

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
KUMASI**

**AN ASSESSMENT OF LIQUIDITY RISK AMONG LISTED COMMERCIAL
BANKS IN GHANA**

**A THESIS SUBMITTED TO THE KWAME NKRUMAH UNIVERSITY OF
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ABSTRACT

The aim of the current study was to explore the liquidity risk of four listed banks. Specifically the current study intended to evaluate evaluate the influence of predictors such as bank size on liquidity risk and also assess the liquidity risk of the chosen banks over a time of ten years. The study used panel data from the four commercial and listed banks in Ghana spanning the period 2002 to 2011. The financial gap ratio (FGAPR) and the net loans to total deposits (NLD) ratio (dependent variables) were used to evaluate liquidity risk among the banks. The panel data was analysed to evaluate the strength of association between these ratios and predictors of bank liquidity (independent variables), i.e., bank size, bank concentration, bank ownership, risky and less risky liquid assets, non-deposits dependence, and inflation. The panel data regression results have revealed that bank size, the rate of inflation and non-deposit dependence had a positive and a statistically significant relationship with liquidity risk while liquid assets and bank concentration in the industry show a negatively significant relationship with bank liquidity risk. The study recommends among other things, that banks in Ghana place particular importance into monitoring the indicators and determinants that were identified to impact liquidity positively or adversely, i.e., the size of the bank, the components of liquid assets which may be either risky or less risky liquid assets, non-deposit dependence, industry concentration and the change in inflation. The study further recommends a yearly update of liquidity risk assessment in light of the burgeoning competition among banks in Ghana and as a follow up, the study also suggests measuring how liquidity risk relates or impacts on profitability among these listed banks

DEDICATION

To the Ancient of Days, Jehovah Almighty and our Risen Saviour. You have brought me this far, giving me strength and guidance through the journey. To you be all the glory and adoration now and forever more.

To my beloved wife, you will forever live in my heart. God bless you for your support.

You have been my bedrock and encouragement

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TABLE OF CONTENTS

DECLARATION.....	i
ABSTRACT	ii
DEDICATION.....	iii
ACKNOWLEDEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES.....	viii
CHAPTER ONE	1
INTRODUCTION.....	1
1.0. Introduction	1
1.1. Background	1
1.2. Problem Statement	2
1.3. Justification	5
1.4. Aims and Objectives.....	6
1.5. Expected Outcome	6
1.6. Organization of Chapters.....	6
CHAPTER TWO.....	8
LITERATURE REVIEW	8
2.0 Introduction	8
2.1 Banking in Ghana.....	8
2.2. Liquidity Risk Concept	12
2.3. History of Liquidity Risk	15
2.4 Determinants of Liquidity Risk.....	17

2.5 Measurement of Liquidity Risk.....	22
2.6 Liquidity Risk and Bank Profitability	25
CHAPTER THREE.....	28
METHODOLOGY	28
3.0. Introduction	28
3.1 Sources of Data and Scope Of Study	28
3.2 Variables of Interest.....	29
3.2.1 Dependent Variable(S)	29
3.2.1.1 Liquidity Risk (Fgapr & Nld).....	29
3.2.2 Explanatory Variables.....	30
3.2.2.1. Bank Size (Size)	30
3.2.2.2 Liquid Assets Ratio (Rla & Lrla)	31
3.2.2.3 Non-Deposits Dependence (Ndd)	32
3.2.2.4 Ownership Type (Own)	33
3.2.2.5 Bank Concentration (Conc).....	33
3.2.2.6 Macroeconomic Variable (Infl)	34
3.3 Conclusion.....	35
CHAPTER FOUR.....	36
PRESENTATION OF DATA AND ANALYSIS	36
4.0 Introduction	36
4.1 Determinants of Liquidity Risk.....	36
4.2 Correlation Matrix.....	38
4.3 Conclusion	44
CHAPTER FIVE	45

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS.....	45
5.0 Introduction.....	45
5.1 Summary Of Findings.....	45
5.2 Conclusion	47
5.3. Recommendations.....	48
REFERENCES	50

LIST OF TABLES

Table 1. Relationships between the Financial Gap Ratio and Determinants of Bank Liquidity	38
Table 2. Relationship Between Net-Loans-to-Deposits and Determinants of Bank Liquidity	44

CHAPTER ONE

INTRODUCTION

1.0. Introduction

This part is concerned with giving a brief outline of the study including some foundation data on the point of interest, a depiction of the issue planned to be mulled over and why it is important to conduct this study. It likewise incorporates the significant inquiries the study plans to reply to add on to existing information or writing.

1.1. Background

For a long time, banks have assumed a fundamental part in the money related framework. This core function has persisted. However the types of banking have changed alongside the needs of the economy. Fraser *et al* (2001) contend that banks give money related intercession and other budgetary administrations which are needed for monetary development, in foresight of winning benefits from these exercises. The bank's central objective along these lines, similar to some other business for benefit, is to expand the abundance of shareholders.

The significance of banks in the financial advancement and development of a nation can't be disparaged. A solid budgetary framework is an essential for fitting money related intercession prompting practical private venture and the advancement of business enterprise.

The banking industry has seen numerous changes and approaches over the previous decade. The competitive landscape and operational environment have become dynamic.

There is uplifted weight on banks to contend as banking has turned out to be more incorporated into the worldwide budgetary framework. Keeping in mind the end goal to withstand monetary stuns and to keep up budgetary dependability, it is basic to distinguish the determinants that impact bank liquidity in Ghana.

Liquidity measures the capacity of banks to meet transient commitment or duties when they fall due. Customarily, banks take deposits from clients and give out loans. Hence, the proportion of bank's loans to client deposits is utilized as an intermediary for liquidity. Liquidity is a prime concern for banks and the deficiency of liquidity can trigger banking disappointments. Banking account controllers likewise see liquidity as a noteworthy concern. This is on account that banks without adequate liquidity to meet requests of their investors are in danger of encountering bank run. Holding resources in a profoundly fluid shape has a tendency to lessen wage as fluid resources are connected with lower rates of return. For example, money which is the most fluid of all assets is a non-acquiring resource. It would hence be normal that higher liquidity would contrarily relate with profitability. To be sure, Molyneux *et al.*, (1992) and Guru *et al.* (1999) found that a negative relationship exists between the level of liquidity and profitability. On the other hand, Bourke (1989), and Kosmidou *et al.* (2005) discovered a critical positive relationship between liquidity and bank benefits. Along these lines, conclusions on the effect of liquidity on bank profitability is vague and may require further experimental work.

1.2. Problem Statement

As indicated by Greuning and Bratanovic (2009), a bank confronts liquidity risks when it is unable to productively oblige the reclamation of deposits and different liabilities to

cover financing increments in the loan and investment portfolio. These authors go further to recommend that a bank has sufficient liquidity potential when it can acquire required deposits (by expanding liabilities, designating more securities, or offering resources) quickly and at a sensible expense. The Basel Committee on Bank Supervision, in its June 2008 consultative paper, characterized liquidity as the capacity of a bank to store increments in resources and meet commitments as they get to be expected, without causing inadmissible misfortunes. Bessis (2010) however considers liquidity risk from three particular circumstances. The primary point is the place the bank experiences issues in raising trusts at a sensible expense because of conditions identifying with exchange volumes, level of premium rates and their changes and the troubles in subsidizing a counter-party. The second point takes a gander at liquidity as a well-being pad which serves to pick up time under troublesome circumstances. For this situation, liquidity risk is characterized as a circumstance where fleeting resource qualities are not adequate to match transient liabilities or startling outpourings. The last edge from where liquidity risk is classified is the extreme circumstance. Such a circumstance can emerge from occasions of expansive misfortunes which unmask liquidity issues and raises questions on the fate of the bank. Such questions can bring about monstrous withdrawal of deposits or shutting of credit lines by different foundations which attempt to secure themselves against a conceivable default. Both can create a fierce liquidity emergency which conceivably ends in bankruptcy. Many components influence a bank's own liquidity and thus influence the measure of liquidity they can make. These variables have a fluctuating level of impact on the harmony between liquidity risk and liquidity creation, or a bank's liquidity

