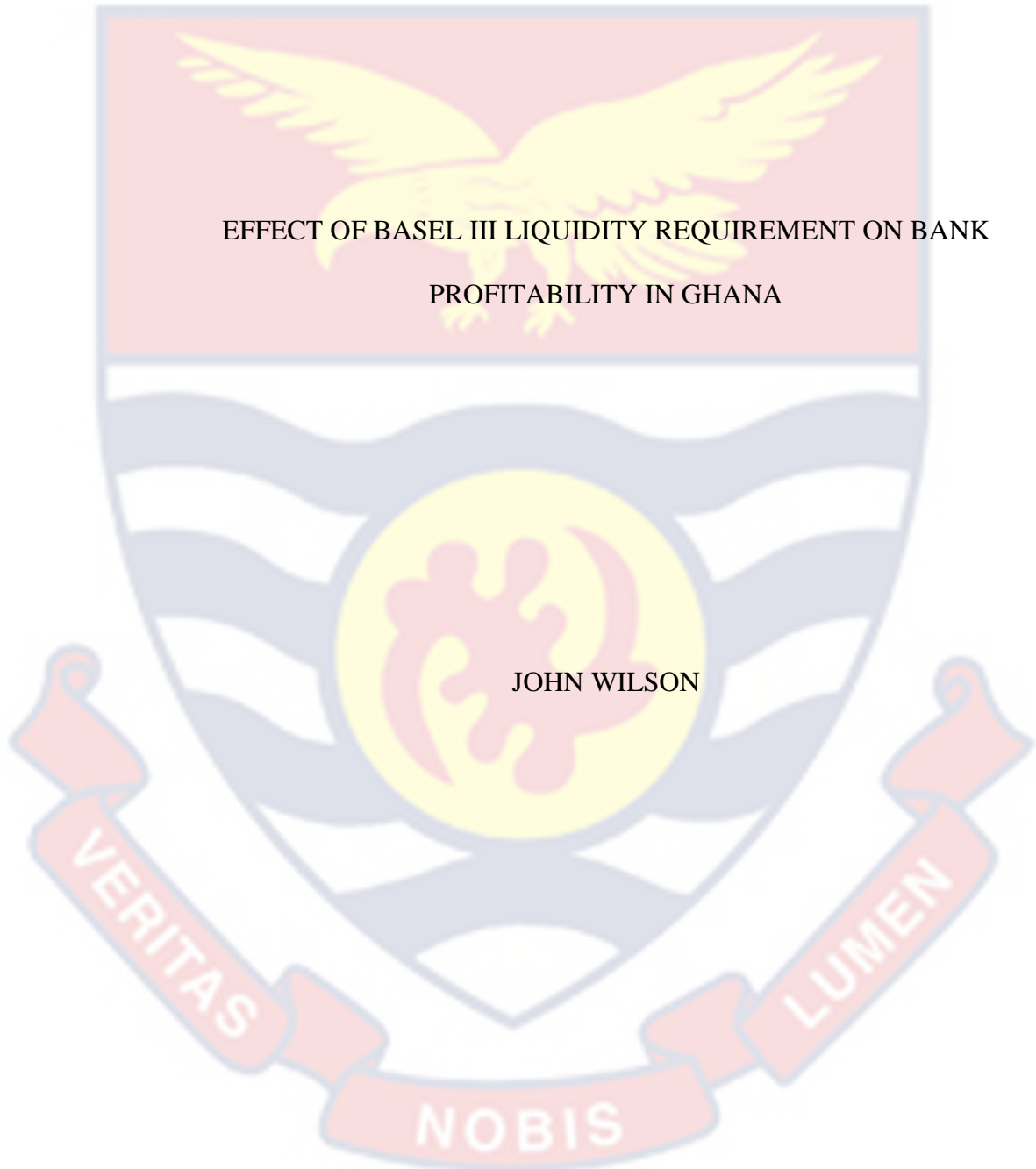


UNIVERSITY OF CAPE COAST

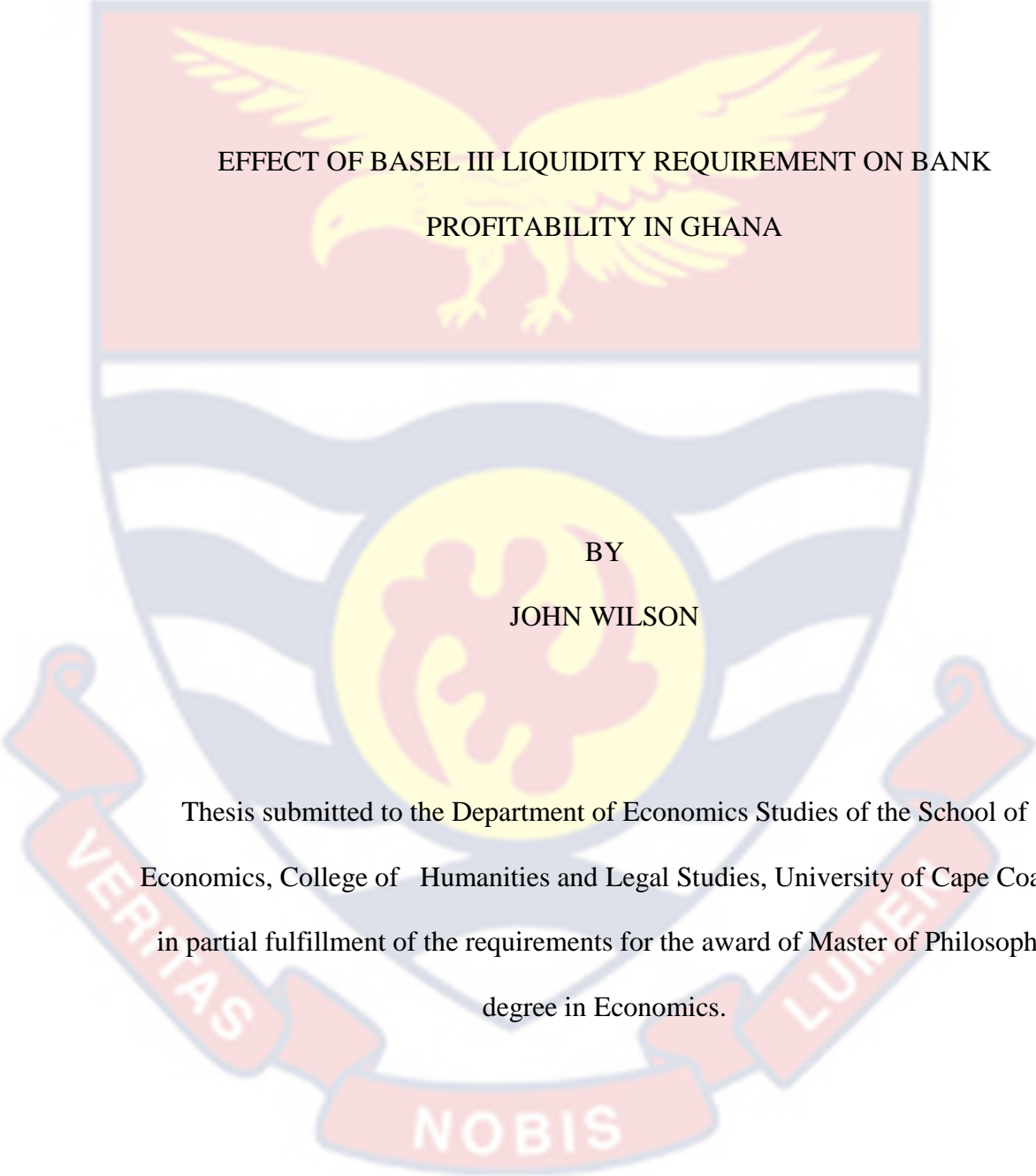


EFFECT OF BASEL III LIQUIDITY REQUIREMENT ON BANK  
PROFITABILITY IN GHANA

JOHN WILSON

2023

UNIVERSITY OF CAPE COAST



EFFECT OF BASEL III LIQUIDITY REQUIREMENT ON BANK  
PROFITABILITY IN GHANA

BY  
JOHN WILSON

Thesis submitted to the Department of Economics Studies of the School of  
Economics, College of Humanities and Legal Studies, University of Cape Coast,  
in partial fulfillment of the requirements for the award of Master of Philosophy  
degree in Economics.

OCTOBER 2023

## DECLARATION

### Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree at this University or elsewhere.

Candidate's Signature..... Date: .....

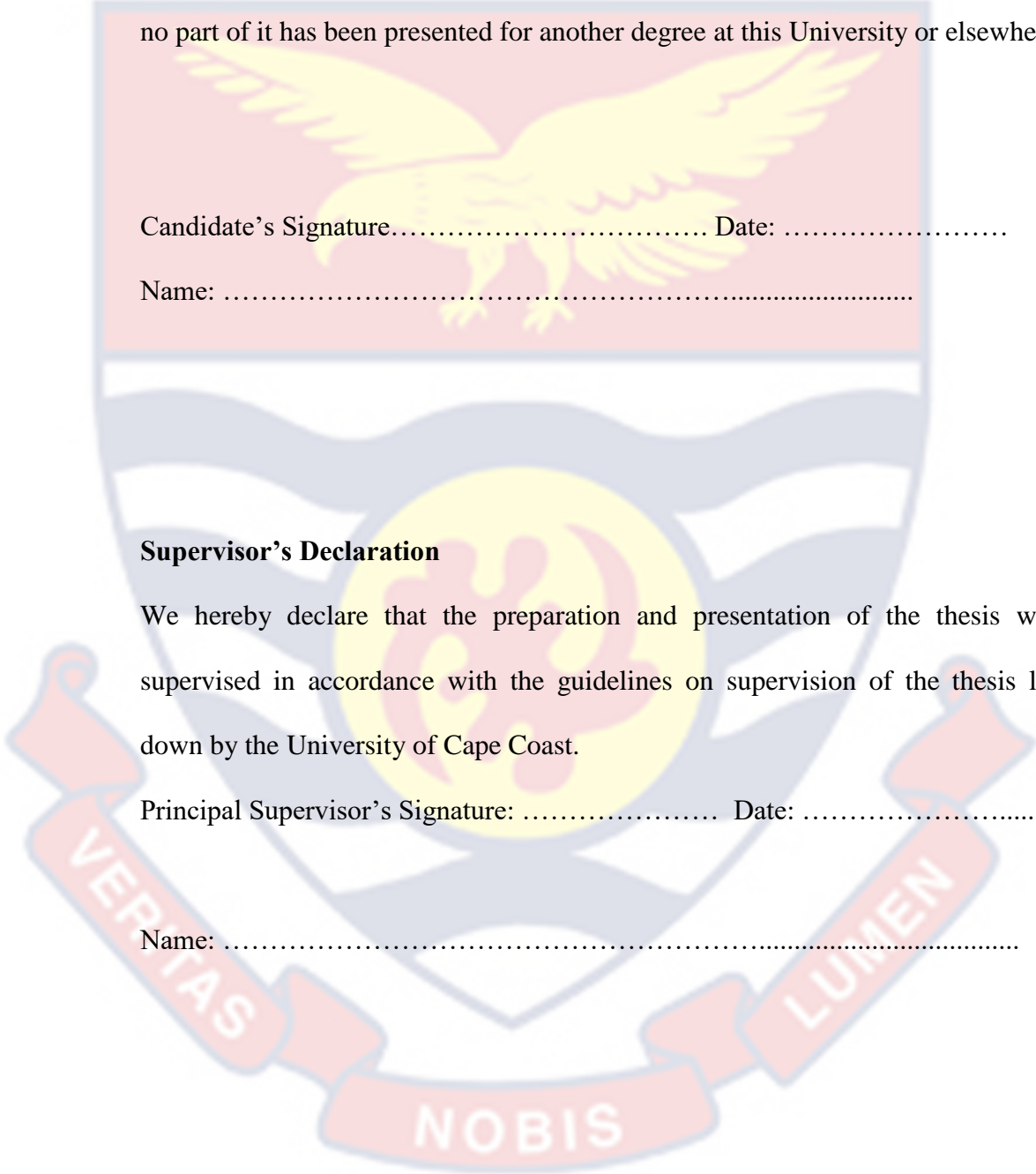
Name: .....

### Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of the thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature: ..... Date: .....

Name: .....



## ABSTRACT

The study investigates the impact of Basel III liquidity requirements on Ghanaian banks and their profitability. Using an unbalanced data set of 14 banks over a 10-year period, the one-step GMM was used to estimate the effect of Basel III liquidity requirements on bank profitability. The study found that bank specialization (SPEC) had a positive and statistically significant relationship with bank profitability under all three objectives or models. However, inflation showed a negative relationship only under objective or model one and two, and management efficiency showed a negative relationship with ROA under objective or model one but a negative insignificant relationship under objective or model two and three. The GDP growth rate had no significant relationship with bank profitability.

Regarding the main variables of interest, Liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) showed a positive and statistically significant relationship with bank profitability on an individual basis, but the variable jointly exhibited a negative statistically significant relationship with bank profitability (ROA); Meaning a percentage increase in these variables result to a decrease in profitability. The study concludes that Basel III liquidity requirements have a mixed effect on bank profitability in Ghana, based on the Basel committee's condition that banks must meet all two regulations.

## ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisor, Professor James Atta Peprah of the School of Economics, for his professional guidance, advice, encouragement, and the goodwill with which he guided this work. I am really very grateful.

I also extend my heartfelt appreciation to my family and everyone who by virtue of your contribution has seen this work to this end I say, I am very pleased and will always remember this gesture done to me.



**DEDICATION**

To my family and loved ones





## TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	iv
DEDICATION	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURE	x
<b>CHAPTER ONE: INTRODUCTION</b>	
Background to the Study	1
The Basel I Accord	6
The Basel II Accord	7
The Basel III Accord	8
Problem Statement	9
Research Objectives	11
Hypotheses of the Study	12
Research Question	12
Significance of the Study	13
Organization of the Study	13
<b>CHAPTER TWO: LITERATURE REVIEW</b>	
Introduction	14
Evolution Of Banking in Ghana	14
Overview Of the Basel III Liquidity Requirements	18

THEORETICAL LITERATURE	20
The Concept and Theories of Profitability	20
The Concept and Theories of Liquidity	22
Empirical Literature on the determinants of Bank Profitability	27
Liquidity Coverage, Net Stable Funding and Banks' Profitability	33
Conceptual Framework	41
Chapter Summary	42
CHAPTER THREE: RESEARCH METHODS	
Introduction	43
Research Design	43
Data Source	44
Empirical Model Specification	45
Empirical Objective 1	47
Empirical Objective 2	47
Empirical Objective 3	48
Measurement and Justification of Variables	50
Dependent Variables	50
Independent variables: NSFR and LCR	51
Other independent variables: Bank -Specific	52
Macroeconomic-specific variables:	53
Estimation Techniques	54
Test for Over-Identifying Restrictions	55
Test for Autocorrelation	55



Data Analysis	56
Chapter Summary	56
<b>CHARPTER FOUR: RESULTS AND DISCUSSIONS</b>	
Descriptive statistics	57
Correlation Matrix	60
Test of multicollinearity	61
Discussion of regression results	62
Empirical Objective 1	62
Empirical Objective 2	68
Empirical Objective 3	73
Chapter Summary	81
<b>CHARPTER FIVE: SUMMARY, CONCLUSSIONS AND RECOMMENDATIONS</b>	
Introduction	83
Summary Findings	83
Conclusions	85
Policy Recommendations:	85
Future Direction of Research	86
REFERENCES	87
APPENDIX A	108

## LIST OF TABLES

Table	Page
1 Summary of Variables, Expected Signs and Data Source	49
2 Summary Descriptive Statistics of variables	58
3 Pairwise correlations matrix of variables used in the model	60
4 Variance inflation factor	61
5 Regression estimates of liquidity coverage ratio (LCR) on Bank Profitability (ROA)	63
6 Regression estimates of net stable funding ratio (NSFR) on Bank Profitability (ROA)	68
7 Regression estimates of jointly liquidity coverage ratio and net stable funding ratio (LCRNSFR) on Bank Profitability (ROA)	74
8 Balance-sheet items and associated weights used for the computation of NSFR	108

**LIST OF FIGURE**

Figure

Page

1 Transmission channel of Basel III liquidity requirement to Bank profitability

41



## CHAPTER ONE

### INTRODUCTION

The financial sector has a significant role in the global economy (Carey, 2001). Typically, banking institutions have multiple functions, with one being to provide lending services by offering the greatest percentage of their deposits as loans (Mashamba, 2018). Also, the banking system plays a major role in the financial intermediation process of every economy making its efficiency and effectiveness an essential requirement towards ensuring stability and growth (Halling & Hayden, 2006).

Liquidity is fundamental to the ongoing existence of banks. Concerns about bank liquidity emanate from their maturity transformation function in the economy. Typically, banks accept short-term demand deposits, which they loan out to businesses. Under the fractional banking system depository institutions, banks loan out a greater part of their deposits and keep a small fraction of the deposits. In the process of providing this vital social service to the economy, banks expose themselves to liquidity risk. Banks can mitigate this risk by holding a large pool of liquid assets, which they can draw down to pay off maturing obligations during a crisis (Davies, 2014).

#### **Background to the Study**

In order, for every nation's economy to flourish, banks must play a crucial role in maintaining financial system stability. This function has persisted in modern times via banking reforms that have adapted to the economic changes (Konadu, 2009). The banking and financial sector has a significant role in the

global economy (Carey, 2001). Typically, banking institutions have multiple functions, with one being to provide lending services by offering the greatest percentage of their deposits as loans (Mashamba, 2018). Also, the banking system plays a major role in the financial intermediation process of every economy making its efficiency and effectiveness an essential requirement towards ensuring stability and growth (Halling & Hayden, 2006).

Banks' continued existence is dependent on liquidity. Concerns about bank liquidity emanates from the economy's maturity transformation function. Banks typically accept short-term demand deposits, which they then lend to businesses. Banks in the fractional banking system lend out a larger portion of their deposits while keeping a small portion of the deposits. Banks expose themselves to liquidity risk by providing this critical social service to the economy. Banks can mitigate this risk by keeping a large pool of liquid assets on hand to pay off maturing obligations during a crisis (Davies, 2014).

The significance of liquidity goes beyond a single bank since liquidity issues at one bank may rapidly spread to other banks. That is, a liquidity crisis is infectious. According to Gomes and Wilkins (2013), irresponsible liquidity management may lead to system-wide disruptions and a breakdown in financial intermediation. A single bank encountering unexpected liquidity concerns may be the origin of market turmoil. Inadvertently, the failure to make appropriate liquidity choices would harm banks' reputation and diminish depositors' faith in the institution and the overall banking system. According to Amengor (2010), banks' inability to meet their cash requirements raises their liquidity risk, which is



likely to expose them to losses. If their objective is to survive into the foreseeable future and maximize shareholder value, financial institutions should evaluate the relevance of liquidity and profitability indicators thoroughly (Olagunju et al., 2011). In another instance, Lartey et al. (2013) defined liquidity of banks as the ease of obtaining the necessary funds for growth in assets and satisfying financial obligations or commitments when they mature. In contrast, we cannot refute the importance of technology, innovation, and competition in the financial sector.