administration. A bank's benefits and liabilities assume a focal part in their adjusting of liquidity risk and creation. A bank's liabilities incorporate every one of the banks wellsprings of deposits . Banks have three primary wellsprings of deposits: store records, obtained finances, and long haul reserves. The sums and wellsprings of deposits obviously influence the amount of liquidity risk a bank has and the amount of liquidity it can make. The simpler a bank can get funds to support itself, the less risk it has and the higher measure of deposits it holds and the more liquidity it can make. Liquidity is important for banks to make up for expected and surprising asset report changes and to give trusts to development (Greuning and Bratanovic, 2009). Santomero (1995) notwithstanding, places that while some would incorporate the need to get ready for development and surprising extension of credit, the danger here ought to be seen all the more effectively as the potential for financing emergency. Such a circumstance would unavoidably be connected with a surprising occasion, for example, an expansive charge off, loss of certainty, or an emergency of national extent. Viable liquidity risk management consequently aides to guarantee a bank's capacity to meet income commitments, which are indeterminate as they are influenced by external influences and other operators' conduct. The Basel Committee on Bank Supervision consultative paper (June 2008) states that the central part of banks in the development change of fleeting deposits into long haul advances makes banks characteristically defenseless against liquidity risks, both of an establishment particular nature and that which influences markets all in all. A liquidity deficit at a solitary bank can have framework-wide repercussions and consequently liquidity risk administration is of fundamental significance to both the controllers and the business players. The cost of

liquidity is on the other hand an element of economic situations and the market's perceptions of the inalienable danger of a borrowing organization (Greuning and Bratanovic, 2009). So if there is a national emergency, for example, intense cash deficiency or decay, impression of the bank's credit standings falls apart, raising support by the bank turns out to be abruptly vital and repetitive or has unforeseen vacillation, subsidizing turns out to be all the more expensive. Money related business improvements in the previous decade have expanded the unpredictability of liquidity danger and its administration..

1.3. Justification

Eljelly (2004) has underlined that the working capital approach to liquidity management has long been the conspicuous strategy used to arrange and control liquidity. The working capital incorporates all things demonstrated on the bank's monetary records as "transient or current assets" while net working capital prohibits current liabilities. This measure is viewed as a helpful device in getting to the accessibility of deposits to meets current operations of organizations. Be that as it may, rather than utilizing working capital as a measure of liquidity, numerous experts advocate the utilization of ratios, which have the upside of making pattern or cross-sectional correlation conceivable. A definitive measure of the effectiveness of liquidity and its control is the impact this has on the benefits of its shareholders.

Raheman and Nasr (2007) have expressed that a definitive goal of any firm, including banks, is to expand benefit. In spite of the fact that benefit is vital, protecting liquidity is an essential goal as well. The issue is that expanding benefits at the expense of liquidity can convey major issues to the bank. There must be an trade-off between these

two and one must not proceed at an advantage or at the expense of the other. In the likelihood that liquidity is not checked, banks stand the chance of indebtedness or bankruptcy.

In lieu of this, shareholders and different partners are keen on the bank's liquidity patterns. This is to help them settle on the right choices on the extent of the measure of cash and the organizations to put resources into. It also helps gauge and determine the possibilities of such organizations before conferring themselves to business dealings

1.4. Aims and Objectives

The aim of the current study was to explore the liquidity risk of four listed banks. Specifically the current study intended to

1. Evaluate the influence of predictors such as bank size on liquidity risk
2. Evaluate the liquidity risk of the chosen banks over a time of ten years

1.5. Expected Outcome

The present study was relied upon to provide more insight into the condition of liquidity of customary banks that have been in presence and operation for as far back as ten years.

1.6. Organization of Chapters

The study is organized into five chapters. It allocates the chapters to the following segments of the study.

CHAPTER ONE: This is assigned to the introduction of the study. It contains the background of study, the statement of the problem, what the study aims to achieve, the significance of the study, the limitations of the study, and its expected outcome.

CHAPTER TWO: Reviews relevant literature of other authors in relation to the topic under study. The literature review explains basic terminologies and deliberations to give good picture of what liquidity management is.

CHAPTER THREE: This chapter concentrates on the methodology of the study. It explains the various methods of data collection employed and the tools for analysis.

CHAPTER FOUR: This chapter deals mainly with the presentation of data and analysis of data collected. To achieve this graphical presentations were made for clarity of study results.

CHAPTER FIVE: This deals with the conclusions, summary of findings and recommendations from the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter deals with existing literature related to banking and liquidity. The chapter first presents banking in Ghana including its introduction and evolution to its current state, and its contributions to economic development. It also captures the challenges faced by players in the industry and how these challenges latch onto liquidity management practices and meeting the primary demands of their businesses.

2.1 Banking in Ghana

The financial services industry has lately seen a gigantic development in all parts with the banking sector being the busiest, quickest and the most dynamic. As indicated by the Ghana Banking Survey (2011), the banking sector is exceptionally fluid, gainful and recording an increase in resource development. Money related stability is a need to the Central Bank and Ghana's budgetary soundness pointers have all enhanced recently because of judicious strategies. In spite of the banking framework's fast development driven by extension in deposit preparation and credit; the framework is turning out to be progressively solid, because of decisive regulation, huge innovative advances in the area, and more reasonable risk mitigation by banks. These patterns offer great prospects in the midst of the diligent difficulties like high cost of acquiring, credit risk, business risk, operations risk and liquidity risk to a bigger degree. The Central Bank, Bank of Ghana controls and manages every one of the banks in the Ghanaian business banking segment with the number remaining at twenty seven (27) as at the end of December, 2012. The

banking framework is in view of the idea of universal banking where banks offer every single banking benefit. However some of them started as particular banks serving specific purposes. The Bank of Ghana has the general supervisory and administrative power in all matters identifying with banking and non-banking monetary business with the aim to accomplish a sound, productive banking framework in light of a legitimate concern for contributors and different clients of these organizations and the economy at large. The administrative and legitimate system within which banks, non-bank budgetary organizations and in addition forex bureaus work in Ghana are the following:

- Bank of Ghana Act 2002, Act 612
- Banking Act, 2004 (Act 673)
- Non-Bank Financial Institutions Act, 2008 (Act 774)
- Companies Code Act 179, 1963
- Bank of Ghana Notices/Directives/Circulars/Regulations

The Bank of Ghana is along these lines, charged with the obligation of guaranteeing that the financial framework is steady to guarantee that it serves as a facilitator for wealth creation, monetary development and advancement. Thus, the Central Bank practices its order to guarantee:

- Depositors' deposits are protected
- The dissolvability, great quality resources, satisfactory liquidity and benefit of banks are kept up;
- Adherence to statutory and administrative prerequisites is upheld;
- Fair rivalry among banks
- The support of an effective installment framework

The banking sector in Ghana has experienced numerous changes and rebuilding throughout the years as a consequence of internal and external monetary improvements and stuns. Broad government mediations and public ownership among other problems that needed to be addressed in the past required a few changes in the banking sector. Focal control of premium rates by the Bank of Ghana, limitations on sectoral credit assignment (for the most part to the general population), serious banking related constraints and high inflation prompting negative interest rates portrayed this period. Late improvements in banking incorporated the appropriation of the International Financial Reporting Standards (IFRS) in accordance with universal models by the Bank of Ghana as a method for diminishing systemic danger. This resulted in founding a collateral registry and credit reference bureaus that looks to advance straightforwardness and simple credit availability. They also aimed to use that in the setting up of the Financial Intelligence Center (FIC) to address government evasion and counter financing for terrorism, and the recapitalization of the banks all of which were designed to moderate risk and stabilize the banking system (Bawumia et al., 2008). The impact of the monetary system reform was to free the financial sector from over the top government regulation keeping in mind the end goal to cultivate a free market-base framework, set costs right, enhance administrative structure, reinforce bank supervision, rebuild troubled banks and tidy up non-performing loans on banks' accounting reports. In the midst of the tight regulation, introduction to fluctuated banking dangers and capitalization of necessities, the banking system has chalked tremendous advancements which incorporate an increment in the section of new private banks into the business, extension in branches by both the current and new banks and the extended utilization of

branches by the current and new banks and so forth. (Source: Bank of Ghana Website). As indicated by the Ghana Banking Survey (2012) by the Price Waterhouse Coopers in a joint effort with the Ghana Association of Bankers, the next huge thing that banks should expect in the industry is thought to be rivalry for individuals (clients, workers and shareholders), reach (technology and branch system) and brand (global, solid/national character or protocol). Bank administrators recognize that with the extra capital that they have obtained, there is considerably more weight to produce capital beyond the average to entice more investors and keep current ones happy. That is, in the short term, banks expect there will be critical jarring inside of the business to secure the local market with such rivalry being more forceful among the residential banks, as opposed to new market participants. There are currently thin lines of distinction among them as diverse bank sorts have united after some time to the degree that non-bank monetary establishments now rival the banks with regards to the provision of banking services. Bank deposits, for instance, contend now with different liabilities of financial liabilities, for example, mutual funds. This occurrence appears to legitimize the initiation of an all-inclusive or universal banking in Ghana, whereby banks initially authorized as merchant or development banks can now be issued universal banking licenses with more generously increased paid-up capital. This move was to dispense off the financial expenses of keeping up administrative obstructions, which had risen despite the fact that the hindrances had turned out to be less successful. The universal banking idea is not just targeting dispensing off with differences due to comparability in bank items/administrations rendered. It has the additional functionality of limiting branch systems of diverse bank sorts, as banks are buying into the concept of being universal.

The yearly comparative profitability investigation reported in the Ghana Banking Survey (2012) displays that, the Ghanaian banking industry has seen steady increments in profitability in the previous years. However the level of productivity differs between the individual banks. The industry's profits before tax margin ascended from 27.2% in 2010 to 30.6% in 2011. However the industry net interest margin (NIM) decreased from 9.3% to 8% in the same period essentially because of competitive pricing by banks. The reports and overviews likewise give the proof that banks depend vigorously on client deposits for their day-to-day operations particularly in issuing loans to deficit spending units and this is evidenced in higher advance to deposit proportions over the past few years. This gives a reasonable sign that banks' administration of liquidity risks among other risks, for example, credit risk, business risk, operations risk has more noteworthy ramifications on their productivity, particularly on net interest margins.

2.2. Liquidity Risk Concept

According to Bonfim and Kim (2012), the many-sided qualities of the elements of banks services ascend to a characteristic risk that lies somewhere down in their central capacity; their remarkable intermediation part. Banks utilize a restricted measure they could call their own assets in giving credits to business visionaries and in this manner furnish them with the liquidity to back their venture and utilization requests. A lot of these assets utilized by these banks are ordinarily connected with liabilities to outsiders generally as deposits. This change of fluid liabilities (deposits) into hazardous fluid (illiquid) resources as loans gaining by their development jumble open them to liquidity risk (Diamond and Dybvig, 1983; Jekinson, 2008). With a specific end goal to diminish the development hole in the middle of benefits and liabilities or the inborn illiquidity, banks

can satisfactorily deal with the liquidity risk by holding a cradle of fluid resources. Aside the high expense of holding a cushion of fluid resources when contrasted with the higher returns connected with illiquid resources, it shows a level of wastefulness with respect to administration as it confines banks' capacity to give liquidity to business visionaries and buyers. Thus, despite the fact that banks have a few impetuses to hold a small amount of fluid resources (as money, fleeting resources or government securities), these cushions will barely ever be adequate to completely guarantee against a bank run or liquidity risk (Bonfim and Kim, 2012). A bank's failure to face diminishes in liabilities or to reserve increments in resources as meaning of liquidity risk as characterized by the Basel Committee for Banking and Supervision (1997) can be arranged into two structures; subsidizing liquidity risk and business liquidity risk as per Decker (2000). He clarified financing liquidity risk as the danger that a bank will meet in view of the failure to sell resources or have insufficient subsidizing sources. Market liquidity risk then again is the danger that a bank can't undoubtedly loosen up or balance particular exposures without essentially bringing down business sector costs on account of deficient business profundity or business interruptions. Gomes and Khan (2011) in an examination paper on fortifying bank administration of liquidity risk through the Basel III liquidity measures made further illuminations on both financing and business sector liquidity risks. They described liquidity risk as the failure of a firm to create reserves by conveying resources hung on its asset report to meet money related commitments without prior warning. The liquidity position of a given bank is resolved principally by its possessions of money and other promptly accessible attractive resources, and also by its subsidizing structure and the sum and kind of unexpected liabilities that may come

over a predefined skyline. They further clarified business sector liquidity risk as the capacity of a bank to execute exchanges in budgetary markets without bringing on a critical development in costs. On a study on business sector liquidity risk, the Bank for International Settlements-BIS (1999) considered the few distinct measurements by which critical development in costs in could emerge and these incorporate speed, broadness, profundity and strength. Speed alludes to the pace with which exchanges of a certain size can be executed. Broadness is the disparity in the cost of an advantage from mid-business costs and is for the most part measured by the offer spread. Profundity alludes to either the volume of exchanges that can be executed without influencing current business costs or the measure of requests on the request books of business producers. Strength is the pace with which value variances that happen amid the execution of an exchange come back to previous levels. These components subsequently go far to influence market liquidity risk in assorted ways. Market and subsidizing liquidity dangers exacerbate one another as it is hard to offer when different financial specialists face subsidizing issues and it is hard to get subsidizing when the guarantee is difficult to offer. Gomes and Khan (2011) again made the declaration that cooperations between these two sorts of liquidity risks could prompt crushing liquidity results where poor conditions for financing liquidity risks to a lessening in business sector liquidity and thus add to a further disintegration in subsidizing liquidity. Brunnermeier (2009) gave an in number evidence that without satisfactory liquidity-risk administration, banks that face a liquidity stun frequently take part in offers of advantages, and reduce giving to the genuine economy. These activities thusly improve the probability of business sector interruptions and liquidity stuns confronted by different organizations, bringing about a

drawn out weakening in business liquidity that has a serious effect on genuine financial development.

2.3. History of Liquidity Risk

Reference is made by Toby (2006) to the beginning of liquidity risk in the historical backdrop of American banking with the "shiftability hypothesis" of saving money which clarified that the liquidity of a bank relied on upon its capacity to move its benefits (transient open business instruments) to another person at an anticipated cost. In situation where huge number of contributors chose to withdraw their cash, every one of the banks required was to just offer these ventures, take the cash in this way obtained, and pay off its investors. Moulton, one of the originators of the hypothesis, attested that "Liquidity is commensurate to shiftability". The shiftability hypothesis diverted the consideration of brokers and the banking powers from loans to ventures as a wellspring of bank liquidity. The significant blemish of the shiftability hypothesis was that albeit one bank could get required liquidity by moving its benefits, the same was not valid for all banks taken together since clearly all banks can't increase extra money holds by moving their winning advantages for one another. Therefore, somewhere around 1929 and 1933, every one of the banks needed to be merchants and none of them needed to purchase. What was required was some office outside the banking framework with the capacity to pour monstrous dosages of fluid deposits into every one of the banks by purchasing what they all needed to offer. Yet, the Federal Reserve System couldn't give this fundamental liquidity, and actually a huge number of banks fizzled as the century progressed. (Toby, 2006). Once more, hypothetical writing gives two restricting perspectives on bank capital and liquidity creation. Under the first view, bank capital has

a tendency to hinder liquidity creation through two unmistakable impacts: the "money related delicacy structure" and the "swarming out of deposits". The "money related delicacy structure" impact, portrayed by lower capital, has a tendency to support liquidity creation (Diamond and Rajan, 2001), while higher capital proportions may group out deposits and in this way lessen liquidity creation (Gorton and Winton, 2000). Generally portrayed, the "budgetary delicacy structure" impact is the result of the monetary intermediation process. By checking borrowers, the bank acquires private data that gives it leeway in surveying the productivity of its borrowers. Be that as it may, this instructive favorable position makes an organization issue and the bank may coerce rents from its contributors by obliging a more noteworthy offer of the advance salary. In the event that contributors decline to pay the higher expense, the bank withholds observing endeavors. As investors realize that the bank may mishandle their trust, they get to be hesitant to store their cash. Subsequently, the bank needs to win depositors' certainty by embracing a delicate money related structure with a huge offer of fluid deposits. An agreement with contributors mitigates the bank's hold-up issue on the grounds that investors can keep running on the bank if the bank undermines to withhold endeavors. Hence, money related delicacy favors liquidity creation since it permits the bank to gather more deposits and give more loans. By complexity, higher capital has a tendency to relieve budgetary delicacy and improves the haggling force of the bank hampering the validity of its dedication to investors in this manner, higher capital has a tendency to reduction liquidity creation. Moreover, Gorton and Winton (2000) demonstrate that a higher capital proportion may lessen liquidity creation through another impact: the "swarming out of deposits". They consider that deposits are more powerful liquidity

supports for specialists than interests in bank value. Without a doubt, deposits are absolutely or incompletely guaranteed and withdrawable at standard quality. In this way the higher is the bank's capital proportion, the lower is its liquidity creation. Under the second view, higher capital upgrades the capacity of banks to make liquidity. Liquidity creation expands the bank's presentation to risk as its misfortunes increment with the level of illiquid resources for fulfill the liquidity requests of clients (Allen and Gale, 2004). Bank capital permits the bank to assimilate more serious risk (Repullo, 2004). Consequently, under the second view, the higher is the bank's capital proportion, the higher is its liquidity creation. Berger and Bouwman (2009) observationally test these late hypotheses of the relationship in the middle of capital and liquidity creation. Utilizing a specimen of US business banks from 1993 to 2003, they find that the relationship is certain for substantial banks and negative for little banks.