In fact, one of the primary causes of the 2008 global financial crisis (GFC) was liquidity problems at financial institutions. In other words, they did not have enough liquidity to deal with the adverse shocks that occurred during that time period (Acharya et al., 2011). As a result, there is widespread agreement that inefficient liquidity management and liquidity pressure are the primary causes of this crisis (Bawazir, 2018). As a result, it is critical to emphasize the significance of regulating bank liquidity. The primary function of liquidity regulations is to reduce the frequency and severity of liquidity shocks for banks in order, to reduce their potential economic impact. In response to the 2008 Global Financial Crisis, the Basel Committee on Banking Supervision (BCBS) established the Basel III Accord in 2010.

This new framework focuses specifically on capital, leverage, and liquidity requirements, with the goal of improving bank solvency, imposing more stringent standards, and improving the Basel II Accord (BCBS, 2010). In other words, the third edition of the Basel regulation aims to stabilize banks' liquidity positions and contribute to the global banking sector's strengthening. The Basel



Committee on Banking Supervision (2008) defined liquidity as the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The Committee posits that the vulnerability of a bank to liquidity risk usually arises when the bank plays the fundamental role of maturity transformation of short-term deposits into long-term loans (the conversion of short-term liquid liabilities to long term illiquid assets), both of an institution-specific nature and that which affects markets as a whole. Again, almost every financial transaction or commitment has implications for a bank's liquidity.

Effective liquidity risk management helps ensure a bank's ability to meet cash flow obligations which are uncertain as they are affected by external events and other agents' behaviour. Iion and Dragos (2006) explain the liquidity risk for a bank; as the expression of the probability of losing the capacity of financing its transactions, or the probability that the bank cannot honour its daily obligations to its clients which includes the withdrawal of deposits, maturity of other debt, and cover additional funding requirements for the loan portfolio and investment.

Liquidity and profitability have globally attracted ample consideration because of the impact of global economic crises or economic meltdown which was felt worldwide. Primarily, for a country's financial system to be stable, sustainable, and strong, it is necessary to pay close attention to the key contributing variables that may limit the viability of banks, namely liquidity and profitability.

Several studies have been carried out to investigate the relationship between liquidity and profitability in the banking sector, with the conclusion being that there are positive or direct correlations between the two variables.

Lukorito et al. (2014), Olagunju et al. (2011), Kosmidou et al. (2005), Ibbih (2018), Lartey et al. (2013), and others are a few examples. Other research, however, came to a different conclusion about the nature of the relationship between bank profitability and liquidity. These studies have concluded that liquidity has a negative relationship with bank performance and profitability (Abdelaziz & Zaghdoudi, 2017; Binay, 2018; Konadu, 2009; Mucheru et al., 2017).

Nonetheless, liquidity and Profitability are like Siamese twins with competing objectives. Profitability represents banks' capacity to generate profits as a return on invested capital and, also serves as a metric for evaluating the management quality and competitiveness of a company (Robinson et al., 2015; Lartey et al., 2013). Return on assets (ROA), return on equity (ROE), and net interest margins (NIM) are fundamental measures of bank profitability in the literature. They are typically expressed as functions of internal and external determinants that are primarily influenced by a bank's management decisions and policy objectives (Athanasoglou et al, 2006). Return on Asset (ROA) is calculated by dividing net profit after taxes by total assets, return on equity (ROE) is the ratio of net profit after taxes to total equity, and net interest margin (NIM) is the ratio of interest income minus interest expenditure to total assets.

Existing research on bank liquidity ratios and profitability offers empirical evidence of the several liquidity risk measurements used and their effect on bank profitability. Typical measures of liquidity ratio include the ratio of current assets to current liabilities (current ratio), the ratio of cash and equivalent to current liabilities (cash ratio), the ratio of cash plus marketable securities plus accounts receivable to current liabilities (quick ratio) and current assets minus current liabilities (net-working capital ratio) but this study will adopt the Basel III liquidity ratio measurement.

### **The Basel I Accord**

In 1988 the BCBS introduced the first accord of the Basel regulation, which is a capital measurement system for banks. This accord stresses the case for adequacy of banks' capital (BCBS, 2010). More specifically it was released for banks that have the minimum level of capital to risk-weighted assets of 8% (Goodhart, 2011). Furthermore, the Basel I requirements aim to avoid any issues regarding credit risk and insolvency.

However, Ahmed and Khalidi (2007) noticed some weaknesses in the framework of Basel I, which led this accord to experience various amendments. Most notably the Basel I worked only as a cushion against credit risk, whereas it should consider the other types of risk, such as operational risk and interest rate risk, when assessing capital adequacy (BCBS, 2010). Another concern raised about implementing the Basel I regulation was the equal treatment of the assets' risk. In fact, each category of assets has a different risk-weight, but the regulation did not consider that issue. After several issues emerging regarding the Basel I

framework, in 2004 the BCBS introduced the second accord, known as the Basel II (Blundell-Wignall and Atkinson, 2010).

### **The Basel II Accord**

The Basel Committee aimed, with the new accord, to enhance the capital requirements and strengthen the resilience of the banking sector. In addition, this second accord considers the risk management's quality (Balin, 2008). Based on this, the new framework involves three pillars, with the first consisting of a minimum capital ratio for market, operational and credit risks. Accordingly, the operational risk is considered in this new accord as an underlying risk. In line with the first Accord, the minimum capital ratio remained the same as in the Basel I, which is 8%. Moreover, the next pillar was introduced to be the principle of supervisory review, transparency, and risk management guidance. The third pillar is related to the market discipline for banks and is regarded as complementing the former two pillars and the disclosure requirements (Balin, 2008).

However, this second accord has been criticized, especially after the GFC in 2008. Dănilă (2012) mentioned that one of the significant criticisms is that it ignores the leverage and liquidity issues, as it was acknowledged that banks were not adequately prepared for such turmoil. Furthermore, some fundamental risks were underestimated, such as liquidity and credit risks (BCBS, 2010). Consequently, the BCBS accelerated its studies to establish a new and stronger banking regulation.



## The Basel III Accord

The Basel II accord failed to avert the 2008 global financial crisis and was criticized for a lack of liquidity monitoring, a lack of a clear definition of capital in the global banking system, etc. In 2010, the Basel committee issued a new accord known as Basel III to strengthen this regulation and its effect on banks. Referring to the BCBS (2013a), the third accord of the Basel framework was aimed to address liquidity and systemic risks by imposing stricter capital and liquidity requirements.

Specifically, the three pillars remained the same as in Basel II; however, the first pillar saw significant alterations with the introduction and imposition of two minimum requirements for funding liquidity. Notably, these modifications to the minimum capital requirement seek to increase both the quantity and quality of qualifying capital.

Thus, the primary purpose of modifying the Basel accord is to enhance the banking sector's capacity to absorb financial shocks and, consequently, to reduce their impact on the real economy. In addition, it is believed that increasing risk management and bolstering banks' transparency and disclosure play a significant influence in the banking sector. Consequently, the resilience of banks during a financial crisis would be enhanced (Petersen and Mukuddem-Petersen, 2014).

In the context of the new rules of the Basel III accord, the minimum capital requirement ratio has increased to 10.5%. In addition to that, a leverage ratio of 3% has released Tier 1 capital, to reduce the uncertainties from various kinds of risk. Moreover, two liquidity standards have been introduced for the

Liquidity Coverage Ratio (LCR) in aiming to improve the short-term liquidity performance of banks. Furthermore, the Net Stable Funding Ratio (NSFR) is the second liquidity standard regarding maintaining a sufficient level of funding (BCBS, 2013a).

The Ghanaian banking sector is based on the concept of universal banks, where banks can offer all banking services such as accepting customer cash deposits and providing various kinds of banking and financial business, like insurance, mutual funds, investment banking, housing finance, factoring, bank accounts, loans, share trading account, mutual funds, among others ([www.bog.gov.gh](http://www.bog.gov.gh)). The Ghanaian banking sector have gone through numerous reforms with the recent one being the recapitalization and other reforms undertaken by the central bank starting from 2017 which witness some major mergers and collapse of some banks and financial institutions.

### **Problem Statement**

Preserving liquidity is a challenge for financial organizations, since banks face a trade-off between profit and liquidity keeping (Goodhart, 2008). Liquidity is the ability to expand assets and fulfill foreseen and unexpected cash and collateral requirements at the lowest possible cost (Basel, 2006). The problem of funding liquidity was cited as one of the major causes of the 2007-2009 global financial turmoil (Acharya & Merrouche, 2012; King, 2013). In response, the Basel Committee on Banking and Supervision (BCBS) introduced two separates but complementary liquidity standards to complement its 2008 liquidity risk management framework.



The first is the Liquidity Coverage Ratio (LCR), which requires banking firms to hold adequate high-quality liquid assets (HQLA) to survive demands for liquidity during significantly stressed conditions lasting over a month. The second standard is the Net Stable Funding Ratio (NSFR), which seeks to curtail maturity mismatches between bank liabilities and assets. Although Basel III LCR and NSFR are aimed at strengthening the resilience of the banking system to liquidity shocks and curtailing banks' maturity mismatches, in practice, these new liquidity requirements might stimulate changes in bank profitability.

Using a sample of European banks, Claessens and van Horen (2015) discovered that a greater NSFR is associated with decreased profitability, but the effect is not statistically significant. Similarly, a sample of Greek banks was used by Papanikolaou et al. (2019) to find that a greater NSFR is related with worse profitability, but the effect is not statistically significant. In contrast, Ho and Liang (2017) discovered, using a sample of Chinese banks, that a greater NSFR correlates with increased profitability. Similarly, Bele and Farkas (2019) discovered, using a sample of Swiss banks, that a higher NSFR is related with greater profitability.

Also, the recent radical reform of the banking sector by the central bank starting from 2017, which saw the implementation of major elements of Basel II and III and catapulting Ghana to be among the most ambitious implementers of Basel standards. While the literature review indicates mixed findings regarding the impact of the Basel III liquidity standards LCR and NSFR on banks'

profitability. LCR is expected to have a negative impact on the profitability of owning HQLA, while NSFR is associated with greater profitability for banks.

And there is a considerable amount of research on the implications of other bank regulatory measures. The Basel III accord has been in existence for some number of years now. however, little is known about the potential impacts of the Basel III liquidity requirement on banking sector performance. Hence, it is important to undertake this study with the objective of examine, empirically, the effects of these new liquidity requirements in the Basel III on Ghana bank profitability and also make an important contribution to the literature on the impact or effect of macroprudential regulations on banking sector performance.

### **Research Objectives**

The general objective of the study is to examine effect of Basel III liquidity requirement on bank profitability in Ghana.

Specifically, this study aims to:

1. Examine the effect of the Liquidity Coverage Ratio (LCR) on the Profitability of banks in Ghana
2. Investigate the effect of the Net Stable Funding Ratio (NSFR) on the Profitability of banks in Ghana
3. Explore the extent to which the Basel III Liquidity Requirement affect Profitability of banks in Ghana

### Hypotheses of the Study

Following from the research objective, the study, seeks to test the following hypotheses.

1)  $H_0$ : There is no effect of liquidity coverage ratio on Profitability of banks in Ghana.

$H_1$ : There is significant effect of liquidity coverage ratio on profitability of banks in Ghana.

2)  $H_0$ : There is no effect of net stable funding ratio on profitability of banks in Ghana.

$H_1$ : There is significant effect of net stable funding ratio on profitability of banks in Ghana.

3)  $H_0$ : There is no significant effect of Basel III liquidity requirement on profitability of banks in Ghana.

$H_1$ : There is a significant effect of Basel III liquidity requirement on profitability of banks in Ghana.

### Research Question

Considering the study's objectives, this research aims to answer the following question:

1. Does liquidity requirement affect the profitability of Ghanaian Banks?
2. To what extent does liquidity requirement affect the profitability of Ghanaian Banks?

### **Significance of the Study**

This research will help not just the study's chosen banks, but also the industry in assessing the condition and impact of Basel III liquidity on profitability in the sector. Other firms and investors outside the sector will find the report useful. The finding will also assist others' financial and transactional choices, adding to existing knowledge, academics, legislators, and the broader corporate environment.

### **Organization of the Study**

The remaining of the study is organized as follows: Chapter Two examines theoretical and empirical research on the idea of liquidity requirement, measurements of liquidity, and the impact of liquidity on bank profitability. The study's methodology, which covers aspects such as the data sources, econometric specifications, justification of variables, and predicted correlations between the dependent variables are described in detail in Chapter Three. The calculations and results are analyzed and interpreted in Chapter Four. The Fifth Chapter summarizes the findings of the whole research and makes policy suggestions.

## CHAPTER TWO

### LITERATURE REVIEW

#### Introduction

This chapter provides both the theoretical and empirical underpinnings on which the ideas and opinions presented in this study are built. This chapter examines the published works of numerous authors, researchers, and regulatory bodies regarding the concept and theories of profitability, the concept and theories of liquidity and the effects of Basel III liquidity requirements (LCR and NSFR) on bank profitability. The chapter serves as the foundation for the regression model selected for empirical estimation in the following chapter.

#### Evolution Of Banking in Ghana

The primary function of a bank is to act as a financial intermediary by accepting deposits and extending loans. The goal of the establishment of banks on the Gold Coast during colonial rule was to supply funds for our British masters. In 1896, Standard chartered bank, formerly known as "The Bank of British West Africa," began operations in Accra as the first bank to access the shores of Gold Coast. The profitability of banking in Ghana encouraged more international investors to enter the banking industry in Ghana. "The Colonial Bank, for instance, commenced operations in 1918 and subsequently merged with Somewhat Anglo-Egyptian Bank, the National Bank of South Africa, and Barclays Bank to become Barclays Bank." From 1920 until 1950, there were only two banks in Ghana: The Bank of British West Africa and the Barclays Banks. In 1953, the government deemed it prudent to form The Ghana Commercial Bank



due to the monopoly they possessed over the economy during their operation period.

In the wake of independence from colonial authority in 1957, "the Bank of Ghana was established to manage the nation's currency." In 1974, several state-owned banks and "Development Financial Institutions" (DFI) were founded to increase the monetary supply by providing services that were often devalued by commercial banks. These institutions include the National Investment Bank, Agricultural Development Bank, Bank for Housing and Construction, Merchant Bank, and Social Security Bank.

"Various locally established banks, including the Meridian (BIAO), The Trust Bank, CAL Merchant Bank, Allied and Metropolitan Bank, and Ecobank, began operations as a result of changes in the financial sector and the introduction of the Banking law in 1989 (PNDC Law 225)" Immediately following independence, banks lacked autonomy due to state involvement. The 1960s and 1970s were marked by banks that lacked independence from government supervision. However, in 1992 the government began to "denationalize a section of the state-owned banks and liberalize the financial sector, resulting in the entry of numerous foreign banks into the Ghanaian economy and an increase in the number of domestic banks."

The minimum capital requirement for banks is currently GHS400 million, compared to GHS100 million in 2013 and GHS60 million in 2007. The evolution of the minimum capital requirement through time was the outcome of the 2004



passage of a new Banking Act. "The new law led to the creation of the Universal Banking License, which permits banks to offer a variety of banking services."

The "rise in the minimum capital requirement with Access Bank and Intercontinental Bank, Ecobank and TTB Bank, and HFC Bank and Republic Bank of Trinidad and Tobago" contributed significantly to the expansion of bank mergers and acquisitions.

The inflow of Nigerian banks into the economy is the most noticeable transformation in the banking industry's history over the years. This influx of Nigerian and other international banks has created several difficulties in the business, particularly in terms of their capacity to attract consumer deposits and their market share. There are currently seven Nigerian banks operating in Ghana, representing around 26% of the total number of banks in the country. The huge number of Nigerian banks operating in Ghana is due to the ECOWAS agreement and the favorable financial climate in Ghana, as well as the generally high minimum capital requirements for banks operating in Nigeria.

However, it is essential to recognize that industry competition has a causal effect on the level of productivity, and we have witnessed a significant improvement in administration delivery and efficiency across the nation's banks. In addition, the difficulty in the financial industry has prompted technological advancements, such as "Automated teller machines (ATMs), e-banking, phone banking (Mobile money), SMS banking, etc., these technological advancements have greatly contributed to the expansion of banking services in Ghana."

The continuous competition between banks has also compelled them to re-evaluate their approach to managing the informal sector. Today, banks devote resources and staff to the informal sector of the economy. As a result of the rise in the minimum capital requirement to GHS400 million, some banks were unable to finance it and faced insolvency, resulting in several mergers and acquisitions. Mergers and acquisitions created a larger bank with a vast capital base, indicating an increase in the Gross domestic product. Increasing the base capital is also advantageous because banks are well protected against future industry-related losses. Typically, larger banks are increasingly suited to resist industry shocks.

Non-banking financial organizations include a stock exchange, insurance companies, a trust for social security and national insurance, discount houses, building societies, venture capital firms, mutual funds, and leasing companies. Given that banks are private or public businesses that participate in the provision of services with the expectation of earning a profit from these services, their primary objective would be to maximize shareholder wealth or return to the firm, just like any other profit-driven entity. How these returns may be measured, or how the acceptability of these returns to the owners, becomes a matter of great concern.

Fraser et al. (2001) proposed that "shareholder value is assessed by the market price of a bank's stock and the amount of cash dividends paid." Currently, only "8 banks (out of 23 banks) are listed on the stock exchange," so stock prices cannot be utilized as an indicator of risk and return. For unlisted banks, there is no record of stock prices that can be relied upon as an indication of a company's

financial success. When evaluating companies, most financial analysts employ a range of assessment methods.

### Overview Of the Basel III Liquidity Requirements

The 2007-2009 global financial crisis revealed flaws in the liquidity management of banking organizations (Dietrich et al., 2014). In 2010, the BCBS launched global liquidity regulatory measures for the first time to address this issue. The BCBS recommended two independent but complementary global liquidity criteria in 2010: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The former (a short-term liquidity measure) requires banks to maintain adequate high-quality liquid assets (HQLA) to meet their liquidity needs for more than a month under strained conditions. It is anticipated that bank managers and regulatory agencies can take the necessary corrective activities, or that the bank can be dissolved in an orderly manner (BCBS, 2013). HQLA consists of cash, unencumbered marketable securities, and government bonds. According to the BCBS (2013), these securities must be listed on a developed and established exchange, have low volatility, low risk, low correlation with risky assets, ease, and certainty of valuation, and be listed on a developed and established exchange.

The Basel III accord requires that:

$$\text{LCR} = \frac{\text{Stocks of HQLA}}{\text{Total net cash outflows over the next 1 month}} \geq 100\%$$

The LCR is a restriction on the amount of short-term liquidity risk a bank is permitted to assume. The LCR implementation was intended to begin on 1

January 2015 at a pace of 60 percent, grow by 10 percent annually, and reach a minimum level of 100 percent on 1 January 2019. (BCBS, 2013).