2.4 Determinants of Liquidity Risk

Despite the fact that liquidity risk has dependably been considered in writing as a noteworthy determinant of bank performance, just a couple of studies have gone further to mull over the different determinants of liquidity risk in the day by day operations of a bank. Work done by most analysts show fluctuated determinants in distinctive keeping money situations essentially arranged under particular banking or full scale monetary variables. Indeed with the experimental investigation of information in light of 5066 European banks over the period somewhere around 1998 and 2004, Lucchetta (2007) theorized that premium rates influence banks' risk taking and the choice to hold liquidity. The study reasoned that crosswise over European nations, the interbank premium rate had constructive outcomes on the liquidity held by banks and the choice of a bank to be a

loan specialist in the interbank market. The key variable which affected the choice to loan in the interbank business sector was the liquidity value which relies on upon the interest and supply of liquidity and on the risk free premium rate. The outcomes likewise demonstrated a negative relationship between fiscal strategy premium rate and the choice of a bank to hold liquidity and to give in the interbank market. In their investigation of the bank particular and macroeconomic determinants of liquidity risk among 57 U.K. occupant banks inside of the period 1985 to 2003, utilizing a liquidity (proportion of fluid advantages for aggregate resources) as a measure of liquidity risk, Aspachs et al. (2005) mentioned some objective facts. They demonstrated that the likelihood of getting backing from the loan specialist of final resort, which ought to bring down the motivating force for holding fluid resources was emphatically identified with liquidity risk. The yearning to accomplish higher net premium edges (higher gainfulness) which serves as a measure of chance expenses of holding money decidedly influenced liquidity risk pretty much as advance development since higher credit development signs increment in illiquid resources. They further showed that while the measure of a bank had a non-straight (no unequivocal) impact on liquidity risk, GDP development as a marker of business cycle and fleeting premium rates which catches the money related strategy impact both had beneficial outcomes on liquidity risk. Still with the proportion for fluid advantages for aggregate resources as measure of liquidity risk (ward variable), Bunda and Desquilbet (2008) dissected the determinants of liquidity risk of banks from rising economies with board information relapse investigation. The outcome demonstrated that the extent of a bank had a beneficial outcome on liquidity risk, the proportion of value to resources as a measure of capital sufficiency had a negative impact

on liquidity risk. Once more, the vicinity of prudential regulation convincing banks to be sufficiently fluid, the offer of open use on GDP as a measure of supply of generally fluid resources and the rate of expansion which expands the weakness of banks to ostensible estimations of credits gave to clients all have negative impact on liquidity risk. They additionally demonstrated that in times of the acknowledgment of budgetary emergency likely created by poor bank liquidity, the association with liquidity risk is certain. With the conversion scale administration element, banks in nations with compelling administrations (the autonomously skimming swapping scale administration and hard pegs were less inclined to face liquidity risk than in nations with moderate administrations. Shen et al. (2009) connected board information instrumental variables relapse, utilizing two-stage minimum squares (2SLS) estimators to gauge bank liquidity risk and an execution model. The study utilized an option liquidity risk measure other than liquidity proportion; the financing crevice proportion and researched the reasons for liquidity risk (reasons for liquidity risk model), utilizing an uneven board dataset of business banks from 12 propelled over the period 1994-2006. They found that liquidity risk is an endogenous determinant of bank execution with determinants including size, parts of fluid resources (risky and less risky) and reliance on outside financing, supervisory and administrative components and macroeconomic variables. While the relationship in the middle of size and liquidity risk was observed to be non-straight, unsafe fluid resources and outer subsidizing reliance had a positive relationship while less risky fluid resources showed a negative association with liquidity risk. Rauch et al. (2010) in their investigation of 457 German state-possessed reserve funds banks from 1997 to 2006 examined the determinants of their liquidity creation. As per the study, full

scale financial variables, for example, tight money related arrangements had negative consequences for bank liquidity creation through their advantage rates. The level of unemployment which is joined with interest for credits utilized as an intermediary for the general strength of the economy demonstrated a negative impact on liquidity and subsequently a beneficial outcome on liquidity risk. The negative impact implied that the healthier the economy, (the bring down the unemployment rate), the more liquidity the made by banks. They presumed that just full scale financial variables had solid relationship with liquidity risk and that bank particular components such bank productivity and the extent of the bank measured by the aggregate number of bank clients did not have any impact on liquidity creation. Moore (2010) considered the impacts of budgetary emergency on the liquidity of business banks in Latin America and Caribbean nations over the time of 34 years traversing the period 1970 to 2004. The outcomes in view of month to month perceptions uncovered that liquidity risk has a tendency to be emphatically identified with the business cycle in a large portion of the nations mulled over and to the unpredictability of the money (withdrawals) to store proportion; an evidence that business banks had the inclination to extend liquidity when the instability of money interest by clients rises and the other way around. The outcomes further demonstrated that the impact of currency business sector interest rate as a measure of the open door expense of holding liquidity is blended. Nations with higher interest rates had a negative association with holding liquidity; in this manner demonstrating a positive connection with liquidity risk and the other way around. Therefore, the relationship between monetary emergency and bank liquidity fluctuated crosswise over nations relying upon where there was a loaning blast before the

emergency or where banks were liable to vast store withdrawals amid the emergency; making them more powerless against liquidity risk. Others were more fluid amid the emergency, particularly in nations where the emergency were joined by a conversion scale emergency that presumably drove banks to be more moderate in their liquidity however this practice had the inclination of extending the emergency if organizations couldn't get to credit to fund their operations. A study on how banks dealt with the liquidity stun that happened amid the budgetary emergency somewhere around 2007 and 2009 by Cornet et al. (2011) examined quarterly information of all US business banks. This was finished by evaluating separate relapse capacities for both little and substantial banking with logical variables, for example, the offer of illiquid resources, for example, credits, leases, resource supported securities and so on aggregate resources, the extent of center deposits altogether resources, the bank ampleness proportion, the proportion of unused responsibilities to duties in addition to resources. The outcomes were diverse agreeing the span of the banks since little banks depended all the more intensely on stable wellsprings of financing like center deposits capital in respect to bigger banks. It was further uncovered that bigger banks have higher extents of their aggregate resources as illiquid resources when contrasted with littler making them more presented to liquidity risk than little banks over four measurements including more undrawn responsibilities, less capital, less dependence on center deposits and lower liquidity of accounting report resources. In the investigation of the determinants of business bank's liquidity in Slovakia, Vodova (2011) considered bank particular and macroeconomic information over the period from 2001 to 2010 and dissected them with board information relapse examination. The variables incorporated the extent of the bank, bank

gainfulness, acknowledgment of monetary emergency, rate of GDP, swelling rate, premium rate on interbank exchanges, contrast between premium rate on loans and premium rate on deposits, and the rate of unemployment. It was found that bank liquidity dropped for the most part as an aftereffect of the monetary emergency. Again bank liquidity was adversely identified with bank benefit, capital ampleness and the span of bank while liquidity measured by loaning movement of banks increments with the development of GDP. It was further settled that bank liquidity diminished with higher unemployment. Key premium rates, premium edge, rate of expansion and the level of non-performing loans had no factually critical impact on the liquidity of Slovak business banks. It is consequently vital to note that aside the variables that had no noteworthy impact on liquidity, the inverse of the connections of alternate variables and bank's liquidity holds for liquidity risk.