The goal of the NSFR (a measure of long-term liquidity) is to alleviate financing risks caused by mismatches in the maturities of bank assets and obligations. In other words, it seeks to provide a minimal amount of constant funding for bank assets in relation to their liquidity characteristics. The NSFR is the proportion of a bank's available stable financing (ASF) to its required stable financing (RSF). The BCBS requires banks to maintain a minimum ratio of 100 percent.

$$\text{NSFR} = \frac{\text{Available Stable Funding}}{\text{Required Stable Funding}} \geq 100\%$$

The amount of the ASF is computed as the weighted sum of a bank's funding sources (capital and liabilities) according to their stability criteria. Similarly, the RSF is determined by weighting the use of financing sources according to their liquidity. The RSF represents the percentage of funding usage (exposure) that must be maintained by continuous funding. The larger the continuous funding requirement for an asset, the lower its liquidity. BCBS can provide additional information on Basel III liquidity rules (NSFR and LCR) (2010, 2011).



## THEORETICAL LITERATURE

### The Concept and Theories of Profitability

Banks, like any other conventional business, aim to generate a profit for the organization's growth and stability, as well as to satisfy their shareholders. Financial institutions serve as the backbone of every economy; therefore, for an economy to thrive and remain stable, their evaluation and management must be well-maintained. According to Aburime (2009), "profit is the difference between the income generated in the ordinary course of business and the opportunity cost of each item utilized in the manufacture of that output." Profit maximization is the result of a bank's operations being meticulously managed.

Profitability in banks also implies that the ability to generate profits exceeds costs when the bank's capital is considered (Olweny & Shipho, 2011). In other words, profitability is typically viewed as the link between a bank's revenues and the investments that contribute to obtaining those revenues. This notion tends to make the banking industry more profitable and stable. Alshatti (2015) claimed that this sector would be able to withstand any financial shocks or crises using profitability as a measure of the banks' soundness.

According to Lartey et al. (2013), previous research on the performance of banks was based on the Market Power theory (MP) and the Efficiency Structure theory (ES). However, there are also more theories about profitability, such as the Structure-Conduct-Performance (SCP) which are regarded as key theories in this regard. These theories are outlined below:

### **The Market Power Theory**

The application of the Market Power theory to the banking sector is characterized as the sector's market structure influencing the performance of banks. According to the theory, for instance, the concentration of banks in a market leads to an increase in their market power, which could boost their profitability. Moreover, banks' profitability is determined by their market share. For instance, huge banks may be able to exert market power by influencing pricing and revenues (Athanasoglou et al., 2008).

### **The Efficiency Structure Theory**

The Efficiency Structure theory, on the other hand, speculates that banks with high levels of efficiency will earn higher profits than others due to lower expenses (Owolabi & Obida, 2012). In addition, banks with a high market share tend to get higher levels of profits, lower costs, a rise in concentration, and hence, increased profitability. In accordance with this theory, the portfolio theory is regarded as one of the most essential theories for analyzing the performance of banks. According to Olweny and Shipho (2011), this theory proposes that the ability of banks to produce larger profits is contingent on the management's decision to hold a realistic combination of assets and liabilities. In addition, the total cost of investments incurred by banks is also impacted by management decisions. Therefore, there are a variety of internal elements that could influence the optimal performance decisions of banks.



### **The Structure-Conduct-Performance (SCP) Model**

This model describes the elements that influence the profitability of banks. According to Baye (2010), the structure of an industry is comprised of variables such as concentration, technology, and market conditions. It includes advertising decisions, pricing decisions (such as commission, interest rate, and fees), and research and development investment decisions, among others. Profit is the performance indicator in this case.

### **The Concept and Theories of Liquidity**

According to Ibe (2013), liquidity is defined as the quantity of capital that can be invested. Bank liquidity refers to the capacity of banks to hold sufficient funds to meet their maturing obligations. In other words, as indicated by Olarewaju and Adeyemi (2015), banks' liquidity is defined as their ability to rapidly satisfy their obligations by having adequate funds and the ability to convert any assets into cash. Consequently, the objective of banks' liquidity management is to retain funding sources and hold an adequate amount of short-term cash reserves without impacting their investments or profitability.

Williamson (2008) defined liquidity as "the capacity of an economic agent to swap existing wealth for commodities, services, and other assets." According to Chamberlain (2008), "bank liquidity is the ability to meet obligations when they mature without incurring unacceptable losses." In other words, this simply refers to the capacity of banks to maintain sufficient cash to meet maturing and contractual obligations, such as lending, investment commitments, deposit withdrawals, and liability maturity, in the normal course of business.

The proportion of a bank's resources devoted to loans to entrepreneurs is negligible. These allow entrepreneurs and bank customers to meet their additional capital requirements. According to (Diamond & Dybvig, 1983; Jenkinson, 2008), "this transition of deposited liquid liabilities into illiquid assets in the form of loans, with a focus on their maturity mismatch, exposes them to liquidity risk." To bridge the mismatch between asset and liability maturities, banks can ensure that they have sufficient assets that can be easily converted for cash or its equivalent within a short period of time without suffering a major loss in balance sheet value. "Banks should retain more liquid assets in preparation of potential losses from write-downs on securities" It is vital to fulfill obligations such as withdrawals since banks require a deposit to convert them into loans. In light of this, there is a mismatch between assets and liabilities where the assets (loans) cannot be sold rapidly at a high price and clients demand their deposits in the shortest time feasible.

According to Gorton and Winton (2003), bank "liabilities serve as a medium of trade. This fundamental function generates ideas and models for liquidity that are extremely distinct and possibly more natural than the concept that bank liabilities merely facilitate consumption smoothing. This basically means that the more liquid a bank is, the more business transactions it can conduct, resulting in a higher profit margin.

Nonetheless, it demonstrates a degree of inefficiency on the part of management as it hinders banks' capacity to fulfill contractual obligations to their clients. Decker defines funding liquidity risk and market liquidity risk as the

inability of a financial organization to accept a reduction in liabilities or an increase in assets (2000). He defined "funding liquidity risk as the risk that a bank will be unable to meet its obligations as they fall due, because of its inability to liquidate assets or inadequate funding sources" and "market liquidity risk as the risk that a bank cannot easily unwind or offset specific exposures without significantly lowering market prices due to insufficient market depth or market disruptions."

Controlling the amount of liquid assets, a bank holds without impeding its ability to generate profits is the definition of liquidity management. In their study, Gomes and Khan elaborated on funding and market liquidity risk (2011). They defined "funding liquidity risk" as a company's inability to generate funds by deploying assets held on its balance sheet to meet financial obligations on short notice. The liquidity position of a given bank is primarily determined by its holdings of cash and other readily available marketable assets, as well as by its funding structure, the amount and type of contingent liabilities that may become due within a given time frame.

Several theories exist about liquidity and liquidity management, but the trade-off theory is one of the core theories on liquidity. Additionally, liability management theory, shiftability theory, and anticipated income theory are regarded as essential theories in this regard. The following explains these theories.

### **The Trade-off Theory**

According to this theory, banks seek to maintain an optimal level of liquidity by balancing the cost and benefit of retaining cash (Alexiou and Sofoklis, 2009). For example, the cost of keeping cash consists of a low return on these assets. Moreover, banks with excessive leverage or liquidity difficulties may be unable to access low-cost debt, which could have a negative impact on their profitability. In contrast, banks could benefit by retaining cash due to the availability of funds sources without having to sell assets to meet their obligations.

### **Liability Management Theory**

This theory, according to Ibe (2013), assumes that banks can achieve their liquidity obligations by focusing on both sides of the balance sheet as liquidity sources. In other words, these banks can receive funds from the capital and money markets, therefore they are not required to hold a huge inventory of liquid assets. According to this concept, liquid asset reserves are unnecessary when capital markets and financial resources are readily accessible. However, this theory has been questioned, especially in times of crisis. During such a time, market confidence may be significantly weakened, and banks would therefore lack capital. Nevertheless, the liability management theory assumes that the cost and value of acquiring liquid assets depend on several variables, such as management decisions and obtaining the optimal level of liquidity.



### **Shiftability Theory**

Toby (2006) in his study alluded to Moulton H.G one of the originators of this theory, which was propounded in the USA in 1918. The concept of shiftability has clarified that a bank's liquidity is dependent on its ability to move its short-term asset to another at a reasonable cost and without incurring severe losses in the event of a bank run. According to Moulton, "liquidity is synonymous with transferability, therefore the bank's ability to transfer or sell its assets to possible buyers, such as lenders or investors, in exchange for cash." The shiftability theory refocuses the attention of bankers and regulatory authorities from "loans to investments" as a route for bank resources.

### **Anticipated Income Theory**

This concept was created by Herbert V. Prochnow. Before issuing loans, financial institutions were obligated to match a borrower's expected income. Future earnings must be predicted. In other words, regardless of whether the borrower has a regular or considerable source of income, a thorough examination of his ability to repay should be conducted. A bank's liquidity can be governed by the structure and language of its clients' loan agreements. This allows banks' liquidity to organize clients' ability to repay loans more efficiently. According to Nzotta (1997), "the concept emphasizes the earning potential and trustworthiness of the borrower as the overall guarantee for maintaining adequate liquidity." However, there is no information regarding the borrower's future income, willingness, or ability to repay the debt.



### **Empirical Literature on the determinants of Bank Profitability**

Alzoubi (2018) and Yao et al. (2018) highlighted that the profitability of banks is influenced by a variety of factors, including size, capital, risk, etc. Each variable has a unique association with profitability. According to the BCBS (2013a), liquidity risk is among the primary types of risk that influence banks. Liquidity risk arises when a bank is unable to get sufficient cash, either by swiftly converting assets or by raising their commitments at an acceptable cost, so impacting their profitability.

In most of the academic research, return on assets (ROA), return on equity (ROE), and net interest margin (NIM) are expressed as a function of both internal and external measures of profitability, such as Operating efficiency, capital adequacy, liquidity, and external determinants such as money supply and banking industry concentration. Return on Asset just reflects whether a company is generating sufficient income from its assets. Return on Asset excludes assets that are not reflected on the balance sheet. Despite this flaw, Return on Assets is regarded as a reliable predictor of profitability. Return on Equity gauges a company's ability to generate profits from its equity, whereas Return on Assets analyzes its ability to generate profits from its assets. This statistic has the disadvantage that banks with "high financial leverage" yield a higher average ratio. Even though these institutions may have a high ROE, significant financial leverage may be correlated with a higher degree of risk.

Mpesum (2010) did research on Cal Bank Ghana Ltd. and the factors influencing the bank's profitability. The findings reveal that industry size had the greatest impact on a bank's profitability. Having observed an "inverse link between size and profitability," he concluded that for a bank to be profitable, it must be aware of both its size and the bureaucratic obstacles that accompany it. This research was inadequate since a single bank was not representative of the whole banking industry.

The comprehensive methodology employed by Flamini et al. (2009) accounted for many organizations. In Sub-Saharan Africa, a sample of 389 firms in 41 countries that existed between 1998 and 2006 was used to assess the results. In addition to loan uncertainty, it appears that larger bank size, operational diversification, and personal property are related with higher investment returns. The yields of banks are influenced by macroeconomic considerations, demonstrating that credit extension is driven by macroeconomic policies that encourage low inflation and stable production growth. In addition, the findings imply that moderate profitability endures. Consequently, the study lends credence to the premise of "increasing capital needs in the region to ensure financial stability."

Vong et al. (2009) examined "the effect of bank characteristics, macroeconomic and financial structure variables on the performance of the Macao banking sector." It was demonstrated that a firm's capital status has a significant impact on its profitability. This result agrees with Al-Shubiri (2010), Li (2007),

and Sufian (2005). The inflation rate was the only macroeconomic factor with a "significant connection with profitability."

In his study, Li (2007) analyzed characteristics unique to the banking business and macroeconomic factors that may have influenced the profitability of the banking industry in the United Kingdom from 1999-2006. It sought to demonstrate how effectively banks handle risk. The data, however, demonstrated a significant negative link between bank profitability and loan loss provisions. This outcome validated Sufian's results (2009). In contrast to the findings of Vong et al. (2009), he discovered that macroeconomic factors such as inflation, interest rates, and GDP growth had a relatively little impact on performance.

Kutsienyo (2011) studied panel data from 26 banks in Ghana from 2000 to 2009 using the generalized least squares (GLS) method to build fixed effect regression models. With ROA and ROE as dependent variables, the regression models included bank-specific factors such as capital adequacy, operating expense, liquidity, asset quality, and bank size, as well as macroeconomic factors such as the rate of inflation, Gross Domestic Product (GDP), money supply, and banking industry concentration. Capital adequacy, bank size, inflation rate, and GDP were positively linked with bank profitability, while asset quality, liquidity, operational expenses, money supply, and bank concentration were negatively connected with bank profitability. Except for GDP, banking industry concentration, and asset quality, when bank profitability was assessed by Return on Equity, all the drivers were consistent (ROE). In the case of ROE, the

association between adequate capital and bank profitability was negative and statistically significant.

Goddard et al. (2004), for instance, examined the profitability of European (Denmark, France, Germany, Italy, Spain, and the United Kingdom) banks between 1992 and 1998 utilizing cross-sectional and dynamic panel analysis. Using return on equity (ROE) as the dependent variable, the study included size, business diversity, capital sufficiency, credit risk, ownership type, and dynamic effects as explanatory variables. Despite the rising competition among banks, the results suggested that abnormal profits persisted significantly from year to year.

Petria, Capraru, and Ihnatov (2015) employed ROA and ROE as bank profitability measures to analyse the factors influencing bank profitability in EU-27 over the period 2004–2011. The results from the regression estimates indicated that bank profitability can be explained by management efficiency, diversification, credit and liquidity risk, economic growth, and competition.

Moreover, it was evident that the correlation between size and profitability was rather modest. The link between the significance of off-balance-sheet enterprises (OBS) in a bank's portfolio and profitability was good in the United Kingdom, but neutral or negative elsewhere, where several banks that had aggressively expanded into OBS firms struggled to retain profitability. The relationship between the capital–assets ratio and profitability were positive but did not reflect the expected theoretical relationship between risk and return, as a high CAR (capital-assets ratio) indicates that a bank is operating overly cautiously and



ignoring potentially profitable trading opportunities. However, it was shown that a high CAR covers the cost of bankruptcy insurance, indicating more future profitability and producing a positive correlation between CAR and ROE. There was no consistent association between ownership type and profitability, based on the global pooled estimate. In all cross-sectional estimates, cooperative banks were less profitable than commercial and savings banks, although the difference was only statistically significant at the 10% level.

Sufian and Chong (2008) employed a multiple regression analysis to examine the factors of bank profitability in the Philippines, a developing economy between 1990 and 2005. In their linear regression analysis, the dependent variable was a measure of profitability; return on assets (ROA). Bank-specific explanatory variables included size, credit risk, non-interest income to total assets ratio (a measure of diversification and business mix), non-interest expense (efficiency of management), and equity to assets ratio. External explanatory variables included the growth rate of the GDP, growth of money supply, the rate of inflation, and stock market volatility. The results revealed a negative correlation between bank size and profitability, indicating that larger banks are typically less profitable than smaller ones.

The inflation rate is found to have a positive insignificant relationship with ROA but a significant positive association with ROE (Bogdan and Ihnatov, 2014). Chowdhury and Rasid (2017) revealed that inflation rate is negatively and statistically significant to the performance of Islamic banks.



The effect of the inflation rate of a country on banks' profitability is ambiguous, according to the literature. While Kosmidou, et al. (2005) and Naceur and Omran (2011) found a positive relationship between customer price index and bank profitability in their studies for banks in U.K and MENA countries respectively whiles Sufian and Chong (2008) rather found a negative coefficient for inflation for their study in the Philippines.

The impact of economic activity (GDP) in prior research is mixed. Anbar and Alper (2011), Masood and Ashraf (2012), Combey and Togbenou (2017) and Messai and Gallali (2019) concluded that GDP is negatively insignificant as far as banks' profitability is concerned. Acaravci and Çalim (2013), Jara-Bertin et al. (2014) and Yahya et al. (2017) reported that banks' performance is positively related to economic growth. Further, Marijana et al. (2012), Petria et al. (2015) and Salike and Ao (2017) concluded that GDP has an influence on banks' profitability.

Gross Domestic Product is another important measure of the economic condition of a country or countries. The GDP is used as a proxy of business cycles in which banks operate, and controls for variances in profitability due to differences in business conditions which impact the demand and supply of loans and deposits. Obamuyi (2013) study in Nigeria, represented the GDP with a dummy variable with 1, representing favourable economic cycle and 0, for unfavourable economic cycle. Obamuyi's result shows higher GDP represent improved business opportunities, which ultimately leads to higher profitability.

This is consistent with other findings such as Sufian & Chong (2008); Naceur & Omran (2011); among other studies.

### **Liquidity Coverage, Net Stable Funding and Banks' Profitability**

The performance of banks in terms of profitability has far-reaching effects. As previously said, the financial sector has a significant impact on the entire economy (Pawlowska, 2016). Consequently, it is believed that the profitability of banks plays a vital role in preserving the economic stability of a nation. Therefore, there is a trend for national authorities to strive to increase the profitability and effectiveness of the banking sector.

To improve banks' liquidity risk management, the BCBS (2010) enacted the Base III liquidity standards. Although the purpose of the new liquidity indicator LCR is to ensure that banks have sufficient liquidity to withstand short-term financial shocks whereas the NSFR is for long-term financial shocks, the viability and execution of Basel III are the subject of extensive controversy. According to one school of thought, liquidity norms have a positive correlation with profitability. In other words, these ratios are expected to lessen the likelihood of crises and the danger of failure and insolvency (Admati et al., 2013; Harle et al., 2010).

Nonetheless, another review of literature indicates that the application of the new liquidity rules could have a substantial negative impact on profitability (Angelini et al., 2014). Roger and Vlcek (2011) highlighted that these laws could lead to an increase in the stock of liquid assets, which have lower yields and so reduce profitability. In addition, Olweny and Shipho (2011) noted that banks

retaining a high level of liquidity may incur opportunity costs that may be produced by investments. Consequently, a high liquidity standard may indicate that banks are taking less risks and generating fewer profits. Therefore, banks could confront a conflict between profitability and liquidity. The following analysis is predicated on how banks' performance would react to Basel III's increased liquidity requirements.

Giordana and Schumacher (2017) analyzed the profitability of Luxembourg banks under the Basel III liquidity and capital framework. The study analyzed the influence of the LCR and NSFR on the profitability and likelihood of default of banks by estimating a historical series of Luxembourgish banks spanning the years 2003 to 2011. Generalized Method of Moments (GMM) was used to determine the endogenous linkages between profit, capital, LCR, NSFR, and other variables. The research demonstrated that the additional liquidity requirements decreased the likelihood of default. Additionally, the effect of the liquidity criteria on profitability was contingent on the funding structure and not the structure of the assets.

Hong et al. (2014) investigated the connection between the new liquidity standards (LCR and NSFR) and bank failures. They computed approximate liquidity standards under the guidelines of the Basel III for a sample of U.S. commercial banks throughout the period 2001-2011. Using a discrete-time hazard model, they discovered that LCR and NSFR had a modest impact on bank failures. In other words, the buffers resulting from the application of LCR and NSFR may not reduce the systemic solvency crisis that banks would confront.

Roulet (2018) analyzed the response of bank lending to the new Basel III liquidity and capital framework by analyzing data from 269 commercial European banks. It was believed that loans are the primary source of profits for banks. This 2008-2015 study employed a basic Ordinary Least Squares (OLS) model to provide empirical findings. In addition, the NSFR was considered an indicator of liquidity in the study. The Basel III liquidity rules were found to have both good and negative effects on the features and behavior of banks. In other words, despite the fact that these findings indicate that, in general, banks in Europe face pressures to reduce their growth of lending in order to increase their level of liquid assets in response to the new liquidity requirements, the growth of the banks' commercial lending was positively impacted.

Nonetheless, the introduction of the Basel III framework had a negative effect on the large European banks, as their short-term lending activity contracted. Similarly, King (2013) proposed that the Net Interest Margins (NIM) would decrease if the NSFR were implemented. Banerjee and Mio (2018) empirically studied the impact of the stricter liquidity regulation on the performance of 90 banks in the United Kingdom (UK). The Individual Liquidity Guidance (ILG) was introduced by the UK Financial Services Authority as a liquidity strategy. This indicator's concept and calculation are comparable to the LCR recommended by the BCBS. The results indicated that there is no evidence to suggest that the ILG implementation had a negative impact on the lending activity of banks. However, the application of the ILG had a negative effect on the profitability of banks because of their decision to maintain low-yielding liquid assets. Using a



sample of US and European banks, Harle et al. (2010) discovered that the new liquidity requirements led to a decline in the Returns on Equity (ROE) ratio of banks.

Moreover, Saif-Alyousfi et al. (2017) examined the profitability of Saudi commercial banks based on a variety of metrics. Their study's sample included twenty domestic and international banks from 2000 to 2014. In particular, the dependent variables were profitability metrics (ROA, ROE, and NIM), whilst the ratios of net loans to total deposits and liquid assets to Total assets were employed to quantify liquidity risk. Using OLS and the fixed effect model, the results suggested that the ratio of liquid assets to total assets of domestic banks had a negative effect on ROE and NIM.

Altahtamouni and Alyousef (2021) investigates the impact of the Basel III liquidity regulation on banks' profitability in Saudi Arabia. A sample of 12 Saudi banks covering the period 2015-2018 was used in the study. The study analyzed the influence of the LCR and other variables on the profitability. Using several models of panel data, such as the pooled ordinary least square, the fixed effects model and the random effects model. The empirical results of the study indicated that the new liquidity ratio had no impact on Saudi banks' profitability, as it was plausibly illustrated that, when the banks maintained their liquidity levels following application of the Liquidity Coverage Ratio, they would have lower funding costs and risk, hence increasing the banks' profitability.

In contrast, Mashamba (2018) examined the impact of the new LCR of Basel III on the profitability of banks in developing market economies. This



study's sample comprised 40 commercial banks between 2011 and 2016. Data estimation was performed using a GMM estimator. ROA for profitability was the dependent variable, whereas the LCR engaged in other control factors was the primary independent variable. The empirical findings demonstrated that the LCR benefited banks in emerging nations by increasing their profitability.

Du (2017) investigated how the Basel III LCR might mitigate the systemic risk of U.S. bank holding companies. The sample period spanned from 2002 to 2015 and included 761 banks. The study analyzed quarterly balance sheets and income statements to determine the sample's approximate LCR. The OLS regression results suggested that banks with a high degree of LCR would have a lower systemic risk. Prior to the Great Financial Crisis, banks had an LCR of less than 100 percent, as evidenced by the fact that the result was demonstrated.

Yaacob et al. (2016) investigated the determinants of liquidity risk utilizing the LCR and NSFR as well as other microeconomic and macroeconomic factors as indicators. For instance, the returns on assets ratio (ROA) were computed as an internal element to gauge profitability. This study's sample comprised of 17 Islamic banks in Malaysia from 2000 to 2013. Two models were used to compute the two liquidity ratios in accordance with the BCBS and the Islamic Financial Services Board (IFSB) recommendations. The findings of the regression analysis revealed that liquidity risk was positively significant for funding. In other words, an increase in financing tends to raise the liquidity risk exposure, and as a result, the performance of banks could be impacted by an increase in the bankruptcy risk. Therefore, a rise in Basel III's liquidity ratios

could have a favorable impact on the profitability arising from the reduction of liquidity shocks.

Dietrich et al. (2014) investigated the potential effects of the NSFR under Basel III on the performance of 921 Western European banks between 1996 and 2010. Using a regression framework and the GMM technique, the study evaluated how the adoption of the NSFR affected the profitability of banks. In addition to explanation and macroeconomic considerations, ROA, ROE, and NIM were employed as profitability indicators. Prior to the 2008 financial crisis, banks' NSFR declined significantly, according to the research. In terms of the effect of the NSFR on the profitability of banks, the data demonstrated that banks with a low NSFR had more erratic performance. Therefore, it may be hypothesized that using the new liquidity indicators tends to make banks more stable and resilient.

Setiyono and Naufa (2020) This study examines whether liquidity, as measured by net stable funding ratio (NSFR), impacts bank performance and risk. Based on an annual panel data set consisting of 2,909 banks from 127 countries, we find that NSFR reduces both performance and risk.

In addition, the above findings were supported by Said (2018), who researched the influence of NSFR on the profitability of Malaysian commercial banks, supported the findings. The study evaluated three measures for profitability, namely ROA, ROE, and NIM, using a balanced panel of data from eight banks spanning the years 2005 to 2011. According to the regression results, the NSFR had a beneficial impact on all three profitability measures. In other words, banks were able to preserve their profitability despite adopting HQLA's

effect on the profitability of Malaysian commercial banks. Using a balanced panel data of 8 banks covering the period from 2005 until 2011, the study employed three measures for profitability, namely ROA, ROE and NIM. According to the regression results, the NSFR positively affected all three ratios of profitability. In other words, the banks were able to maintain their profitability's performance, even when switching to holding an HQLA.

Al-Hares et al. (2013) evaluated the Basel III-compliant financial performance of conventional and Islamic banks in the Gulf Cooperation Council (GCC) region. The sample consisted of 75 banks spanning nine years, from 2003 to 2011. Financial ratios were utilized to analyze the performance of the banks. Specifically, the study used ratios such as ROA and ROE to evaluate the profitability. In addition, the ratio of loans to total assets and the ratio of total loans to deposits were utilized to evaluate the liquidity level. The results demonstrated that GCC banks were typically well-capitalized, indicating that they were able to withstand any liquidity strain.

Yan et al. (2012) presented in their study a long-term cost-benefit analysis for the United Kingdom in response to the new Basel III liquidity and capital regulations. The sample for the study's liquidity assessment, which is considered a measure of liquidity by the NSFR, consisted of seventeen banks. This analysis utilized quarterly data from 1997 to 2010. In addition to liquidity, other microeconomic and macroeconomic variables were included in the research. The empirical findings suggested that the Basel III framework delivered a large positive benefit for the UK economy, and it is probable that this benefit will grow

if the liquidity criteria are met and implemented. In addition, the findings demonstrated that these liquidity regulations played a crucial role in absorbing financial shocks and enhancing financial stability.

Using a sample of European banks, Claessens and van Horen (2015) discovered that a greater NSFR is associated with decreased profitability, but the effect is not statistically significant. Similarly, a sample of Greek banks was used by Papanikolaou et al. (2019) to find that a greater NSFR is related with worse profitability, but the effect is not statistically significant. In contrast, Ho and Liang (2017) discovered, using a sample of Chinese banks, that a greater NSFR correlates with increased profitability. Similarly, Bele and Farkas (2019) discovered, using a sample of Swiss banks, that a higher NSFR is related with greater profitability.

Dang (2021) studies the impact of NSFR on the performance of Vietnamese banks for the period of 2007–2018. The author finds that the higher NSFR levels not only have a favorable influence on the accounting ratios—Return on assets (ROA) and return on equity (ROE) but also lead to an increase in the bank NIMs by reducing funding costs. The findings are consistent with those of Khan et al. (2015), who document an improvement in the NIMs of US commercial banks, as the fund providers Favor the banks with sufficient liquidity.

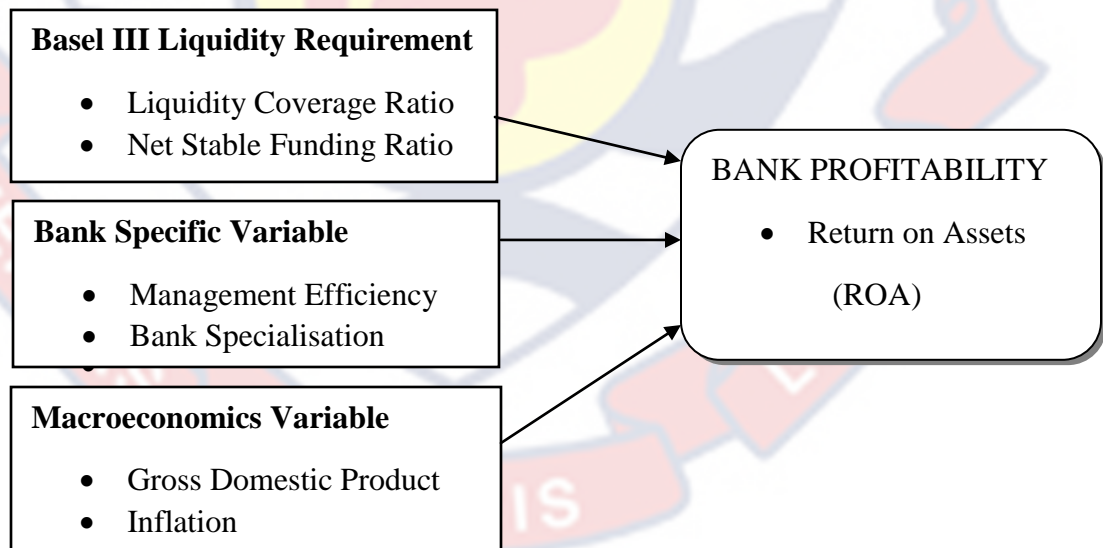
Furthering the discussion on the decline in profitability of banks due to advanced liquidity levels, Pak (2020) observes that the implementation of NSFR would lead to a decline in NIMs of the banks due to a narrower spread (loans) and maturity mismatch. The author's findings support that of Molyneux and Thornton



(1992), who evidence that higher liquidity holdings (particularly those imposed by the authorities) have an adverse impact on profitability, as they represent a cost to the bank. Similarly, Muriithi and Waweru (2017), in their study conducted for Kenyan banks, find a decline in banks' profitability in response to NSFR implementation. They suggest that increased competition for stable sources of funding, such as retail deposits, capital, and debt instruments, leads to higher costs, resulting in deteriorated bank performance.

### Conceptual Framework

According to Elmendorf *et al.*, (2000) a Conceptual Framework involves pictorial representation of identified variables once aggregated, elucidates issues of concern. The current study constructed a conceptual framework that links Basel III liquidity requirement, bank specific variables and macroeconomic variables to bank profitability. The framework is depicted in Figure 1.



**Figure 1:** Transmission channel of Basel III liquidity requirement to Bank profitability

Source: (Author's construct, 2023)



## Chapter Summary

Overall, the literature review indicates mixed findings regarding the impact of the Basel III liquidity standards LCR and NSFR on banks' profitability.

According to several research, this new standard is expected to have a negative impact on the profitability of owning HQLA, which produces low yields. Others, however, indicated that the introduction of LCR will result in banks holding higher liquidity buffers, hence lessening the likelihood of liquidity crises. Therefore, this new law tends to improve the banks' financial stability and profitability. Similar, the findings of earlier studies, a higher NSFR is associated with greater profitability for banks.

However, only a few empirical studies examine the impacts of new liquidity requirements on bank performance since the announcement of BASEL III out of which all the literature reviewed either considered one out of the two requirement and also none of the literatures focus on Ghana. Consequently, this study intends to contribute to the existing literature to fill this void. Moreover, previous research appears to focus on the influence of Basel III capital and leverage restrictions on the performance of banks. In contrast, the purpose of this study is to shed new light on the impact of the new Basel III liquidity requirement on the profitability of bank by considering both requirement under the regulation and also focus on Ghana.

## CHAPTER THREE

### RESEARCH METHODS

#### Introduction

The methodology explains the approaches used in the study. The chapter covers: the research design of the study, the population and sampling technique. It also involves the data source for the study and clarification on the various variables of the study as well as how the data was analyzed using financial ratios, and other statistical tools.

#### Research Design

This study employed a quantitative research approach. The selection of this methodology was motivated by the fact that one of the aims of the study is to investigate the effect of Basel III Liquidity Requirements on the profitability of banks. Creswell (2013) suggests that this method is frequently suited for research that evaluate the relationships between variables using statistical and mathematical techniques. In addition, the analytical procedures used in this study were equivalent to those typically employed in the banking literature and, as such, could be relied upon to offer legitimate and accurate answers to the research questions. The method investigates the relationship between variables by gathering numerical data and analyzing it with statistical instruments (Aliaga & Gunderson, 2002). In comparison to qualitative research, quantitative findings are more trustworthy, valid, objective, precise, and generalizable (Hammersley, 2008; Saunders, Lewis, & Thornhill, 2012).

This study's philosophical viewpoint was the positivist approach, which involves employing existing theories to examine the formulated hypothesis. The notion is fact-based and objectively describes the research (Levin, 1988). The positivist perspective allows the researcher to maintain objectivity and independence during the investigation. This means positivists concentrate on techniques that generate facts unaffected by human interpretation (Crotty, 1998). Positivist thought affords the opportunity to assess socioeconomic phenomena objectively and establish causal relationships (Cantah, 2017).

The study employed an explanatory research strategy because it permits the researcher to identify and explain cause-and-effect correlations. In general, explanatory research is used to assess the effects of certain modifications on existing processes. The design is the best method to the research since it provides a deeper understanding of the study and a more convincing conclusion.

### **Data Source**

This section discusses the study's scope and the data sources for the variables utilized in the econometric models. To determine the impact of Basel III liquidity requirements on the profitability of Ghanaian banks, this study examines panel data on 14 banks in Ghana out of the 23 from 2012 to 2021. It also represents a period of major changes for the Ghanaian banking system, as seen by the new capital requirements resulting from the Bank and Specialised Deposit Institutions Act, 2016 (Act 930), and it falls within the implementation period of the Basel III liquidity requirements. On the Ghana Stock Exchange website and individual banks website, secondary data based on the annual audited financial

reports of the selected banks is obtained. From this source, bank-specific information on total assets, liquid assets, sources of funding, advances, operating incomes, operating expenses, and total equity, among others, was collected. The World Development Indicators served as the source for the macroeconomic variables GDP growth and inflation change information used in this study (World Bank Online, 2021.)

The study considered non-probability sampling techniques mainly the purposive sampling technique. This technique was used to select the 14 commercial banks and the number of years and based on data availability. Tabular descriptions of the variables utilized in the study, their source, units of measurement, and predicted signs are provided in Table 1.

### **Empirical Model Specification**

This section discusses the selection and specification of the econometric models employed in the study. Using panel data regression techniques, the effect of Basel III liquidity restrictions on bank profitability is estimated. Arellano and Bond (1991) define panel data as the collection of observations on a cross-section of units of observation throughout time. This solves several drawbacks of using cross-sectional or time series data (Arellano & Bond, 1991; Baltagi, & Liu, 2013).

According to Baltagi (2001), referenced by Gujarati (2004), panel data provides more meaningful data, more variability, less collinearity across variables, more degrees of freedom, and greater efficiency by integrating time series with cross-section observations. By analyzing multiple cross-sections of observations, panel data are more suitable for examining the dynamics of change.



Since these panel data pertain to enterprises (banks) throughout time, variation is inevitable among these units. Allowing for individual-specific factors, panel data estimate techniques can also explicitly account for the inescapable heterogeneity inherent in the study of banks across time. Panel data can discover and assess effects that cannot be observed with cross-section or time series data alone, so enhancing empirical research in ways that may not be achievable with cross-section or time series data alone. Given the panel structure of the data, the study adopted Chong and Sufian. (2008) model referenced by Sandino, A (2021) and modified. Hence the general model is outlined below.

$$\pi_{it}^n = C + \pi_{i,t-1}^n \sum_{m=1} \beta_m X_{it}^m + \sum_{k=1} \beta_k X_{it}^k + \varepsilon_{it} \quad (1)$$

Where:

$\pi_{it}^n$  is the dependent variable and represent profitability of selected banks measured by ROA, for bank i at time t.

C is the constant term.

$\pi_{i,t-1}^n$  is the lag value of the dependent variable

$\sum_{m=1} \beta_m X_{it}^m$  = a vector of  $m^{th}$  bank specific variables

$\sum_{k=1} \beta_k X_{it}^k$  = is the vector for  $k^{th}$  external variables (Macroeconomics variable)

$\varepsilon_{it} = \nu_i + \mu_{it}$ , the error term where  $\nu_i$  is the unobserved bank specific effect and  $\mu_{it}$  the idiosyncratic error



### Empirical Objective 1

This objective examines the effect of the Liquidity Coverage Ratio (LCR) on the Profitability of banks in Ghana. The equations used was formulated as.

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 LCR_{it} + \beta_3 MEFF_{it} + \beta_4 SPEC_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \varepsilon_{it} \quad (2)$$

Where  $ROA_{it}$  is defined as the return on assets of bank  $i$  in period  $t$ ;  $ROA_{i,t-1}$  represents first lag of return on assets,  $LCR_{it}$  represents the liquidity coverage ratio of the bank,  $MEFF_{it}$  represents the management efficiency of the bank,  $SPEC_{it}$  represents bank specialisation,  $GDP_{it}$  represents gross domestic product,  $INF_{it}$  represents inflation, and  $\varepsilon_{it}$  represents the error term.  $\beta_0$  to  $\beta_6$  represents the constants. The  $it$  subscripts represents bank and time respectively.

### Empirical Objective 2

Investigate the effect of the Net Stable Funding Ratio (NSFR) on the Profitability of banks in Ghana. The equations used was formulated as.

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 NSFR_{it} + \beta_3 MEFF_{it} + \beta_4 SPEC_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \varepsilon_{it} \quad (3)$$

Where  $ROA_{it}$  is defined as the return on assets of bank  $i$  in period  $t$ ;  $ROA_{i,t-1}$  represents first lag of return on assets,  $NSFR_{it}$  represents the liquidity coverage ratio of the bank,  $MEFF_{it}$  represents the management efficiency of the bank,  $SPEC_{it}$  represents bank specialization,  $GDP_{it}$  represents gross domestic product,  $INF_{it}$  represents inflation, and  $\varepsilon_{it}$  represents the error term.  $\beta_0$  to  $\beta_6$  represents the constants. The  $it$  subscripts represent bank and time respectively.

### Empirical Objective 3

Explore the extent to which the Basel III Liquidity Requirement jointly affect Profitability of banks in Ghana. The equations used was formulated as.