2.5 Measurement of Liquidity Risk

According to Ioan and Dragos (2006) the management of liquidity risk presents two main perspectives both of which have an effect on a bank's profitability. They indicated that an inadequate level of liquidity may lead to the need to attract additional sources of funding associated with higher costs that will result in the reduction of the profitability of the bank and ultimately lead to insolvency. On the other hand an excessive liquidity may lead to a fall in net interest margins and in consequence poor financial performance. Keeping appropriate levels of liquidity is manifested in a bank's ability to obtain with immediacy the needed funds at a reasonable cost as and when necessary. Maintaining an adequate degree of liquidity in the whole banking system is extremely important, because the registration of a liquidity crisis at a single bank can have negative

repercussions over the whole banking system courtesy the risk of contagion through inter-bank settlements. Banks may need to borrow from the market even at an exceptionally high rate during a liquidity crisis ultimately causing a decline in the banks' earnings. Moreover, a bank's further borrowing to meet depositors' demand may place the bank's capital at stake leading to rise in the debt equity ratio, affecting the bank's effort to maintain an optimal capital structure (Arif and Anees; 2012). According to Diamond and Rajan (2001), liquidity risk may cause a fire sale of the assets of the bank which may spill over into an impairment of bank's capital base. If any of the financial institutions faces a situation in which it has to sell a large number of its illiquid assets to meet the funding requirements probably to reduce the leverage in conformity with the requirement of capital adequacy, the fire sale risk may arise. A bank with liquidity problems loses a number of business opportunities placing it at a competitive disadvantage, in contrast to those of the competitors. Diamond and Rajan (2001) asserted that there are instances when banks refuse lending even to a potential entrepreneur; if it feels that the liquidity need of the bank is quite high; representing an opportunity loss for the bank. They emphasized that a mismatch in depositors demand and production of resources forces a bank to generate the resources at a higher cost and at rare situations when a bank is unable to meet the requirements of demand deposits, there could be a bank run. According to Holmstrom and Tirole (2000), though a bank may invest some of its resources in the long-term projects much of the funding resources are invested in the short term liquid assets to provide a buffer against liquidity shocks. Liquidity risk of banks can be measured from balance sheet positions particularly by throwing light on liquidity ratios, however, Poorman and Blake (2005) cautioned that adopting just this

practice would not be the solution to the liquidity risk menace. This reason stemmed from the fact a large regional bank, Southeast Bank, used over 30 liquidity ratios for liquidity measurement but eventually failed due to liquidity risk. It is therefore imperative that beyond mere liquidity ratios, banks develop new forms of measuring liquidity risk. While the Basel Committee on Banking Supervision (2000) proposed the maturity laddering method for measuring liquidity risk; Saunders and Cornett (2006) gave a strong indication that banks could use sources and uses of liquidity, peer group ratio comparisons, liquidity index, financing gap and the financing requirement, and liquidity planning to measure their liquidity exposure. Besides, Matz and Neu (2007) also indicated that banks could apply balance sheet liquidity analysis, cash capital position and maturity mismatch approach to assess liquidity risk. The Basel Committee on Banking Supervision (BCBS) in the “Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring,” published in December 2010 (BCBS 2010), proposed some quantitative metrics in analyzing a banks liquidity risk at any point in time. These two quantitative metrics include the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), which were developed to meet two separate, but complementary, objectives. The two indicators were to ensure that banks held an adequate pool of liquid assets, while simultaneously adopting a reasonable and prudent maturity mismatch. The objective of the LCR was to promote short-term resilience by ensuring that a bank had enough high-quality liquid assets to survive an acute stress scenario that lasts for one month. The NSFR was developed to achieve the second objective of the Basel III liquidity standards: promoting longer-term resilience by encouraging banks to fund their activities with more stable sources of funding. That is,

the NSFR was a longer-term structural ratio designed to address liquidity mismatches and to encourage an increased reliance on medium and long-term funding, thus increasing the average maturity of banks' liabilities. The Liquidity Coverage Ratio (LCR) aimed at increasing banks' resilience to an acute 30-day stress scenario. The LCR is calculated as the stock of high-quality liquid assets/total net cash out-flows over the next 30 calendar days = 100 per cent. In other words, to meet funding obligations and draws on contingent liabilities over the next 30 days, the LCR required banks to hold a stock of unencumbered high-quality liquid assets equal to or greater than stressed net cash outflows. The requirement must be met continuously and reported to supervisors on at least a monthly basis, with an ideal time lag of not more than two weeks. The LCR was complemented by a structural funding ratio, the Net Stable Funding Ratio (NSFR), which was structured to ensure that long-term assets were funded with a minimum amount of stable long-term funding. The NSFR is calculated as the available amount of stable funding/required amount of stable funding > 100 per cent.

2.6 Liquidity Risk and Bank Profitability

Though liquidity risk can be measured by considering a bank's liquidity gap, liquidity risk measures have in the past focused on the use of liquidity ratios and have thus achieved varied results in relation to bank profitability. Among the widely used measures of liquidity risk are the ratio of liquid assets to total assets, the ratio of loans to total assets, the ratio of liquid assets to total deposits, the ratio of liquid assets to customer and short term funding, the ratio of net loans to customer and short term funding etc. The ratio of liquid assets to total assets normally gives information about the general liquidity shock absorption capacity of a bank. As a general rule, the higher the share of liquid assets in

total assets, the higher the capacity of a bank to soak up a probable liquidity shock, given that market liquidity is the same for all banks in the sample. Nonetheless, a higher value of this ratio may be also interpreted as inefficiency, since keeping much liquid assets on the balance sheet results in lower net interest margins hence the need to optimize liquidity and profitability and thus reduce opportunity cost of the bank. Previous studies that used this ratio to determine the relationship between liquidity risk and bank performance include Molyneux and Thornton (1992) and Barth *et al.*(2003) both of whom established a negative relationship between this liquidity ratio and return on assets (ROA) while Bourke(1989) established a positive relationship between the two. Demirguc-Kunt *et al.* (2003) concluded that banks that held a high fraction of liquid assets had lower net interest margins and this is consistent with banks receiving lower returns on holding cash or securities but facing competitive market for deposits. Another widely used liquidity ratio as a measure of liquidity risk is the ratio to liquid assets to deposits (deposits of individuals, enterprises and other financial institutions). This liquidity ratio is more focused on the bank's sensitivity to selected types of funding. The ratio thus captures the bank's vulnerability to liquidity risk in relation to its funding sources. The bank is able to meet its obligations in terms of funding if the volume of liquid assets is high enough to cater for the deposits and this can be signified by a ratio of more than one. Ratios lower than this value signal a bank's vulnerability to liquidity risk with respect to the withdrawal of deposits. Earlier studies that used this ratio as a measure of bank performance include Shen *et al.* (2001) who established that banks with higher fractions of liquid assets had lower net interest margins. Kosmidou *et al.* (2005) also found that the ratio of liquid assets to total deposits (customer and short term

funding) had a positive effect on the return on assets (ROA) but a negative effect on net interest margins. Other studies also relied on the ratio of loans to total assets to assess the correlation between liquidity risk and bank profitability. This liquidity ratio measures the proportion of total assets made up of net loans, thus a relative measure of illiquidity of a bank's total assets. This means that the higher this ratio, the less liquid the bank is and the higher the vulnerability to bank liquidity risk. With this ratio, Demirguc-Kunt and Huizinga (1999) established a negative relationship with return on assets (ROA) but a positive relationship with net interest margins (NIM). However, Athanasoglou *et al.*(2006) made the conclusion that ratio had no effect on either return on assets (ROA) or return on equity (ROE). The ratio of net loans to customer (deposits) and short term funding has also been used significantly as a measure of liquidity risk. Kosmidou (2008) indicated that the ratio of net loans to customer and short term funding is negatively related to return on assets (ROA). However Naceur and Kandil (2009) established that the ratio of net loans to customer and short term funding was positively and significantly related to net interest margin (NIM) of domestic banks, indicating a negative relationship between net interest margins (NIM) and the level of liquid assets held by the bank. Nonetheless, they found out that bank's liquidity risk does not determine returns on assets or equity (ROA or ROE) significantly.

CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter demonstrates the manner in which data was collected and analysed. It details the variables considered in adequately answering this study's major questions. The chapter is sectioned into various components that are dealt with in considerable detail including the study's design, sampling technique, sampling frame, data collection and analysis techniques.