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 LCR_{it} + \beta_3 NSFR_{it} + \beta_4 MEFF_{it} + \beta_5 SPEC_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + \beta_8 NSFR_{it} * LCR_{it} + \varepsilon_{it} \quad (4)$$

Where  $ROA_{it}$  is defined as the return on assets of bank  $i$  in period  $t$ ;  $ROA_{i,t-1}$  represents first lag of return on assets,  $LCR_{it}$  represents the liquidity coverage ratio of the bank,  $MEFF_{it}$  represents the management efficiency of the bank,  $SPEC_{it}$  represents bank specialization,  $GDP_{it}$  represents gross domestic product,  $INF_{it}$  represents inflation,  $NSFR_{it} * LCR_{it}$  represent the interaction term between net stable funding ratio and liquidity coverage ratio and  $\varepsilon_{it}$  represents the error term.  $\beta_0$  to  $\beta_8$  represents the constants. The  $it$  subscripts represents bank and time respectively.

*Table 1: Summary of Variables, Expected Signs and Data Source*

variables	Descriptions	Expected sign	Data Source
<b>Dependent variable</b>			
ROA	Return on assets for bank		Annual audited bank report
<b>Independent variables</b>			
LCR	Liquidity coverage ratio	Negative (-)	Annual audited bank report
NSFR	Net stable funding ratio	Negative (-)	Annual audited bank report
<b>Bank – specific variables</b>			
MEFF	Management efficiency	Negative (-)	Annual audited bank report
SPEC	Bank specialization	Positive (+)	Annual audited bank report
<b>Macroeconomic variables</b>			
GDP	Gross domestic product	Positive (+)	WDI
INF	Inflation	Mixed (-/+)	WDI

Author's construct, 2023

## Measurement and Justification of Variables

In this study, the following variables were measured: liquidity coverage ratio, net stable funding, return on assets, bank specialization, and bank management efficiency.

### Dependent Variables

As mentioned in Table 1, the following variables were employed for the purposes of the study. According to the research question, the dependent variable is the profitability of banks. There are a variety of profitability ratios. Returns on assets (ROA) and returns on equity (ROE) are the most popular ratios used to evaluate profitability performance (Mashamba, 2018). The ratio of return on assets (ROA) is computed by dividing net income after taxes by total assets. This ratio indicates the management's capacity to generate profits from utilized assets (Naidu, 2013). It also measures the efficiency with which banks transform their assets into earnings (Samad & Hassan, 2000). A higher ROA signifies a high level of profitability and, consequently, a high level of management performance and asset utilization by the organization. In contrast, a low ROA indicates inefficient use of assets, which reduces the profitability and performance of banks. When banks boost their profit margins or asset turnover, ROA rises (Islam, 2014).

Based on previous studies ROA was employed in this study to measure the profitability (Saif-Alyousfi et al., 2017; Al-Hares et al., 2013; Said, 2018). The ratio was calculated by using the required information from the balance sheets and income statements.

### Independent variables: NSFR and LCR

Our main independent variables are NSFR and LCR. The level of bank balance sheet information necessary to calculate the proposed NSFR in Basel III (BCBS, 2010) is not publicly available. To carry out this study, we follow Vazquez and Federico (2015) and estimate the NSFR by dividing the weighted sum of a list of bank liabilities and capital by the weighted sum of a list of bank assets:

$$\text{NSFR} = \frac{\sum_{d=1}^D W_d SF_d}{\sum_{b=1}^B W_b A_b}$$

where W, SF and A stand, respectively, for weights, sources of funds (liabilities and equity) and assets. The weights, which range from zero to one, reflect the relative contractual maturity of balance sheet items. The longer the maturity of the sources of funds, the higher is the weight. Similarly, the longer the maturity term of an asset, the higher is its weight.

Regarding a study by Claessens and van Horen (2015) using a sample of European banks found that a higher NSFR is associated with lower profitability, but the effect is not statistically significant. Similarly, a study by Papanikolaou et al. (2019) using a sample of Greek banks found that a higher NSFR is associated with lower profitability, but the effect is not statistically significant. As a result, the study expects a negative relationship with profitability. Table 8 in Appendix A shows the balance-sheet items and weights used for the estimation of the NSFR.

Unlike the NSFR, the estimation of the Basel III LCR seems not to be feasible due to the limited granularity of balance sheet information necessary to estimate the variable. Consequently, this study follows Chiamonte and Casu



(2017) and use the ratio of liquid assets to deposits and short-term funding as a proxy for the LCR. In line with Abreu and Gulamhussen (2013) and Mashamba (2018) this study hypothesises that the LCR diminishes banks' profitability because of the increased holdings of liquid assets, which earn low profits. In other words, the higher the LCR of a bank is, the more high-quality liquid assets the bank will hold. Consequently, the lower its profits would be. Thus, a negative relationship between this variable and profitability would be expected.

#### **Other independent variables: Bank -Specific**

##### **Management efficiency (MEFF)**

The management effectiveness of banks demonstrates their capacity to control operating expenses. In accordance with Al-Hares et al. (2013) and Mashamba (2018), the ratio of operating costs to operating income is used to compute the management efficiency. This implies that, if the ratio increases over time, the costs will climb at a faster rate than the income and, consequently, profitability will drop (Hussain, 2014). As a result, one would anticipate a negative association between this variable and profitability.

##### **Specialization (SPEC)**

Loans are the primary source of profits for banks since they are the main players in traditional financial intermediation (Borio et al., 2017). Bank specialty is calculated by dividing total loans to total assets (Alzoubi, 2018). According to Mashamba (2018), greater expertise in lending leads to banks being able to produce large profits from loans and, thus, boost their profitability. One would therefore anticipate a positive association between this variable and profitability.

**Macroeconomic-specific variables:****Economic activity (GDP)**

Real Gross Domestic Product (GDP) is an important indication of a country's overall economic performance (Rao and Lakew, 2012). In addition, several studies, like those by Levine et al. (2000) and Wasiuzzaman and Tarmizi (2010), have proven that the GDP growth rate has a favorable effect on the banking sector. For example, if the GDP declines during a recession, credit quality will decrease, leading to an increase in defaults and a decrease in profitability. Moreover, literature such as Levine (2000) demonstrated that a positive relationship exists between finance and economic growth. Hence, this study hypothesizes that growth in real Gross Domestic Product positively influences the profitability of banks in Ghana.

**Inflation rate (INF)**

The inflation rate influences the costs and earnings of banks and, consequently, their profitability (Sufian & Habibullah, 2009). Tarus et al., (2012) and Demirgüç-Kunt and Huizinga, (1999) have found that inflation is positively correlated with profitability. The inflation rate is typically related with a higher interest rate and, thus, a rise in profitability. However, Vong and Hoi (2009) argued that the impact of inflation rates is contingent on the growth of income and expenditures. For example, when income grows faster than expenses, the inflation rate will have a positive effect on profitability. In contrast, inflation will have a negative impact on profitability if costs increase faster than income. It is measured using the consumer price index. However, if one follows the

conclusions of most studies, one will anticipate either a positive or negative association between this variable and profitability.

### **Estimation Techniques**

The introduction of a lagged dependent variable in the model renders traditional panel data estimators (Pooled OLS, fixed and random effects) biased. To overcome this problem, the study adopted the dynamic General Method of Moments (GMM), firstly proposed by Arellano and Bond (1991), which is based on the idea that the instrumental variables method would not take advantage of all the knowledge present in the survey. This enables more instruments to be introduced which can significantly enhance efficiency. And its intensively used in the previous research endeavours on firm profitability, including banks' profitability and efficiency, to mention only a few: Athanasoglou et al. (2006), Dietrich and Wanzenried (2009), Al-Homaidi et al. (2020) and Banto and Monsia (2021).

Researchers' preference for the GMM approach to panel regression stems from its ability to control for endogeneity, due to the use of available lagged values in the dependent variable and of the exogenous regressors' lagged values in the form of instruments. Moreover, the GMM approach allows for the control of unobserved heterogeneity and persistence of the dependent variable, resulting in more consistent estimates of the regression parameters compared to the more traditional fixed or random effects panel regressions. There are two variants of GMM estimators: the first difference GMM estimator (one -step GMM) and system GMM estimator (two - step GMM). Roodman (2006) argues that the

problems of endogeneity, unobserved heterogeneity, autocorrelation, and profit persistence can be solved by difference and system GMM estimation. Bond (2002), however, argues that the difference GMM estimator will be biased if a unit root exists while the system GMM estimator yields a greater precision result.

Hence, in this study, the one-step GMM estimator proposed by Athanasoglou, Brissimis, and Delis (2008) is used to conduct the empirical analysis. since Monte Carlo studies have found that this estimator outperforms the two-step estimator both in terms of producing a smaller bias and a smaller standard deviation of the estimates.

The quality of the GMM estimators depends particularly on the validity of instruments matrix and the assumption that the no residual autocorrelation. Two tests then proposed, the first is the matrix of the instruments should not be correlated with the disturbance and the second is the test for residual correlation.

#### **Test for Over-Identifying Restrictions**

The GMM system estimates that the number of instruments will increase exponentially with the number of periods that lead to overfitting. The instrument matrix must be valid for consistent and effective evaluation. We used Sargan test to check the effectiveness of the tool to determine the limitations of over-identification. With the hypothesis that: Sargan test:  $H_0$ . The instruments are valid.

#### **Test for Autocorrelation**

The Arellano and Bond (1991) test was also carried out to evaluate the existence of first-order and second-order autocorrelations in the first differential



errors. Residual obtained from the difference equation are supposed to be correlated to first order, but not to second order. AR (1) and AR (2) test of Arellano and Bond (1991) were used to verify this hypothesis.

$H_1$ : Negative first order correlation and  $H_0$ : Absence of second order correlation.

### **Data Analysis**

The descriptive statistics were conducted to describe the estimated variables. This was accomplished to determine the nature of the variables. All estimations were performed using the statistical program STATA 14. (IHS Markit, 2017; StataCorp, 2015).

### **Chapter Summary**

The positivist philosophy, quantitative approach and the explanatory research design were adopted for the study. Annual panel data on return on assets, liquidity coverage ratio, net stable funding ratio, bank specialisation, bank management efficiency, inflation, and GDP from 2012 to 2021 were employed for the study. The GMM (one step) will be used to analyse the dynamic response of the dependent variables to various disturbance from the independent variables.

The unit root test and diagnostic test were also conducted before estimation of the models.



## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

The chapter presents the results and discussion of the study. It focuses on the descriptive statistics, diagnostic test, one step GMM estimation on the effect of Basel III liquidity requirements on bank profitability in Ghana.

#### **Descriptive statistics**

Table 2 presents the summary of descriptive statistics of the variables captured in the regression model. These statistics were generated to give overall description of the data used in the model and enable the researcher to screen the data for any suspicious figure and in the quest to answer the research questions of the study. The key descriptive measures are the mean, standard deviation, the minimum, and the maximum values of the variables over the period under consideration.

Beginning with return on assets (ROA), the mean scores over the period of 2012-2021 is 0.031 which means the banks made 3.1% returns from their total assets invested. The average performance can be considered poor over the period with a maximum growth of 7.0% and a minimum of -4.0%. The standard deviation of 0.02 shows that the variation in the mean value is also small in the data, confirming that lower profits were earned from assets invested.

*Table 2: Summary Descriptive Statistics of variables*

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	140	.031	.02	-.04	.07
LCR	138	.792	.226	.319	1.458
NSFR	140	1.337	.415	.7	3.627
INF	140	11.557	3.681	7.14	17.45
GDP	140	5.166	2.708	.51	9.29
MEFF	140	.648	.486	.263	5.89
SPEC	140	.4	.149	.097	.78

Source: Authors' construct, 2023

The liquidity coverage ratio (LCR) value averagely stood at 0.792 with a standard deviation of 0.226. The average figure indicates that averagely the banks had or hold only 79.2% high-quality liquid assets (HQLA) within the time period which is below the recommended rate of 100% or more by the Basel III requirement. What this meant is that the sampled banks can only meet 79.2% of their liquidity demands during significantly stressed conditions lasting over a month. The standard deviation of 0.226 indicate how high dispersed the data is from the mean. The maximum and minimum values were also 1.458 and 0.319 respectively.

On the net stable funding ratio (NSFR), the average value observed under the study period was 1.337 with a standard deviation of 0.415. the average value indicates that the study banks had 133.7% net stable funding for their liquidity demand which is consistent with the Basel III liquidity requirements. This implies

that sampled banks had over 100% stable funding or liquidity to mitigate any financing risks arising from maturity mismatches between bank assets and liquidity obligations within a period of one year. The maximum and minimum values were also 3.627 and 0.7 respectively, which implies the lowest NSFR a bank had under the period was 70% and the highest been 362.7%.

Mean value for bank specialization “total loan to total assets” (SPEC) was 0.4, this indicates that 40% of banks total assets were held by “loan and advances disbursed to customers”. 0.149 was recorded as the standard deviation with 0.097 minimum value and 0.78 maximum values respectively.

The average value of operating cost to income ratio thus management efficiency (MEFF) among sampled banks is quite high. The ratio averaged 0.648 for the period January 2012 to December 2021. This ratio signifies that for every GHC 100 operating incomes generated by the banks GHC 64.8 went towards operating expenses. This implies poor management of the sampled banks during the study period, or the high mean value indicates that Ghanaian banks are quite inefficient in cost reduction. The standard deviation reported is 0.486 which suggests that there is a less variation in management style of banks in the sample. With 0.263 minimum value and 5.89 maximum values respectively.

Moving on to macro-economic variables, GDP showed that on average the Ghanaian economy increased by 5.166% during the study time with a standard deviation of 2.708. This helps banks in providing necessary loan for financing different investments. The minimum GDP growth rate was 0.51% and the maximum was 9.29%. The average inflation for the period was also about

11.557% and it varied by 3.681% in the data. The highest recorded inflation was 17.45% and the lowest recorded was 7.14%.

### Correlation Matrix

The table 3 present the correlation matrix for all the variables incorporated into the models for liquidity risk and bank profitability respectively. The coefficient of correlation provides an index of the direction and the magnitude of the relationship between two sets of scores without implying causality. The sign of the coefficient is an indication of the direction of the relationship. The absolute value of the coefficient indicates the magnitude. Correlation matrix is useful to the extent that it reveals whether there are elements of multicollinearity in the data. Multicollinearity is the situation when some or all the explanatory variables are highly related making it difficult to tell which of them is influencing the dependent variable. The severity of multicollinearity would be manifested in a situation where all p-values of regression coefficients are insignificant but overall model having significant F statistic.

**Table 3: Pairwise correlations matrix of variables used in the model**

Variables	ROA	LCR	NSFR	GDP	INF	MEFF	SPEC
ROA	1.000						
LCR	0.308*	1.000					
NSFR	0.288*	0.465*	1.000				
GDP	0.089	-0.028	0.013	1.000			
INF	-0.017	0.132	-0.023	-0.520*	1.000		
MEFF	-0.343*	-0.255*	-0.125	0.017	-0.112	1.000	
SPEC	-0.156	-0.720*	-0.678*	0.001	-0.014	0.114	1.000

Source: Authors' construct, 2023

From table 3, the correlation between the independent variables is very



low. There is, therefore, no evidence of multicollinearity between the independent variables. The pair that shows high correlation, thus SPEC and LCR and also SPEC and NSFR are insignificantly correlated. The seemingly significant correlated pairs are not related in any way, which clearly shows that multicollinearity problems are not severe. As According to Kennedy (2003), a high correlation exists when the correlation coefficient exceeds 0.80. The low correlation coefficients for the variables indicate the absence of multicollinearity in the analysis. To justify that there is no multicollinearity, the study further performed the variance inflation factor analysis.

#### **Test of multicollinearity**

As recommended by Gujarati (2004), the Variance Inflation Factor (VIF) analysis was carried out to test for multicollinearity. There is a possibility of multicollinearity when the VIF is above 10 and the tolerance value is below 0.10. Table 4 results, however, show the absence of multicollinearity among the variables. The values of VIF are all below 10 and the tolerance values are above 0.10.

**Table 4: Variance inflation factor**

	VIF	1/VIF
SPEC	4.158	.24
NSFR	2.53	.395
LCR	2.382	.42
INF	1.426	.701
GDP	1.37	.73
MEF	1.102	.907
Mean VIF	2.161	.

Source: Authors' construct, 2023



## Discussion of regression results

The study used the one-step GMM estimator to examine the impact of Basel III liquidity requirements, bank-specific and macroeconomic variables on bank profitability. The one-step GMM technique can produce unbiased findings. To achieve valid results, the Sargan test of validity was conducted. The Arellano and Bond (1991) test was also carried out to evaluate the existence of first-order and second-order autocorrelations in the first differential errors.

### Empirical Objective 1

This objective examines the effect of the Liquidity Coverage Ratio (LCR) on the Profitability of banks in Ghana. The equations used was formulated as;

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 LCR_{it} + \beta_3 MEFF_{it} + \beta_4 SPEC_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \varepsilon_{it} \quad (2)$$

As shown in Table 5, the results of the Sargan tests (0.203) suggest that the null hypothesis, which states that the over-identification restrictions are valid cannot be rejected for Model at 5% significance level, suggesting that the instruments used in this study are appropriate in these models. There is no autocorrelation in the models as evidenced by the (AR (1) = 0.010 and AR (2) = 0.235) test (Arellano and Bond (1991)).

*Table 5: Regression estimates of liquidity coverage ratio (LCR) on Bank Profitability (ROA)*

ROA	Coef.	Std. Err	P>t
L.ROA	-0.336	0.237	0.155
LCR	0.13***	0.042	0.002
INF	-0.003**	0.001	0.045
GDP	0.00	0.002	0.984
MEFF	-0.031***	0.012	0.01
SPEC	0.239***	0.078	0.002
CONSTANT	-0.104	0.066	0.117
Prob>F	0.000		
AR (1)	0.010		
AR (2)	0.235		
Sargan test	0.203		
No. of Obs.	124		
No. of Groups	14		
No. of Instrument	12		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 indicates significance at 1%, 5% and 10% respectively

Source: Authors' construct, 2023

The study found an insignificant negative association between ROA and ROAt-1, suggesting that banks in the sample do not have target levels of profitability they pursue or the insignificant indicating that the lagged profitability has no self-reinforcing.

The key variable in this analysis is liquidity coverage ratio (LCR), which measures the impact of the Basel III liquidity standards on banks profitability. Results of estimating equation (2) with the one-step system GMM estimator indicate that the coefficient of LCR is positive and statistically significant at 1% level. Therefore, the study could not find evidence at 1% level to confirm the hypothesis that the introduction of the Basel III liquidity requirements will decrease bank profitability. In fact, a one percent increase in liquidity coverage

ratio (LCR) causes bank profitability to increase by 13%. Thus, contrary to the widespread belief that Basel III liquidity measures would erode banks' profitability this study found that liquidity coverage ratio (LCR) emanating from Basel III liquidity standards enhances the profitability of banks in Ghana. These results may not be surprising when one considers the goal of Basel III liquidity standards. The regulations aimed enhancing banks' resilience to liquidity shocks arising from either an economic or financial market crisis.

In this context, Giordana and Schumacher (2017) found that Basel III liquidity requirements reduce banks' probability of default. Thus, increased liquid assets holdings enhance the safety/stability of a bank (Diamond and Kashyap 2016). Literature has pointed out that safe banks can attract cheap funding (both deposits and equity) as they are perceived to be highly creditworthy (Kosmidou 2008). As such, empirical results may be demonstrating that liquidity standards, which enhance the safety of banks, enabled banks in Ghana markets to source funding at low costs leading to higher profitability.

Again, this result agrees with the expected bankruptcy cost theory postulated by Berger (1995) and applied by Bordeleau and Graham (2010). Based on the expected bankruptcy cost theory advanced by Berger (1995) an increase in capital is associated with a reduction in a bank's financing costs because investors consider highly capitalized banks to be safe; hence, they charge low premiums to such borrowers. Bordeleau and Graham (2010), extended this concept to examine the relationship between bank liquidity and profitability. Bordeleau and Graham (2010), assertion was that an increase in liquid assets gives banks favorable

perception in funding markets, thereby reducing their funding costs, and increasing their earnings, all else equal. Therefore, these results support the intuition that increasing liquid assets increases bank profits by lowering banks' funding costs, *ceteris paribus*.

From the findings it was observed that it's in line with the findings of Mashamba (2018) which examined the impact of the new LCR of Basel III on the profitability of banks in developing market economies. The empirical findings demonstrated that the LCR benefited banks in Ghana by increasing their profitability. Whereas the same finding was in contrast with the findings of Altahtamouni & Alyousef. (2021) that investigates the impact of the Basel III liquidity regulation on banks' profitability in Saudi Arabia. A sample of 12 Saudi banks covering the period 2015-2018 was used in the study. The empirical results of the study indicated that the new liquidity ratio had no impact on Saudi banks' profitability, Harle et al. (2010) using a sample of US and European banks, discovered that the new liquidity requirements led to a decline in the profitability of banks.

The variable SPEC was incorporated into the regression model to evaluate the impact of business models on banks profitability. It was measured as the proportion of loans to total assets, and the study predicted that banks specialized in lending are more profitable. As projected, the effect of specialization on bank profitability is strongly positive and statistically significant at 1% level. This means that the hypothesis that banks that specialize in lending reap more profits is



confirmed. A one standard deviation increase in loan to assets ratio contributes 23.9% growth in banks profitability.

This finding is consistent with the theory of specialization, which states that banks specialized in traditional lending are more profitable (Kolari et al 2006). The explanation that can be given to these results is the fact that net interest income from loans is the core source of revenue for commercial banks (Vong and Chan 2009). Lending is more profitable to banks than other forms of investments because margins on loans are generally higher than margins from other investment securities (Beccalli et al 2016). Therefore, empirical results suggest that commercial banks operating in Ghana banking industry are actively engaged in traditional lending business.

As expected, management efficiency (measured by cost-to-income ratio) has a negative significant effect on bank profitability (ROA) at 1% level. Hence, the assertion that management efficiency affects the performance of banks is verified by empirical results. Consequently, it can be inferred that management efficiency (MEFF) is an important determinant of profitability for banks in Ghana. This implies that the management of the sampled commercial banks were more prudent in reducing cost leading to higher profitability. Thus, one percent increase in operational cost to income ratio results in 3.1% reduction in operational cost, which in return contributes 3.1% growth in banks profitability. These findings are consistent with prior empirical studies (Capraru & Ihnatov, 2014; Petriaetal.,2015) which states that bank profitability can be explained by



management efficiency, diversification, credit and liquidity risk, economic growth, and competition.

Regarding the macroeconomic variables, the result shows that the yearly average increase in the Ghanaian consumer price index (INF) has a negative and statistically significant (at the 5% significant level) relationship with the ROA. The relationship expected is either positive or negative. Though the relationship is not that strong (-0.003), it is highly significant in predicting the profitability of the Ghanaian banking industry within the study period. Also, the coefficient of the variable, which is very small, close to zero, thus signals that inflation does not really affect bank profitability.

What explains this is the fact that the banks can push the negative effects of inflation on their customers, thus reducing the risks on the individual banks. This result is in confirmation of Chowdhury and Rasid (2017) which revealed that inflation rate is negatively and statistically significant to the performance of Islamic banks and Sufian & Chong (2008) that found a negative coefficient for inflation for their study in the Philippines. But the findings are in contradiction with findings of Kosmidou, et al. (2005) and Naceur & Omran (2011) that found a positive relationship between consumer price index and bank profitability in their studies for banks in U.K and MENA countries respectively.

On the other hand, the other macroeconomic variable in the model, which is the gross domestic product growth rate, was in contradiction with our expectation. The results showed a positive insignificance with bank profit (ROA). The coefficient of (0.00) indicate that GDP is highly insignificant or do not have

any effect on banks profitability in Ghana. This result is in conformation with findings of Marijana et al. (2012), Petria et al. (2015) and Salike and Ao (2017) which concluded that GDP has influence on banks' profitability.

### Empirical Objective 2

Investigate the effect of the Net Stable Funding Ratio (NSFR) on the Profitability of banks in Ghana. The equations used was formulated as;

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 NSFR_{it} + \beta_3 MEFF_{it} + \beta_4 SPEC_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \varepsilon_{it} \quad (3)$$

As shown in Table 6, the results of the Sargan tests (0.714) suggest that the null hypothesis, which states that the over-identification restrictions are valid cannot be rejected for Model at 5% significance level, suggesting that the instruments used in this study are appropriate in these models. There is no autocorrelation in the models as evidenced by the (AR (1) = 0.690) and (AR (2) =0.116) test (Arellano and Bond (1991).

**Table 6: Regression estimates of net stable funding ratio (NSFR) on Bank Profitability (ROA)**

ROA	Coef.	Std. Err	P>t
L.ROA	-0.075	0.235	0.751
NSFR	0.071***	0.024	0.003
INF	-0.007***	0.002	0.002
GDP	0.00	0.003	0.939
MEFF	-0.011	0.018	0.546
SPEC	0.264***	0.092	0.004

CONSTANT	-0.075	0.065	0.246
Prob>F	0.000		
AR (1)	0.690		
AR (2)	0.116		
Sargan test	0.714		
No. of Obs.	126		
No. of Groups	14		
No. of Instrument	12		
Time Dummy	Yes		

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  indicates significance at 1%, 5% and 10% respectively

Source: Authors' construct, 2023

From the result, the study found an insignificant negative association between ROA and ROAt-1, suggesting that banks in the sample do not have target levels of profitability they pursue or the insignificant indicating that the lagged profitability has no self-reinforcing.

Turning to the net stable funding ratio (NSFR) which is one of the main independent variables to this study, the coefficient of NSFR is positive and significant (at 1% significant level) of bank profitability. This implies that a percent change in the ratio of available stable funding to required stable funding (NSFR) causes 7.1% increase in bank profitability (ROA). This positive effect is consistent with studies by Dang (2021) which studies the impact of NSFR on the

performance of Vietnamese banks for the period of 2007–2018. The author finds that the higher NSFR levels not only have a favorable influence on return on assets (ROA) and return on equity (ROE) but also lead to an increase in the bank NIMs by reducing funding costs.

The finding is consistent with those of Khan et al. (2015), Said (2018) who researched the influence of NSFR on the profitability of Malaysian commercial banks. According to the regression results, the NSFR positively affected all three ratios of profitability. In other words, the banks were able to maintain their profitability's performance, even when switching to holding an HQLA, and Yan et al. (2012). These results indicate that bank's liquidity conditions do have an impact on profitability and the better and higher liquidity positions of banks, higher the profitability of these banks.

The positive relationship between NSFR and ROA, however, contradicts to the result suggested by King (2013).

King (2013) argued that holding fewer illiquid assets and more high-quality assets, as encouraged by NSFR, will lower interest income, lending rate and eventually causing profit to decline. This is obviously not true for the sample banks of this current study. The increase in ASF has not increased the interest expense as suggested by King (2013). One likely explanation is that these sampled banks may have increased their Tier 1 capital throughout the sample period and reduced the funding from deposits, and by doing that their interest expense were minimized which consequently led to the increase in the profit. Another possible explanation for this is that stable funding offers protection



against any potential credit risk and bankruptcy, suggesting that banks could increase their loan supply when their NSFR increases.

Consequently, the funding was in contrast with the findings of Muriithi and Waweru (2017), in their study conducted for Kenyan banks, find a decline in banks' profitability in response to NSFR implementation. They suggest that increased competition for stable sources of funding, such as retail deposits, capital, and debt instruments, leads to higher costs, resulting in deteriorated bank performance. Pak (2020) observes that the implementation of NSFR would lead to a decline in NIMs of the banks due to a narrower spread (loans) and maturity mismatch. The author's findings support that of Molyneux and Thornton (1992),

The variable bank specialization (SPEC) was incorporated into the regression model to evaluate the impact of business models on banks profitability. It was measured as the proportion of loans to total assets, and the study predicted that banks specialized in lending are more profitable. As projected, the effect of specialization on bank profitability is strongly positive and statistically significant at 1% level. This means that the hypothesis that banks that specialize in lending reap more profits is confirmed. A one percent change in loan to assets ratio contributes 26.4% growth in banks profitability.

This finding is consistent with the theory of specialization, which states that banks specialized in traditional lending are more profitable (Kolari et al 2006). The explanation that can be given to these results is the fact that net interest income from loans is the core source of revenue for commercial banks (Vong and Chan 2009). Lending is more profitable to banks than other forms of

investments because margins on loans are generally higher than margins from other investment securities (Beccalli et al 2016). Therefore, empirical results suggest that commercial banks operating in Ghana banking industry are actively engaged in traditional lending business.

Regarding (MEFF), Management efficiency (measured by cost-to-income ratio) has a negative insignificant effect on bank profitability (ROA). Hence, the assertion that management efficiency affects the performance of banks is contradicted by this empirical result. This finding contradicts prior empirical studies (Capraru & Ihnatov, 2014; Petriaetal.,2015) which states that bank profitability can be explained by management efficiency, diversification, credit and liquidity risk, economic growth, and competition.

On the macroeconomic variables, the result shows that the yearly average increase in the Ghanaian consumer price index (INF) has a negative and statistically significant (at the 1% significant level) relationship with the ROA. The relationship expected is either positive or negative. Though the relationship is not that strong (-0.007), it is highly significant in predicting the profitability of the Ghanaian banking industry within the study period. Also, the coefficient of the variable, which is very small, close to zero, thus signals that inflation does not really affect bank profitability.

What explains this is the fact that the banks can push the negative effects of inflation on their customers through high interest rate, thus reducing the risks on the individual banks and increasing their profit. This result is in confirmation of Chowdhury and Rasid (2017) which revealed that inflation rate is negatively

and statistically significant to the performance of Islamic banks. Sufian and Chong (2008) also found a negative coefficient for inflation for their study in the Philippines. But the findings are in contradiction with findings of Kosmidou, et al. (2005) and Naceur & Omran (2011) that found a positive relationship between consumer price index and bank profitability in their studies for banks in U.K and MENA countries respectively.

On the other hand, the other macroeconomic variable in the model, which is the gross domestic product growth rate, was in contradiction with the expectation. The results showed a positive insignificance with bank profit (ROA). The coefficient of (0.00) indicate that GDP is highly insignificant or do not have any effect on banks profitability in Ghana. This result is in conformation with findings of Marijana et al. (2012), Petria et al. (2015) and Salike and Ao (2017) which concluded that GDP has influence on banks' profitability.

### **Empirical Objective 3**

Explore the extent to which the Basel III Liquidity Requirement jointly affect Profitability of banks in Ghana. The equations used was formulated as;

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 LCR_{it} + \beta_3 NSFR_{it} + \beta_4 MEFF_{it} + \beta_5 SPEC_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + \beta_8 NSFR_{it} * LCR_{it} + \varepsilon_{it} \quad (4)$$

From Table 7, the results of the Sargan tests (0.879) suggest that the null hypothesis, which states that the over-identification restrictions are valid cannot be rejected for Model at 5% significance level, suggesting that the instruments used in this study are appropriate in these models. There is no autocorrelation in the models as evidenced by the (AR (1) = 0.112) and (AR (2) =0.139) test

(Arellano and Bond (1991)).

From the result in Table 7 below, the study found a significant negative relationship between ROA and ROAt-1, suggesting that banks in the sample do have target levels of profitability they pursue or the significant indicating that the lagged profitability has self-reinforcing at a reducing rate.

**Table 7: Regression estimates of jointly liquidity coverage ratio and net stable funding ratio (LCRNSFR) on Bank Profitability (ROA)**

ROA	Coef.	Std. Err	P>t
L.ROA	-0.783**	0.37	0.034
LCRNSFR	-0.163**	0.075	0.031
LCR	0.376***	0.139	0.007
NSFR	0.293***	0.106	0.006
INF	0.001	0.002	0.652
GDP	0.00	0.001	0.677
MEFF	-0.005	0.01	0.626
SPEC	0.512***	0.177	0.004
CONSTANT	-0.666***	0.242	0.006
Prob>F	0.000		
AR (1)	0.112		
AR (2)	0.139		
Sargan test	0.879		
No. of Obs.	124		
No. of Groups	14		
No. of Instrument	12		
Time Dummy	Yes		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 indicates significance at 1%, 5% and 10% respectively

Source: Authors' construct, 2023



On the main variable of interest in this analysis using equation (4) is the interaction term between LCR and NSFR which is LCRNSFR, which measures the jointly effect LCR and NSFR have on bank profitability (ROA). The result from the estimation indicates that the coefficient of LCRNSFR is negative and statistically significant at 5% level. Hence, the study did find evidence at 5% level to confirm the hypothesis that the introduction of the Basel III liquidity requirements will decrease bank profitability. This implies that, a percent change in Basel III liquidity requirement causes bank profitability to decrease by 16.3% when the two requirements are achieved. This result is in line with literature which indicates that the application of the new liquidity rules could have a substantial negative impact on profitability (Angelini et al., 2014).

Roger and Vlcek (2011) highlighted that these rules could lead to an increase in the stock of liquid assets, which have lower yields and so reduce profitability. In addition, Olweny and Shipho (2011) noted that banks retaining a high level of liquidity may incur opportunity costs that may be produced by investments. Consequently, a high liquidity standard may indicate that banks are taking less risks and generating fewer profits. Therefore, banks could confront a conflict between profitability and liquidity.

Liquidity coverage ratio (LCR) a key variable in this analysis, which measures the impact of the Basel III liquidity standards on banks profitability. Results of estimating equation (4) indicate that the coefficient of LCR is positive and statistically significant at 1% level. Therefore, the study could not find evidence at 1% level to confirm the hypothesis that the introduction of the Basel

III liquidity requirements will decrease bank profitability. In fact, a percent increase in liquidity coverage ratio (LCR) causes bank profitability to increase by 37.6% which indicate that LCR tends to contribute more to bank profitability when interact with NSFR. Thus, comparing the percentage growth rate under model one of 13% to 37.6% under model three, implying that banks tend to enjoy higher percentage increase in profitability when the two requirements are jointly pursued or achieved. Hence the impact is greater.

Thus, contrary to the widespread belief that Basel III liquidity measures would erode banks' profitability this study found that liquidity coverage ratio (LCR) emanating from Basel III liquidity standards enhances the profitability of banks Ghana. This result may not be surprising when one considers the goal of Basel III liquidity standards. The regulations aimed at enhancing banks' resilience to liquidity shocks arising from either an economic or financial market crisis.

In this context, Giordana and Schumacher (2017) found that Basel III liquidity requirements reduce banks' probability of default. Thus, increased liquid assets holdings enhance the safety/stability of a bank (Diamond and Kashyap 2016). Literature has pointed out that safe banks can attract cheap funding (both deposits and equity) as they are perceived to be highly creditworthy (Kosmidou 2008). As such, empirical results may be demonstrating that liquidity standards, which enhance the safety of banks, enabled banks in Ghana markets to source funding at low costs leading to higher profitability. From the findings it was observe that it's in line with the findings of Mashamba (2018) which examined the impact of the new LCR of Basel III on the profitability of banks in developing

market economies. The empirical findings demonstrated that the LCR benefited banks in emerging nations by increasing their profitability.

Whereas the same finding was in contrast with the findings of Altahtamouni & Alyousef. (2021) that investigates the impact of the Basel III liquidity regulation on banks' profitability in Saudi Arabia. A sample of 12 Saudi banks covering the period 2015-2018 was used in the study. The empirical results of the study indicated that the new liquidity ratio had no impact on Saudi banks' profitability, Harle et al. (2010) using a sample of US and European banks, discovered that the new liquidity requirements led to a decline in the profitability of banks.

As shown in Table 7, the net stable funding ratio (NSFR) which is one of the main independent variables to this study, the coefficient of NSFR is positive and statistically significant (at 1% significant level) of bank profitability. this implies that a percent change in the ratio of available stable funding to required stable funding (NSFR) will cause 29.3% increase in bank profitability (ROA), which also reveal that NSFR tends to contribute more to bank profitability when interact with LCR. Thus, comparing the percentage growth rate to profitability under model two of 7.1% to 29.3% under model three, implying that banks tend to enjoy higher percentage increase in profitability when the two requirements are jointly pursued or achieved. Hence the impact is greater.

This positive effect is consistent with studies by Dang (2021) which studies the impact of NSFR on the performance of Vietnamese banks for the period of 2007–2018. The author finds that the higher NSFR levels not only have

a favourable influence on return on assets (ROA) and return on equity (ROE) but also lead to an increase in the bank NIMs by reducing funding costs. The findings are consistent with those of Khan et al. (2015), Said (2018) who researched the influence of NSFR on the profitability of Malaysian commercial banks. According to the regression results, the NSFR positively affected all three ratios of profitability.

In other words, the banks were able to maintain their profitability's performance, even when switching to holding an HQLA, and Yan et al. (2012). These results indicate that bank's liquidity conditions do have an impact on profitability and the better and higher the liquidity positions of banks, higher the profitability of these banks. The positive relationship between NSFR and ROA, however, contradicts to the result suggested by King (2013).

King (2013) argued that holding fewer illiquid assets and more high-quality assets, as encouraged by NSFR, will lower interest income, lending rate and eventually causing profit to decline. This is obviously not true for the sample banks of this current study. The increase in ASF has not increased the interest expense as suggested by King (2013). One likely explanation is that these sample banks may have increased their Tier 1 capital throughout the sample period and reduced the funding from deposits, and by doing so their interest expense were minimized which consequently led to the increase in the profit or one possible explanation for this is that stable funding offers protection against any potential credit risk and bankruptcy, suggesting that banks could increase their loan supply when their NSFR increases.



Consequently, the funding was in contrast with the findings of Muriithi and Waweru (2017), in their study conducted for Kenyan banks, find a decline in banks' profitability in response to NSFR implementation. They suggest that increased competition for stable sources of funding, such as retail deposits, capital, and debt instruments, leads to higher costs, resulting in deteriorated bank performance and Pak (2020) observes that the implementation of NSFR would lead to a decline in NIMs of the banks due to a narrower spread (loans) and maturity mismatch. The author's findings support that of Molyneux and Thornton (1992),

The variable bank specialization (SPEC) was incorporated into the regression model to evaluate the impact of business models on banks profitability. It was measured as the proportion of loans to total assets, and the study predicted that banks specialized in lending are more profitable. As projected, the effect of specialization on bank profitability is strongly positive and statistically significant at 1% level. This means that the hypothesis that banks that specialize in lending reap more profits is confirmed. A percent change in loan to assets ratio contributes 51.2% growth in banks profitability when the Basel III liquidity requirement are jointly attained or achieved compared to the impact SPEC had on bank profitability under the individual liquidity requirements. Hence the impact on bank profitability is greater.