3.1 Sources of Data and Scope Of Study

This section considers the scope of the study and the sources of data on the variables used. In a quest to ascertain the determinants of bank liquidity risk and estimate the effects of this liquidity risk on profitability among the banks in Ghana, the study used panel data from 4 commercial and listed banks in Ghana spanning the period 2002 to 2011. The time period selected is based on the reason that it provided recent time series observations and it also represented a period of major changes for the Ghanaian banking system; typified by the universal banking principle resulting from the enactment of the Banking Act, 2004 (Act 673). Secondary data based on the annual financial reports of the selected banks was acquired from the Ghana Association of Bankers. Bank specific data on total assets, components of liquid assets, sources of funding, advances, loan loss provisions, operating expenses, total equity among others was thus obtained from this source. Data on the macroeconomic variables change in GDP and inflation incorporated in this study was sourced from the World Development

Indicators (World Bank Online, 2013).

3.2 Variables of Interest

This section of the study's methodology sought to rationalize the measures of liquidity risk of banks as well as bank-specific, market structure and macroeconomic variables that have been hypothesized to determine the liquidity risk exposure of banks in Ghana.

3.2.1 Dependent Variable(S)

3.2.1.1 Liquidity Risk (Fgapr & Nld)

Liquidity ratios like the ratio of liquid assets to total assets, the ratio of liquid assets to deposits, the ratio of liquid assets to customer and short term funding, etc., have been used extensively in literature as the better options for the measurement of liquidity risk. This study however deviates from the orthodox practice by adopting the financing gap ratio as proposed by Saunders and Cornett (2006) and also employed by Shen *et al.* (2009) as a very good alternative in measuring the liquidity risk exposure of any bank and thus its vulnerability to failure. The financing gap is defined as the difference between a bank's average core loans and its average core deposits. Bank managers often regard average core deposits such as current accounts, savings accounts, fixed time deposit accounts etc as a more stable cheap source of funding compared to wholesale funding (institutional borrowing) which can permanently cater for the bank's average loans. In order to standardize, the financing gap of each bank is divided by its total assets to get the ratio of financing gap to total assets or the financing gap ratio (FGAPR). That is, the financing gap ratio is calculated as:

$$\text{FGAPR} = (\text{Advances (Loans)} - \text{Deposits}) / \text{Total Assets}$$

Relative values instead of absolute values are taken into consideration in determining the liquidity risk of a bank. A negative value depicts a lower figure and a lower liquidity risk while the bigger or more positive the value, then the higher the liquidity risk. It is expected that banks with higher financing gap ratio will use much of their cash, sell liquid assets and depend much on sources of funding such as borrowings (wholesale funding) other than deposits to finance this gap. In order to test for the robustness of the results, one of the liquidity ratios normally used as a measure of liquidity risk in the past, the ratio of net loans to total deposits (NLD) is used. This is calculated as the ratio of total loans (advances) less provision for loan loss to deposits and. The higher the ratio, the higher the liquidity risk and vice versa. This is clearly specified as:

$$NLD = \text{NetLoans} / \text{Deposits}$$

3.2.2 Explanatory Variables

3.2.2.1. Bank Size (Size)

The size of a bank, calculated by the natural log of the bank's total assets contributes to its liquidity levels since it has an effect on its ability to mobilize funds from different sources as well as the cost associated with it. Bunda and Desquilbet (2008) included the size of a bank in the determinants of liquidity risk of banks from emerging economies with panel data regression analysis. The result showed that the size of a bank had a positive effect on liquidity risk. Shen *et al.* (2009) considered bank size as one of the major determinants of bank liquidity risk (an endogenous determinant of bank profitability) and the results showed a non-linear relationship between bank size and liquidity risk. That is they found out that liquidity risk was positively related to size

but beyond a certain level was negatively related. This was ascertained by also adding the square of bank size as one of the variables. Other studies also suggest that banks face less liquidity risk as they grow in size (economies of scale) and are able to obtain funding at a lower cost due to implicit guarantee but beyond particular levels; they begin to face liquidity risk due to diseconomies of scale. Also associated with the conclusions from such studies are the huge financial commitments associated with several branch openings and thus the vulnerability to liquidity risk. It is thus expected that as banks grow in size, they acquire the inherent capacity to mobilize much deposits with less difficulty and for that matter are able to grant more loans at any point in time coupled with the higher operating cost associated with expansion. Bank size is expected to be positively related with liquidity risk (FGAPR and the NLD).

3.2.2.2 Liquid Assets Ratio (Rla & Lrla)

Another bank specific determinant of liquidity risk is the nature of assets that the bank has in respect of its propensity of transformation to cash or very liquid assets. Shen *et al.*(2009) indicated that because a bank could sell or collateralize its liquid assets to obtain liquid funds, holding liquid assets can reduce a bank's liquidity risk. However, this is not the case for all the banks due to the difficulty in selling or collateralizing their liquid assets (due to credit freeze). Consequently, in order to ascertain the degrees of liquidity of each bank's assets, the liquid assets are classified into either risky liquid assets or less risky liquid assets after which each is divided by the bank's total assets for standardization, represented by RLA and LRLA respectively. Less risky liquid assets include liquid assets such as cash and balances with bank of Ghana, treasury bills, monies due from other banks and other short term government securities, etc. which

could be sold with little price risk and low transaction cost and easily pass for a collateral as well. Risky liquid assets include investment in medium and long term securities and other financial products presented on the bank's balance sheet which are relatively difficult to sell or collateralize when the need arises. With respect to the relationship with liquidity risk, it is expected that RLATA has a positive relationship while LRLATA has a negative effect on the liquidity risk of each bank. That is, the higher the proportion of less risky liquid assets to the bank's total assets, the better the position of the bank to finance its obligations as they fall due while the opposite is expected to be true for risky liquid assets.

3.2.2.3 Non-Deposits Dependence (Ndd)

A bank's reliance on external sources of funding other than deposits or wholesale funding cannot be over emphasized in assessing its probability of facing liquidity risk. Shen *et al.*(2009) considered it as one of the causes of liquidity risk and thus used the ratio of external funding to total liabilities to proxy for non deposit dependence. Banks heavily depending on general (wholesale funding) borrowings and other money market instruments rather on core deposits to fund loans and other financial obligations have the likelihood of facing liquidity risk compared to banks that engage in the practice of the contrary. Shen *et al.* (2009) cautions that the larger the funds these banks would need to borrow in the money market, the greater the liquidity risk they would be challenged with. It is thus obvious that non-deposit dependence and bank liquidity risk are expected to have a positive relationship.

3.2.2.4 Ownership Type (Own)

Ownership structure of banks can also determine the vulnerability of a bank to liquidity risk. It is normally expected that banks with external affiliations are able to manage their liquidity better than local banks because of the opportunity of getting external help from their foreign partners in times of difficulty which may not be the same for a local bank. This is thus considered a dummy variable, it equals 1 if the bank is Ghanaian owned and equals zero if the bank is foreign owned. Liquidity is thus expected to have a positive relationship with Ghanaian owned banks but a negative relationship with foreign owned banks. That is, banks vulnerability to liquidity risk is expected to be significantly different from the other in line with the type of ownership be it foreign or local.

3.2.2.5 Bank Concentration (Conc)

In order to measure the level of competition among the banks in Ghana and to a larger extent the structure of the market, bank concentration (CONC) enters the liquidity risk equation. Recent times in Ghana have witnessed a seemingly high level of competition for customer deposits characterized by juicy promotions, extensive advertisements, the employment of sales persons etc. Since deposits represent a stable and cheaper source of funding, banks with higher proportions of deposits are able to cut down cost of funding, minimize liquidity risk and consequently maximize profitability. This is measured by the Hirschman-Herfindahl index (HHI) which is calculated by summing the squares of the individual market shares of all the banks with respect to total deposits. Depending on the use of either absolute percentage figures or proportions, the HHI ranges from 10,000 (1) in the case of a pure monopoly to a number approaching

zero in the case of an atomistic market. With respect to the results, the results are divided into three; considered unconcentrated (HHI below 1000 or 0.1), moderately concentrated (HHI between 1000 and 1800 or 0.1 and 0.18), and highly concentrated (HHI above 1800 or 0.18). It is expected that the higher the level of concentration, the lesser the competition and the lesser the vulnerability to liquidity risk. The opposite is true since banks would have to work extra harder in order to mobilize appreciable levels of deposits when there is stern COMPETITION in the industry.