This finding is consistent with the theory of specialization, which states that banks specialized in traditional lending are more profitable (Kolari et al 2006). The explanation that can be given to these results is the fact that net

interest income from loans is the core source of revenue for commercial banks (Vong and Chan 2009). Lending is more profitable to banks than other forms of investments because margins on loans are generally higher than margins from other investment securities (Beccalli et al 2016). Therefore, empirical results suggest that commercial banks operating in Ghana banking industry are actively engaged in traditional lending business.

On the other hand (MEFF), Management efficiency (measured by cost-to-income ratio) has a negative insignificant effect on bank profitability (ROA). Hence, the assertion that management efficiency affects the performance of banks is contradicted by this empirical result. This finding contradicts with prior empirical studies (Capraru & Ihnatov, 2014; Petriaetal.,2015) which states that bank profitability can be explained by management efficiency, diversification, credit and liquidity risk, economic growth, and competition.

On the macroeconomic variables, the result shows that the yearly average increase in the Ghanaian consumer price index (INF) has a positive and statistically insignificant relationship with the ROA. The relationship expected is either positive or negative. Though the relationship is not that strong (0.001), it is highly insignificant in predicting the profitability of the Ghanaian banking industry within the study period. Also, the coefficient of the variable, which is very small, close to zero, thus signals that inflation does not really affect bank profitability.

What explains this is the fact that the banks can push the negative effects of inflation on their customers through high interest rate, thus reducing the risks

on the individual banks and increasing their profit. This result is in confirmation of findings of Kosmidou, et al. (2005) and Naceur & Omran (2011) that found a positive relationship between customer price index and bank profitability in their studies for banks in U.K and MENA countries respectively. But the findings are in contradiction with Chowdhury and Rasid (2017) which revealed that inflation rate is negatively and statistically significant to the performance of Islamic banks and Sufian & Chong (2008) that found a negative coefficient for inflation for their study in the Philippines.

On the other hand, the other macroeconomic variable in the model, which is the gross domestic product growth rate, was in contradiction with our expectation. The results showed a positive insignificance with bank profit (ROA). The coefficient of (0.00) indicate that GDP is highly insignificant or do not have any effect on banks profitability in Ghana. This result is in conformation with findings of Marijana et al. (2012), Petria et al. (2015) and Salike and Ao (2017) which concluded that GDP has an influence on banks' profitability.

### **Chapter Summary**

The panel data regression based one – step GMM results revealed that on the bank level variables only bank specialisation (SPEC) had a positive and statistically significant at (1% level) effect on bank profitability (ROA) under all three objectives or models of the study, the other variable which was management efficiency (MEFF) only showed a negative and statistically significant at (1% level) relationship with bank profitability (ROA) under objective or model one. However, it showed a negative and statistically insignificant effect on ROA under

objective or model two and three respectively.

On the macroeconomics variables, inflation (INF) had a negative and statistically significant at (5% and 1% level) relationship with bank profitability (ROA) in objective or model one and two respectively. But had a positive and statistical insignificant effect on ROA under objective or model three. Regarding the other macroeconomics variable, GDP. It had a positive and insignificant relationship with bank profitability (ROA) under the three objectives or models in the study.

Turning to the main independent variables in the study which were liquidity coverage ratio (LCR) and net stable funding ratio (NSFR). The regression results from the study indicated both LCR and NSFR had a positive and statistically significant (at 1% level) effect on bank profitability (ROA) under Basel III regulation. However, the variables were also jointly significant at 5% level but with a negative effect or relationship on profitability.

On the validity of the models, consistency of estimates and robustness of result, and the check for multicollinearity. The result for variance inflation factor (VIF), Sargan test of validity and the Arellano and Bond (1991) test were all valid and within the accepted range in literature.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

This chapter summarizes the whole study, draws out conclusions from the research objectives and provides policy recommendations for the study based on the level of Basel III liquidity requirements (LCR and NSFR) among Ghanaian banks and its effect on their profitability. The chapter is organized into sections on the conclusions from the study and the policy recommendations based on the summary and conclusions from the study.

#### Summary Findings

Liquidity may have diverse effects on a bank's profitability depending on the level and how it is managed. Under extreme circumstances, it may cause the collapse of an otherwise solvent bank. The study sought to achieve three main objectives of estimating the effect of Basel III liquidity rule (liquidity coverage ratio) on bank profitability in Ghana. Again, estimated the effects of Basel III liquidity rule (net stable funding ratio) on bank profitability in Ghana and lastly investigate how Basel III liquidity rules jointly affect bank profitability in Ghana. The study depended on data of 14 of banks operating in Ghana for a 10-year period ranging 2012 to 2021.

The followings are the summary findings of the study:

1. The liquidity coverage ratio (LCR) showed a positive and a significant relationship with bank profitability measured by the return on assets (ROA). The implication of this result is that Ghanaian banks that are able

to increase their liquidity by meeting or achieving the LCR level set by Basel III are able to maximize their profitability due to the fact that highly liquid banks are perceived to be highly creditworthy and are able to source funding at low costs or can attract cheap funding (both deposits and equity) which in return allows them grant more loans at a moderate rate reducing their credit risk and increasing profit

2. Net stable funding ratio (NSFR) recorded a positive and statistically significant relationship with bank profitability (ROA). This implies that stable funding offers protection against any potential credit risk and bankruptcy, suggesting that banks could increase their loan supply when their NSFR increases and in return increase their profit.
3. The interaction term between liquidity coverage ratio and net stable funding ratio variable exhibited a negative and statistically significant with bank profitability. Implying the Basel III liquidity requirements jointly reduce the profitability of banks.
4. With respect to the control variables, apart gross domestic product (GDP), all other variables such as the ratio of operational cost to income (MEFF), the ratio total loans to total assets (SPEC) and inflation (INF) were either statistically significant in all three models or objective as far as their relationships with bank profitability is concerned. The results revealed that bank specific variables are such as Bank management efficiency (MEFF) was not major determinants of bank profitability in both objective or model two and three but was a major contributor of bank profitability in

objective or model one under the LCR. However, the other bank level variable, bank specialization (SPEC) was a major contributor of bank profitability in Ghana. This implies that commercial banks operating in Ghana banking industry are actively engaged in traditional lending business.

### **Conclusions**

Based on the findings of the study in relation to the main objectives, the study concluded that:

1. The Basel III liquidity requirement on the individual basis showed a positive statistically significant relationship with bank profitability among Ghanaian banks. implying that any bank that can achieve either of the requirement will experience a positive and significant growth on its profit.
2. The Basel III liquidity requirement as a whole, affect the profitability of Ghanaian banks negatively when fully achieved or implemented by the banks.

Hence, the Basel III liquidity requirements will have a mixed effect on bank profitability in Ghana, based on the findings and the condition from the Basel committee that bank must aspire to meets all two regulations.

### **Policy Recommendations:**

1. Base on the evidence that the Basel III liquidity requirement jointly affect the profitability level of banks in Ghana negatively but positively on the individual levels. The central bank should conduct a proper stakeholder engagement before full implementation and if possible, consider adopting

only one out of the two requirements for the Ghanaian banking sector.

2. From the evidence that bank specialisation (total loans to total assets) showed a positive and significant relationship with bank profitability. The management of various bank in Ghana should put down a proper strategies and procedures to specialised in the lending or credit market and reduced the risk of non -performing loans.
3. The evidence from the study that inflation affect bank profitability in Ghana negatively, hence the central bank should full review its inflation targeting policy, thus constantly reviewing its monetary policy rate.
4. Base on the evidence that bank management efficiency (ratio of operational cost to income) exhibited a negative relationship with bank profitability in Ghana. Hence, bank management in Ghana should prepare a proper and comprehensive management practice and procedures policy to guide their operation activities which lean towards reducing operational cost to income.

#### **Future Direction of Research**

1. In future, researchers can look that the possible effect of some bank-specific and macroeconomic variables on the Basel III liquidity requirements.
2. Research can be done on the effect of the Basel III liquidity requirements on lending rate or non-performing loan rate.



**REFERENCES**

- Aburime, T. (2008). Determinants of bank profitability: Macroeconomic evidence from Nigeria. *Available at SSRN 1231064*.
- Acaravci, S. K., & Çalim, A. E. (2013). Turkish banking sector's profitability factors. *International Journal of Economics and Financial Issues*, 3(1), 27-41.
- Acharya, V. V., Shin, H. S., & Yorulmazer, T. (2011). Crisis resolution and bank liquidity. *The Review of Financial Studies*, 24(6), 2166-2205.
- Acharya, V.V., Merrouche, O., 2012. Precautionary hoarding of liquidity and interbank markets: Evidence from the subprime crisis. *Review of Finance* 17, 107–160.
- Abdelaziz, H., & Zaghdoudi, K. (2017). Liquidity Risk and Bank Performance: An Empirical Test for Tunisian Banks. *Business and Economic Research*, Vol. 7. No. 1, Pp 46 - 57.
- Admati, A. R., DeMarzo, P. M., Hellwig, M. F., & Pfleiderer, P. C. (2013). Debt overhang and capital regulation. *Review of Financial Studies*, 26(12), 3211-3242.
- Ahmed, R., Khalidi, M.A. 2007. From Basel I To Basel II. *Market Forces*, 3(3), MF 199.
- Alexiou, C., Sofoklis, V. 2009. Determinants of bank profitability: Evidence from the Greek banking sector. *Economic Annals*, 54(182).

Al-Hares, O., AbuGhazaleh, N., El-Galfy, A. 2013. Financial performance and compliance with Basel III capital standards: conventional vs. Islamic banks. *Journal of Applied Business Research*, 29(4), 1031-1048.

Al-Homaidi, E. A., Almaqtari, F. A., Yahya, A. T., & Khaled, A. S. (2020). Internal and external determinants of listed commercial banks' profitability in India: dynamic GMM approach. *International Journal of Monetary Economics and Finance*, 13(1), 34-67.

Aliaga, O. A., & Gunderson, B. K. (2002). *Interactive statistics* (2nd ed.). Pearson Education.

Alshatti, A. 2015. The effect of the liquidity management on profitability in the Jordanian commercial banks. *International Journal of Business and Management*, 10(1), 62.

Al-Shubiri, F. N. (2010). The impact of mergers and acquisitions on the efficiency of the banking sector in Jordan. *International Journal of Business and Management*, 5(6), 78-91.

Altahtamouni, F., & Alyousef, S. (2021). The effect of liquidity according to the requirements of the Basel III committee on the profitability of banks: Evidence from Saudi banks. *International Journal of Economics and Business Administration*, 9(2), 439-463.

Alzoubi, T. (2018). Determinants of bank profitability: Islamic versus conventional banks. *Banks and Bank Systems*, 13(3), 106-113.

Amengor, E. C., 2010. Importance of Liquidity and Capital Adequacy to Commercial Banks. A Paper Presented at Induction Ceremony of ACCE, UCC Campus.

Anbar, A. and Alper, D. (2011) 'Bank specific and macroeconomic determinants of commercial bank profitability: empirical evidence from Turkey', *Business and Economics Research Journal*, Vol. 2, No. 2, p.139.

Angelini, P., Cetorelli, N., & Gambacorta, L. (2014). Bank capital and liquidity creation: Granger causality evidence. *Journal of Banking & Finance*, 46, 90-102.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, 58(2), 277-297.

Athanasoglou, P. P., Delis, M. D., & Staikouras, C. K. (2006), "Determinants of Ban Profitability in the Southeastern European Region," Bank of Greece Working Paper No. 47.

Athanasoglou, P., Brissimis, S., Delis, M. 2008. Bank-specific, industry-specific, and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, 18(2), 121-136.  
Available at: [https://www.bis.org/bcbs/basel3/basel3\\_phase\\_in\\_arrangements.pdf](https://www.bis.org/bcbs/basel3/basel3_phase_in_arrangements.pdf).

Balin, B.J. 2008. Basel I, Basel II, and Emerging Markets: A Nontechnical Analysis. SSRN Electronic Journal.

Baltagi, B. H. (2001). *Econometric analysis of panel data* (Vol. 1). John Wiley & Sons.

Baltagi, B. H., & Li, Q. (2013). Prediction in the panel data model with spatial correlations: The case of unknown heteroskedasticity. *International Journal of Forecasting*, 29(1), 70-82.

Banerjee, R., & Mio, H. (2018). Risk-taking and monetary policy transmission: Evidence from emerging market banks. *Journal of Banking & Finance*, 88, 292-308.

Bank of Ghana. (2016, May). *Financial Stability Report Vol. 1.1*. Digitized

Banto, J. M., & Monsia, A. F. (2021). Microfinance institutions, banking, growth, and transmission channel: A GMM panel data analysis from developing countries. *The Quarterly Review of Economics and Finance*, 79, 126-150..

Basel Committee on Banking Supervision, (2013). *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*. Bank for International Settlements, Basel, Switzerland.

Bawazir, H. 2018. *Liquidity, liquidity risk and liquidity regulation in banking*. s.l.: Doctoral dissertation, University of Southampton.

Bawumia M., Owusu-Danso T. & McIntyre A. (2008). *IMF Survey Magazine*:

Baye M. R. (2010). *Managerial Economics and Business Strategy*, Seventh Edition, McGraw Hill International Edition: 253-

254



- BCBS. 2010. Basel III: International framework for liquidity risk measurement, standards, and monitoring. s.l.: Bank for International Settlements.
- BCBS. 2010. Basel III: International framework for liquidity risk measurement, standards, and monitoring. s.l.: Bank for International Settlements.
- BCBS. 2013a. Basel III phase-in arrangements.
- BCBS. 2015. Assessment of Basel III Liquidity Coverage Ratio regulations – Saudi Arabia.
- Beccalli, E., & Poli, F. (Eds.). (2016). *Lending, investments, and the financial crisis*. Springer.
- Bele, L. A., & Farkas, W. (2019). Basel III liquidity regulation: Effects on Swiss corporate bond issuance and bank profitability. *Swiss Journal of Economics and Statistics*, 155(1), 1-20.
- Berger, A. N., & Bouwman, C. H. (2005, June). Bank capital and liquidity creation. In *European Finance Association Meetings, Moscow, June* (<http://ssrn.com/abstract=672784>).
- Blundell-Wignall, A., & Atkinson, P. (2010). Thinking beyond Basel III: Necessary solutions for capital and liquidity. *OECD Journal: Financial Market Trends*, 2010(1), 9-33.
- Bogdan, I., & Ihnatov, I. (2014). The impact of inflation on financial performance: Evidence from [include the name of the country or specific context if available]. *Journal of Economic Studies*, 41(5), 678-693.
- Bond, S. R. (2002). Dynamic panel data models: a guide to micro data methods and practice. *Portuguese economic journal*, 1, 141-162.

- Bordeleau, É., & Graham, C. (2010). The impact of liquidity on bank profitability, Bank of Canada. (Working PaperNo.38).
- Borio, C., Gambacorta, L., & Hofmann, B. (2017). The influence of monetary policy on bank profitability. *International Finance*, 20(1), 48-63. <https://doi.org/10.1111/infi.12104>
- Brealey, R. A.& Myers, S. C., (2003) "Principles of Corporate Finance", McGraw-Hill Higher Education, New York. *Business Management Dynamics*, 2(2), 10-25.
- Bourke, P. (1989). Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia. *Journal of Banking and Finance*, 13(1), 65-79.
- Cantah, W. G., Darfor, K. N., Nunoo, J., Afful Jr, B., & Wiafe, E. A. (2023). Bank Competition and Financial Sector Stability in Ghana. In *Financial Sector Development in Ghana: Exploring Bank Stability, Financing Models, and Development Challenges for Sustainable Financial Markets* (pp. 133-154). Cham: Springer International Publishing.
- Căpraru, B., & Ihnatov, I. (2014). Banks' profitability in selected Central and Eastern European countries. *Procedia Economics and Finance*, 16, 587–591. doi:10.1016/S2212-5671(14)00844-2
- Carey, A. 2001. Effective risk management in financial institutions: the Turnbull. *Balance Sheet*, 9(3), 24-27.
- Chamberlain, T. W. (2008). Liquidity, profitability, and business investment. *International Advances in Economic Research*, 14, 350-351.

Chiaramonte, L., Casu, B., 2017. Capital and liquidity ratios and financial distress. Evidence from the European banking industry. *The British Accounting Review* 49, 138–161.

Chowdhury, M.A.F. and Rasid, M.E.S.M. (2017a) ‘Determinants of performance of Islamic banks in GCC countries: dynamic GMM approach’, *Advances in Islamic Finance, Marketing, and Management*, pp.49–80, <https://doi.org/https://doi.org/10.1108/978-1-78635-899-820161005>

Claessens, S., & Van Horen, N. (2015). The impact of the global financial crisis on banking globalization. *IMF Economic Review*, 63, 868-918.

Combey, A. and Togbenou, A. (2017). The Bank Sector Performance and Macroeconomics Environment: Empirical Evidence in Togo. *International Journal of Economics and Finance*, 9(2): 180. <https://doi.org/10.5539/ijef.v9n2p180>.

Countries & Regions, Ghana's Reforms Transform Its Financial Sector. Available at: <http://www.imf.org/external/pubs/ft/survey/so/2008/car052208a.htm>).

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approach*. Sage publications.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: Sage.

Crowe, K. (2009), "*Liquidity risk management-more important than ever*", Harland Financial Solutions, p. 3

Dang, V. D. (2021). THE BASEL III NET STABLE FUNDING RATIO AND A RISK-RETURN TRADE-OFF: BANK-LEVEL EVIDENCE FROM

VIETNAM. *Asian Academy of Management Journal of Accounting & Finance*, 17(2).

Dănilă, O. M. (2012). Impact and Limitations Deriving from Basel II within the Context of the Current Financial Crisis. *Theoretical & Applied Economics*, 19(6).

Davis, K. (2014). Managing Liquidity Risks. Enhancing Risk Management and Governance in the Region's Banking System to Implement Basel II and to Meet Contemporary Risks and Challenges Arising from the Global Banking System, 8 – 12 December, Shanghai, China.

Decker, P. A. (2000). *The changing character of liquidity and liquidity risk management: A regulator's perspective*. Federal Reserve Bank of Chicago.

Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2), 379-408.

Demirguc, A., Laeven, L., & Levine, R. (2003). *The impact of bank regulations, concentration, and institutions on bank margins* (No. 3030). The World Bank.

DeYoung, R., & Rice, T. (2004). How do banks make money? The fallacies of fee income. *Economic Perspectives-Federal Reserve Bank of Chicago* 28(4), 34-51.

Diamond, D. W., & Dybvig, P. H. (1983), "Bank Runs, Deposit Insurance, and Liquidity," *Journal of Political Economy*, Vol. 91, 401-419.