3.2.2.6 Macroeconomic Variable (Infl)

In capturing the macroeconomic determinants of bank liquidity risk, the annual percentage change in inflation (INF) cannot be overlooked. According to Aspachs *et al.*(2005), it is very characteristic of banks to hold on to high liquidity hoard during period of downturn when lending opportunities may not have picked up. It is thus expected that higher economic growth would inure to the benefit of banks as they cash in on higher net interest margins associated with the ability to lend more to the public while attracting less deposits during the same time. The monetary and fiscal policies of the central bank also affect the supply of money in the economy and this can also have varied effects on inflation depending on which direction it goes and thus affect the liquidity status of banks. Again on inflation, Vodova (2011) in a study of determinants of liquidity in Slovakian banks though indicated the rate of inflation has no significant effect on liquidity risk, Rauch *et al.*(2010) concluded on a strong positive effect on liquidity risk. Shen *et al.* (2009) revealed that the annual percent change in inflation (INF) had a significantly positive correlation with bank's liquidity risk. The study is thus expected to indicate a positive effect of these variables on liquidity risk.

3.3 Conclusion

Panel data on 4 banks in Ghana from various data sources were used to achieve the objectives of estimating the determinants of bank liquidity risk. The determinants of bank liquidity risk were evaluated by the panel data logistic regression.

CHAPTER FOUR

PRESENTATION OF DATA AND ANALYSIS

4.0 Introduction

The chapter is organized into sections on the presentation of preliminary analysis of the data used by the study which is basically the descriptive statistics of the regression variables. Further analysis of the results and the discussion of the estimates of the determinants of bank liquidity risk in Ghana with both the financing gap ratio and the net loan to deposits as the dependent variables are then focused on.

4.1 Determinants of Liquidity Risk

The mean score for the financing gap ratio (FGAPR) which is the measure of liquidity risk and the dependent variable was -0.235. The standard deviation of 0.2181 accounted for the variation between each value and the mean or average FGAPR. This picture suggests that banks kept a considerable amount of liquidity and that faced little liquidity risk during the period under study. This means that banks were able to fund increases in assets or decreases in liabilities without difficulty during the period.

The ratio of net loan to total deposits (NLD) which is an alternative for liquidity risk to also show that a mean value of 67.02% of all deposits were given as loans. This means that while some banks within this period of study lend an insignificant amount of their deposits, others granted loans worth more than double the value of their deposits indicating that funds other than deposits were given out. Such banks could be regarded as having very strong treasury and credit risk departments.

The size of banks (SIZE) measured by the natural log of banks' total assets registers an average score of 14.6097 with a variation shown by the standard deviation of 1.2308. The component of liquid assets as a percentage of total assets which is reclassified into risky and less risky liquid assets also revealed different statistics. The ratio of less risky liquid assets to total assets (RLAs) showed an average of 0.1070 with the standard deviation being 0.0543. This means that banks kept about 10.70 % of their assets as very liquid (cash and short term funds) over this period of study. With an average score of 0.2490, bank risky liquid assets to total assets (LRLAs) recorded a standard deviation of 0.1296. This means that banks over this period kept an average of 24.90% of their assets in risky liquid assets such as securities and other medium term investment instruments. These assets, though liquid were relatively difficult to easily convert to cash or acquire another party to accept it as collateral compared to treasury bills and other short term financial instruments. However, the higher proportion was motivated by the higher returns associated with such assets while still keeping it relatively liquid in order to meet financial obligations in a real time as and when due. Banks' dependence on non-deposits sources of funding (NDD) registered an average score of 0.2110 with a standard deviation of 0.1438 accounting for this variation. This means about 21.10% of banks' funding in meeting their daily obligations was sourced from borrowings other than customer deposit. Again evidence is given of greater competition in the banking industry (CONC) with an average of 9.25% concentration. Banking concentration has declined over time since the gradual inception of new banking institutions into the Ghanaian financial system. The rate of inflation (INFL), the only macroeconomic variable that entered the estimation of the determinants of

liquidity risk recorded an average of 14.59% within the period of study.

4.2 Correlation Matrix

The coefficient of correlation provides an index of the direction and the magnitude of the relationship between two sets of scores without implying causality. It intended to demonstrate relationship or association and the strength of any association identified, if any. 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 of 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 with the overall model having significant F statistic. The huge value of the coefficients between the FGAPR and NLD is expected but both were never used in the same regression model. Aside these values, all the coefficients fell within the tolerance level (the variance inflation factor).

Table 1. Relationships between the Financial Gap Ratio and Determinants of Bank Liquidity

FGAPR	EXP. SIGN	COEFFICIENT	P-VALUE
SIZE	+	0.0229	0.018**
LRLA	-	-0.6416	0.000***
RLA	+	-0.6961	0.000***
NDD	+	0.9339	0.000***
OWN	?	0.0053	0.806
CONC	-	-3.4112	0.000***
INFL	+	0.4901	0.002***
cons_	?	-0.2983	0.105

About bank-specific variables, the relationship between bank size (SIZE) and liquidity risk was significantly positive providing the evidence that as banks grow bigger in size, they have the incentive to increase risk-taking and hold more loans and consequently have larger financing gap ratio. That is, bigger banks have the capacity to mobilize funds (deposits) at a faster pace due to a wider branch network and the enormity of their assets to serve as collateral for funding at a cheaper price. Such banks are thus able to take greater risks by granting more loans to deficit spending units and thus face higher liquidity risk. This supports the findings of Lucchetta (2007), Bunda & Desquilbet (2008), Rauch *et al.* (2009) that as banks grow in size, their exposure to liquidity risk increases. In such scenarios where the banks have grown in size through bigger branch network, because of their inability of such branches to make profit from the commencement of operations, the bank in totality still takes care of such branches and thus curtails its ability to lend massively to the general public and hence face little liquidity problems.

As expected, less risky liquid assets to total assets ratio (LRLATA) was negatively related to liquidity risk and this relationship was very significant. This lends credence to the fact that banks with higher proportions of these types of assets enhance their general liquidity shock absorption capacity and thus minimize their liquidity risk exposure given that market liquidity is the same for all banks in the sample. The results indicate that banks can reduce their liquidity risk by holding much liquid assets such as cash and other short term financial instruments or readily marketable instruments like treasury bills. Though higher proportions of these assets guarantee the ability of banks to meet financial obligations like honoring customer withdrawals, financing increases

in assets or meeting other transaction demands as and when due, it is regarded as inefficiency on the part management because of the lower returns associated with such assets. This result is in line with the findings of Shen et al.(2009), Pavla (2011) and Gomes & Khan (2011). Contrary to expectations of a positive relationship, the ratio of risky liquid assets to total assets (RLATA) exhibited a statistically significant negative relationship with liquidity risk. This implies that banks that hold part of their assets in portfolios like securities and other medium to long term investments are able to meet their financial commitments as they fall due because managers' ability able to secure funds from other sources using such assets as collateral though at a relatively higher cost as compared to less risky liquid assets like treasury bills and other short term financial instruments. It is important to note that since risky liquid assets and less risky liquid assets make a up a bank's liquid assets, keeping higher proportions of it insulates a bank from failing in its liquidity requirements such meeting contingent liabilities like substantial withdrawal of deposits and any other unexpected future costs. This indication is supported by other studies from Shen et al.(2009), Vodova (2011) and Gomes & Khan (2011). The funding structure of a bank is hypothesized to influence its liquidity risk. The dependence on sources funding other than deposits (NDD) such as short term money markets instruments exposes banks to high liquidity risk due to its unstable nature and the relatively expensive costs associated with it. The positive relationship and the strong significance evidenced in the results gives a clear indication that banks that heavily depend on non-deposits sources of funding face bigger liquidity problems. The results revealed that a unit change in non-deposits dependence increased the financing gap ratio by 0.9339 among the banks studied over the period. That is, the

larger funds needed to be borrowed from the money markets to meet a bank's financial obligations, the greater the liquidity risk it will face from such reliance. The implication of this result is that for banks to minimize their liquidity risk, banks can diversify their funding sources to reduce liquidity risk. This result is consistent with the views expressed by Saunders & Cornett (2006), Iion & Dragos (2006), Shen et al. (2009).

The ownership structure (OWN) of a bank which enters the regression model as a dummy variable shows a positive but a statistically insignificant relationship with liquidity risk. The result showed that the ownership structure of a bank was not a major determinant of bank liquidity risk in Ghana since the mean financing gap ratios (liquidity risk) of all banks in the sample were not statistically different from each other at any significance level.