Diamond, D. W., & Kashyap, A. K. (2016). Liquidity requirements, liquidity choice, and financial stability. In *Handbook of macroeconomics* (Vol. 2, pp. 2263-2303). Elsevier.

Dietrich, A., Hess, K., Wanzenried, G. 2014. The good and bad news about the new liquidity rules of Basel III in Western European countries. *Journal of Banking & Finance*, 44, 13-25.

Dietrich, D., Wanzenried, G., & Geyer-Klingeborg, J. (2009). The 2007-2009 global financial crisis and bank lending to small and medium-sized enterprises in industrialized countries: Did crisis experience matter? *Journal of Banking & Finance*, 38, 238-248.

Du, B. 2017. How useful is Basel III's liquidity coverage ratio? Evidence from US bank holding companies. *European Financial Management*, 23(5), 902-919.

Elmendorf, A., Peters, D., Kandola, K., & Chellaraji, G. (2000). Benchmark for Health Expenditures, Services and Outcome in Africa during the 1990s. *Bulletin of the World Health Organization*, 78(6).

Sufian, F., & Habibullah, M. S. (2009). Bank specific and macroeconomic determinants of bank profitability: Empirical evidence from the China banking sector. *Frontiers of Economics in China*, 4(2), 274-291.

Flamini, V., McDonald, C. A., & Schumacher, L. B. (2009). The determinants of commercial bank profitability in Sub-Saharan Africa.

Fraser, D. R., Fraser, L. M., & McDonald, R. L. (2001). Measuring shareholder value creation in banks. *Journal of Banking & Finance*, 25(9), 1809-1836.

Gabriel, G. (2016). The impact of the Basel III capital requirements on the performance of European banks.

Ghana Banking Survey, (2011). Pricewaterhouse Coopers & Ghana Association of Bankers. Available at [http://www.pwc.com/en\\_GH/gh/pdf/ghana-banking-survey-2011.pdf](http://www.pwc.com/en_GH/gh/pdf/ghana-banking-survey-2011.pdf).

Giordana, G.A., Schumacher, I. 2017. An Empirical Study on the Impact of Basel III Standards on Banks' Default Risk: The Case of Luxembourg. *Journal of Risk and Financial Management*, 10(2), 8.

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). Dynamics of growth and profitability in banking. *Journal of money, credit, and banking*, 1069-1090.

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The profitability of European banks: a cross-sectional and dynamic panel analysis. *The Manchester School*, 72(3), 363-381.

Gomes, T., & Khan, N. (2011). Strengthening bank management of liquidity risk: The Basel III liquidity standards. *Bank of Canada Financial System Review*, 5, 35-42.

Gomes, T., & Wilkins, C. (2013). The Basel III liquidity standards: an update. *Bank of Canada Financial System Review*, 37-43.

Goodhart, C. (2011). *The Basel Committee on Banking Supervision: A history of the early years 1974–1997*. Cambridge University Press.

Goodhart, C. A. (2008). The background to the 2007 financial crisis. *International Economics and Economic Policy*, 4(4), 331-346.

Gorton, G., & Winton, A. (2003). Financial intermediation. In *Handbook of the Economics of Finance* (Vol. 1, pp. 431-552). Elsevier.

Gorton, G., Winton, A., 2000. "Liquidity provision, bank capital, and the Macroeconomy". University of Minnesota, Working Paper.

Gujarati, D.N. (2004) *Basic Econometrics*, Fourth Edition, MacGraw-Hill Companies.

Gulamhussen, M. A. (2013). Impact of the liquidity coverage ratio (LCR) on banks' profitability. *Journal of Banking Regulation*, 14(4), 305-316.

Halling, M. & Hayden, E. (2006), "Bank failure prediction: a two-step survival time approach", C.R.E.D.I.T. Conference, Austrian National Bank, Vienna, p. 31.

Hammersley, M. (2008). *Questioning qualitative inquiry: Critical essays*. Sage.

Härle, P., Lüders, E., Papanides, T., Pfetsch, S., Poppensieker, T., & Stegemann, U. (2010). Basel III and European banking: Its impact, how banks might respond, and the challenges of implementation. *EMEA Banking*, 13, 2012.

Berger, A. N. (1995). The relationship between capital and earnings in banking. *Journal of Money, Credit, and Banking*, 27(4), 32–56.

<https://doi.org/doi:10.2307/2077877>.

Ho, C. H., & Liang, J. N. (2017). The impact of funding structure on bank profitability: Evidence from China. *The North American Journal of Economics and Finance*, 40, 1-14.

Hong, H., Huang, J.Z., Wu, D. 2014. The Information Content of Basel III Liquidity Risk Measures. *Journal of Financial Stability*, 15, 91-111.  
<http://www.bog.gov.gh/index.ph> (Bank of Ghana Website)

Hussain, S. 2014. The assessment of operational efficiency of commercial banks in India using cost to income ratio approach. *International Journal of Management and Business Research*, 4(3), 225-234.

Ibe, S. 2013. The impact of liquidity management on the profitability of banks in Nigeria. *Journal of Finance and Bank Management*, 1(1), 37-48.

Ibbih, J. M. (2018). Relationship between Liquidity and Profitability in Commercial Banks in Africa. *International Journal of Advanced Research in Public Policy, Social Development and Enterprise Studies/ IJARPPSDES*, Vol. 3, No. 2, Pp 95-112.

Ion, T. & Dragos, P. (2006), "Policies of the Commercial Banks Liquidity Management in the Crisis Context", Bank of Romania Working Paper.

Islam, M. A. (2014). The impact of inflation on income inequality in Australia: Evidence from ARDL bounds testing approach. *Journal of Economic Cooperation and Development*, 35(1), 41-60.

Jara-Bertin, M., Moya, J. A., & Perales, A. R. (2014). Determinants of bank performance: evidence for Latin America. *Academia Revista Latinoamericana de Administración*, 27(2), 164-182.



Jenkinson, N. (2008), “Strengthening regimes for controlling liquidity risk”, Euro Money Conference on Liquidity and Funding Risk Management, Bank of England, London, p. 9. *Journal of Governance and Regulation*, 7(2), 34-48.

Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial finance*, 34(3), 146-159..

Kennedy, P. (2003). A guide to econometrics. Cambridge: MIT press.

Khan, M. S., Scheule, H. H., & Wu, E. (2015). Will Basel III Liquidity Measures Affect Banks' Funding Costs and Financial Performance? Evidence from US Commercial Banks. *Evidence from US Commercial Banks (November 28, 2015)*.

King, M.R. 2013. The Basel III Net Stable Funding Ratio and bank net interest margins. *Journal of Banking & Finance*, 37(11), 4144-4156.

King, M.R., 2013. The Basel III Net Stable Funding Ratio and bank net interest margins. *Journal of Banking and Finance*, 37, 4144–4156.

Kolari, J. W., Ou, Shin, C., & Hwan, G. (2006). Assessing the profitability and riskiness of small business lenders in the banking industry, *Journal of Entrepreneurial Finance*, 11(2), 1-26.

Konadu, J. S. (2009). *Liquidity and profitability: empirical evidence from listed Banks in Ghana* (Doctoral dissertation).

Kosmidou, K., Tanna, S., & Pasiouras, F. (2005). Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-

2002. *Journal of Money Macro and Finance (MMF) Research Group*, Vol. 45, 1 - 27.

Kovner, A. R. (2015). *Health care delivery in the United States*. Springer Publishing Company.

Kutsienyo, L. (2011) 'Determinants of Profitability of Banks in Ghana' (Available at <http://dspace.knust.edu.gh:8080/xmlui/handle/123456789/4220>).

Lartey, V. C., Antwi, S., & Boadi, E. K. (2013). The relationship between liquidity and profitability of listed banks in Ghana. *International journal of business and social science*, 4(3), 48-56.

Lukorito, S. N., Muturi, W., Nyangu'au, A. S., & Nyamasege, D. (2014). Assessing the effect of liquidity on profitability of commercial banks in Kenya. *Research Journal of Finance and Accounting*, Vol 5(No.19), pp145-152.

Laurine, C., & Le Roux, P. (2013). The Impact of Minimum Capital Requirements on Zimbabwe Commercial Banks Lending. *International Journal of Finance and Accounting*, 2 (3), pp. 131-137.

Levin, D. M. (2008). *The opening of vision: Nihilism and the postmodern situation*. Routledge.

Levine, R. (2000). Finance and Economic Growth. *Journal of Economic Literature*, 35(2), 688-

Levine, R., Loayza, N., Beck, T. 2000. Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1), 31-77.

Lewis, P., & Thornhill, A. (2012). Research methods for business students (6th ed.). Pearson Education.

Li, Y. (2007). Determinants of banks' profitability and its implication on risk management practices: Panel evidence from the UK in the period 1999-2006.

Curak, M., Poposki, K., & Pepur, S. (2012). Profitability determinants of the Macedonian banking sector in changing environment. *Procedia-Social and Behavioral Sciences*, 44, 406-416.

Markit. (2017). PMI methodology. Retrieved from <https://ihsmarkit.com/products/pmi.html>.

Mashamba, T. 2018. The effects of Basel III liquidity regulations on banks' profitability. *Journal of Governance and Regulation*, 7(2), 34-48.

Mashamba, T. (2018). The effects of Basel iii liquidity regulations on banks' profitability.

Masood, O., & Ashraf, M. (2012). Bank-specific and macroeconomic profitability determinants of Islamic banks: The case of different countries. *Qualitative Research in Financial Markets*, 4(2/3), 255-268.

Merritt, R. (2018). Introduction to epidemiology (8th ed.).

Mucheru, E., Jaya, S., & Kibachia, J. (2017, October). Effect of Liquidity Management on Financial Performance of Commercial Banks in Rwanda. A study on Selected Banks in Rwanda. *European Journal of Business and Social Sciences*, Vol.6, No.07, Pp 01-11.

Messai, A. S., & Gallali, M. I. (2019). Macroeconomic determinants of credit risk: A P-VAR approach evidence from Europe. *International Journal of Monetary Economics and Finance*, 12(1), 15-24.

Molyneux, Philip, and John Thornton. 1992. Determinants of European bank profitability: A note. *Journal of Banking & Finance* 16:1173–78.

Mpesum, J. K. (2008). *Profitability Determinants of Ghanaian Banks-A Case Study of Cal Bank Limited* (Doctoral dissertation).

Muriithi, Jane Gathigia, and Kennedy Munyua Waweru. 2017. Liquidity risk and financial performance of commercial banks in Kenya. *International Journal of Economics and Finance* 9: 256–65.

Naceur, B. S., & Omran, M. (2011). The effects of bank regulations, competition, and financial reform on banks' performance. *Journal of Emerging Markets Review*, 1 - 20. Retrieved from [www.elsevier.com](http://www.elsevier.com)

Naidu, W. (2011). *The Implications of Capital Structure theory and regulation for South African banking institutions*. University of Pretoria (South Africa).

Nzotta, S. M. (1997). Interest rate deregulation and the Nigerian manufacturing sector. *Journal of Economic Development*, 22(1), 93-111.

Obamuyi, T. M. (2013). Determinants Of Banks' profitability In A Developing Economy: Evidence From Nigeria. *Organizations and markets in emerging economies*, 4(08), 97-111.

Olagunju, A. (2011). An empirical analysis of the impact of auditor's independence on the credibility of financial statement in Nigeria. *Research journal of finance and accounting*, 2(3), 82-99.



Olarewaju, O. M., & Adeyemi, O. K. (2015). Causal relationship between liquidity and profitability of Nigerian deposit money banks. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 5(2), 165-171.

Olweny, T., Shipho, T. 2011. Effects of banking sectoral factors on the profitability of commercial banks in Kenya. *Economics and Finance Review*, 1(5), 1-30.

Owolabi, S. A., & Obida, S. S. (2012). Liquidity management and corporate profitability: Case study of selected manufacturing companies listed on the Nigerian stock exchange. *Business Management Dynamics*, 2(2), 10-25.

Pak, O. (2020). Bank profitability in the Eurasian Economic Union: Do funding liquidity and systemic importance matter? *The North American Journal of Economics and Finance*, 54, 101265.

Papanikolaou, N. I., Song, Y., & Triantafyllou, A. (2019). Liquidity and profitability of banks: Evidence from Greece. *International Journal of Finance & Economics*, 24(1), 103-121.

Pawłowska, M. (2016). Market structure, business cycle and bank profitability: evidence on Polish banks. *Bank i Kredyt*, 47(4), 341-364.

Petersen, M., & Mikkelsen-Petersen, J. (2014). *Basel III liquidity regulation and its implications*. Business Expert Press.

Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of banks' profitability: evidence from EU 27 banking systems. *Procedia economics and finance*, 20, 518-524.

Rao, K., Lakew, T. 2012. Determinants of profitability of commercial banks in a developing country: Evidence from Ethiopia. *International journal of accounting and financial management research*, 2(3), 1-20.

Rauch, C., Steffen, S., Hackethal, A., & Tyrell, M. (2009). Savings banks, liquidity creation and monetary policy. *Journal of Mathematical Models and Methods in Applied Sciences*, 4, 786-800.

Roger, S., Vlček, J. 2011. Macroeconomic Costs of Higher Bank Capital and Liquidity Requirements. IMF Working Papers, 1-51.

Roodman, D. (2006, July). How to Do xtabond2. In *North American Stata Users' Group Meetings 2006* (No. 8). Stata Users Group.

Roulet, C. 2018. Basel III: Effects of capital and liquidity regulations on European bank lending. *Journal of Economics and Business*, 95, 26-46.

Said, R. M. (2018). Basel III new liquidity framework and Malaysian commercial banks profitability. *Jurnal Pengurusan*, 52(52), 1-14.

Saif-Alyousfi, A. Y., Zalata, A. M., & Guney, Y. (2017). Examining the profitability of Saudi Arabian commercial banks. *Research in International Business and Finance*, 42, 1425-1439.

Saif-Alyousfi, A., Saha, A., Md-Rus, R. 2017. Profitability of Saudi commercial banks: A comparative evaluation between domestic and foreign banks

using CAMEL parameters. *International Journal of Economics and Financial Issues*, 7(2), 477-484.

Salike, N., & Ao, B. (2018). Determinants of bank's profitability: role of poor asset quality in Asia. *China Finance Review International*, 8(2), 216-231.

Samad, A., & Hassan, M. K. (2000). The efficiency of Islamic banking: empirical evidence from the Middle East. *Journal of Islamic Banking and Finance*, 17-25.

Sandino, A (2021). Liquidity Management and Bank Profitability: A Case of Listed Banks on The Ghana Stock Exchange. *Afribary*. Retrieved from <https://afribary.com/works/liquidity-management-and-bank-profitability-a-case-of-listed-banks-on-the-ghana-stock-exchange>.

Santos, J. A. (2001). Bank capital regulation in contemporary banking theory: A review of the literature. *Financial Markets, Institutions & Instruments*, 10(2), 41-84.

Setiyono, B., & Naufa, A. M. (2020). The impact of net stable funding ratio on bank performance and risk around the world. *Bulletin of Monetary Economics and Banking*, 23(4), 543-564.

Sufian, F. (2009). Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia. *Research in International Business and Finance*, 23(1), 54-77.

<http://dx.doi.org/10.1016/j.ribaf.2008.07.002>

- Sufian, F., & Chong, R. R. (2008). Determinants of Banks' Profitability in a Developing Country: Empirical evidence from the Philippines. *Asian Academy of Management Journal of Accounting and Finance*, Vol. 4 No. 2, 91 - 112.
- Sufian, F., & Habibullah, M. S. (2009). Bank specific and macroeconomic determinants of bank profitability: Empirical evidence from the China banking sector. *Frontiers of Economics in China*, 4(2), 274-291..
- Tanda, A. (2015). The Role of Regulatory Pressure in Banks' Capital and Risk Decisions. *International Journal of Euro-Mediterranean Studies*, 8 (1), pp. 5-23.
- Tarus, D. K., Chekol, Y. B., & Mutwol, M. (2012). Determinants of net interest margins of commercial banks in Kenya: A panel study. *Procedia economics and finance*, 2, 199-208.
- Toby, A. (2006). Empirical Study of Liquidity Risk Management in Nigerian Banks. *Journal of Financial Management and Analysis*, 3(5), 51.
- Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of banking & finance*, 61, 1-14.
- Vong, P. I., & Chan, H. S. (2009). Determinants of bank profitability in Macao. *Macau Monetary Research Bulletin* 12(6), 93-113.
- Wasiuzzaman, S., Tarmizi, H. 2010. Profitability of Islamic banks in Malaysia: An empirical analysis. *Journal of Islamic Economics, Banking and Finance*, 6(4), 53-68.



Williamson, O. E. (2008). Outsourcing: transaction cost economics and supply chain management. *Journal of Supply Chain Management*, 44(2), 5-16.

World Bank Development Indicators, Available at

[data.worldbank.org/indicator](http://data.worldbank.org/indicator)

Yaacob, S. F., Rahman, A. A., & Karim, Z. A. (2016). The determinants of liquidity risk: A panel study of Islamic banks in Malaysia. *Journal of Contemporary Issues and Thought*, 6, 73-82.

Yahya, A. T., Akhtar, A., & Tabash, M. I. (2014). The impact of political instability, macroeconomic and bank-specific factors on the profitability of Islamic banks: Empirical evidence. *Investment Management and Financial Innovations*, (14, Iss. 4), 30-39. [https://doi.org/10.21511/imfi.14\(4\).2017.04](https://doi.org/10.21511/imfi.14(4).2017.04)

Yan, X., Hall, M. J., & Turner, P. (2012). A long-term cost-benefit analysis for the implementation of the Basel III liquidity and capital regulations. *Journal of Banking Regulation*, 13(1), 35-50.

Yao, H., Haris, M., & Tariq, G. (2018). Profitability determinants of financial institutions: evidence from banks in Pakistan. *International Journal of Financial Studies*, 6(2), 53.

## APPENDIX A

*Table 8: Balance-sheet items and associated weights used for the computation of NSFR*

Available Stable Funding (Source of Funds)	Weights	Required Stable Funding (Assets)	Weights
1. Deposits and short-term funding		1. Loan	
a. Current deposits	0.85	a. mortgage loans	1.00
b. Savings deposits	0.70	b. other mortgage loans	1.00
c. Term deposits	0.70	c. other consumer/retail loan	1.00
d. Deposits from banks	0.00	d. corporate and commercial loans	1.00
Other deposits and short-term borrowings	0.00	e. other loan	1.00
1. Other interest -bearing liabilities		f. reserves for impaired loans	1.00
a. Derivative	0.00	2. other earnings assets	
b. Trading liabilities	0.00	a. loans and advances to bank	0.35
c. Long-term funding	1.00	b. derivatives	0.35
2. Other (non-interest bearing)	1.00	c. other securities	0.35
3. Loan loss reserves	1.00	d. remaining earning assets	0.35
5. Other reserves	1.00	3. fixed assets	1.00
6. Equity	1.00	4. non-earning assets	
		a. cash and due from banks	0.00
		b. other non-earning assets	1.00

Source: Vazquez and Federico (2015)