Bank concentration (CONC) also played an important role in the determination of liquidity risk among the banks in the industry since the greater the industry concentration, the lesser the competition among the players and vice versa. The results from the regression show a statistically significant negative relationship between bank concentration and bank liquidity risk, thus indirectly showing a positive relationship between bank competition and liquidity risk. A bank in a highly concentrated industry finds less difficulty in mobilizing deposits and thus is able to gather enough stable cheap funds as such to meet its obligations as they fall due. However, as concentration minimizes arising from new banks being incorporated into the industry, the players compete fervently for customer deposits as this source of funding forms the basis of

banks financing. On the asset side, each bank endeavours to take advantage of good business opportunities in lending to profitable business ventures and hence a high propensity of facing liquidity risk. Competition in the Ghanaian banking system has gradually increased since the Banking Act was enacted in 2004 which allowed hitherto specialized banks to engage in universal banking coupled with the influx of foreign banks and the establishment of new indigenous banks. Irrespective of the anxious efforts by banks through intense advertisements and promotions to reach the highly un-banked populace of the Ghanaian economy, the response has not been very encouraging as these banks continue to feed on the little banking public. This result supports the view by Landskroner & Paroush (2008) that liquidity risk increases with increased competition in the banking industry.

The rate of inflation (INFL), defined as the general increases in the prices of goods and services in an economy at a given time exhibited positive and a statistically significant effect on bank liquidity risk among Ghanaian banks. The rate of inflation also indirectly reflects the level of economic activity, the level of demand and supply of goods and services within an economy. Increases in the prices of goods and services directly affect the cost of production and hence the increase in demand for loans by business enterprises and individuals. Banks normally take advantage of this opportunity and hence grant loans to ventures they deem to be profitable in order to make their profit through higher margins, and thus improve the quality of their assets. Because of the desire to lend more during periods of high economic activity and the accompanying high inflation, banks are thus exposed to greater liquidity risk as inflation increases. This results corroborated studies by Kosmidou *et al.*(2005),

Athanasoglou *et al.*(2006), Pasiouras & Kosmidou (2007). However, this result was different from other studies such as Kosmidou (2008) hinge on the view that banks are not able to lend much during the period of high inflation but rather hoard liquidity due to the high cost associated with obtaining short term funds from the money market in order to meet their financial commitments. This means that according to this view, the change in inflation was negatively related to liquidity risk.

In order to ascertain the sturdiness of the relationships between the liquidity risk and the explanatory variables, the ratio of net loans to customer deposits (NLD) was also used as an alternative measure of liquidity risk (dependent variable). The results obtained from this regression also show almost the same relationships and significance levels as obtained in the first regression with the financing gap ratio (FGAPR) as the dependent variable and thus proving the robustness of the results.

From Table 2 which contained the results where the NLD was used as a measure of liquidity risk, apart from bank size that shows an insignificant relationship with liquidity risk, all the results were highly consistent with the earlier results where the FGAPR was used as the measure for liquidity risk. The other difference worthy of note is the sign of the coefficients of the constants which are both significant at 5% but show contrasting relationships with bank liquidity risk.

Table 2. Relationship Between Net-Loans-to-Deposits and Determinants of Bank Liquidity

NLD	EXP. SIGN	COEFFICIENT	P-VALUE
SIZE	+	0.0226	0.241
LRLA	-	-0.8628	0.001***
RLA	+	-1.0652	0.000***
NDD	+	1.3242	0.000***
OWN	?	-0.0097	0.819
CONC	-	-5.4882	0.000***
INFL	+	0.8532	0.002***
_cons	?	0.7977	0.023**

4.3 Conclusion

The panel data regression based the random effects GLS results revealed that bank size, the rate of inflation and non-deposit dependence had a positive and a statistically significant relationship with liquidity risk while liquid assets and bank concentration in the industry showed a negatively significant relationship.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the whole study, draws out conclusions from the research objectives and provides policy recommendations for the study based on the determinants of liquidity risk 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.

5.1 Summary Of Findings

Liquidity risk may have diverse effects on a bank's earnings and capital base depending on where it is managed. Under extreme circumstances, it may cause the collapse of an otherwise solvent bank. The study sought to achieve two main objectives of estimating the determinants of bank liquidity risk in Ghana and also estimated the effects of liquidity risk of bank profitability in Ghana by controlling for the other variables. The study depended on data of 4 banks operating in Ghana for a 10-year period ranging 2002 to 2011. With the financing gap ratio (FGAPR) and the ratio of net loans to deposits (NLD) as the measures for bank liquidity risk, bank size, the components of bank liquid assets (risky liquid assets and less risky liquid assets), the dependence on non-deposit funding, bank ownership, industry concentration (deposits) and the rate of inflation were hypothesized to be the determinants of liquidity risk among banks in Ghana. The size (SIZE) was established to be positively related with liquidity risk measured by the financing gap ratio (FGAPR) and statistically significant at 10% and

5% levels respectively and thus validating the hypothesis that bigger banks have the penchant to lend out much of their deposits due to their capacity mobilize funds with less difficulty.

The components of liquid assets which were classified into risky liquid assets (RLAs) and less risky liquid assets (LRLAs) all standardized by each banks total assets were both negatively related to liquidity risk (FGAPR) and were both statistically significant at 1%. The results indicate that a unit increase (decrease) in LRLAs would lead to a decrease (an increase) in liquidity risk by 0.6416 while a unit increase (decrease) would decrease (increase) liquidity risk by 0.6961 all confirming the hypothesis that banks that hold a considerable amount liquid assets are insulated against liquidity risk. The results also indicated that banks that depend solely on funding sources other deposits (non-deposit dependence) are highly exposed to liquidity risk due to its volatile and expensive nature. The result indicated a positive and a statistically significant relationship between non-deposits dependence and the financing gap ratio. The study also revealed that the type of bank ownership, be it foreign or local has not significant impact on bank liquidity risk. The result depicted a statistically insignificant relationship with in liquidity risk the Ghanaian banking sector. Bank concentration measured by the HHI using bank deposits also indicated a negative relationship with the financing gap ratio (liquidity risk) and was also statistically significant at 1%. The implication of this result is that as competition among the banks increase, the exposure to liquidity increases due to the keen contest among banks for the mobilization of funds (deposits) due to its cheap and stable nature as major funding source for the daily operations of banks in Ghana. The only macroeconomic variable that entered the

regression model for the determinants of liquidity risk among Ghanaian banking system, the rate of inflation also showed a positive association with liquidity risk and was statistically significant as well. This means that the general increases in the prices of goods and services in the Ghanaian economy normally requires banks to lend much of their deposits and also charge higher interest rates on the loans granted. On the side of deposit mobilization, individuals and corporate bodies at large spend much their daily activities and other operational expenditure and are thus left with little or nothing to save with the banks that serve as a major source of funding for the banks. It is important to acknowledge that the conclusions inferred from the usage of the financing gap ratio (FGAPR) as the dependent variable the liquidity risk model does not vary significantly with the use of the net loans to deposits (NLD) as a measure for liquidity risk.

5.2 Conclusion

The aim of the current study was to explore the liquidity risk of four listed banks. Specifically the current study intended to evaluate evaluate the influence of predictors such as bank size on liquidity risk and also assess the liquidity risk of the chosen banks over a time of ten years. The study used panel data from the four commercial and listed banks in Ghana spanning the period 2002 to 2011. The financial gap ratio (FGAPR) and the net loans to total deposits (NLD) ratio (dependent variables) were used to evaluate liquidity risk among the banks. The panel data was analysed to evaluate the strength of association between these ratios and predictors of bank liquidity (independent variables), i.e., bank size, bank concentration, bank ownership, risky and less risky liquid assets, non-deposits dependence, and inflation. The panel data

regression results have revealed that bank size, the rate of inflation and non-deposit dependence had a positive and a statistically significant relationship with liquidity risk while liquid assets and bank concentration in the industry show a negatively significant relationship with bank liquidity risk. The study recommends among other things, that banks in Ghana place particular importance into monitoring the indicators and determinants that were identified to impact liquidity positively or adversely, i.e., the size of the bank, the components of liquid assets which may be either risky or less risky liquid assets, non-deposit dependence, industry concentration and the change in inflation. The study further recommends a yearly update of liquidity risk assessment in light of the burgeoning competition among banks in Ghana and as a follow up, the study also suggests measuring how liquidity risk relates or impacts on profitability among these listed banks. The study concludes that though there may be other factors that affect the liquidity risk of banks, the size of the bank, the components of liquid assets which may be either risky or less risky liquid assets, non-deposit dependence, industry concentration and the change in inflation are major determinants due to their high statistical significance.

5.3. Recommendations

The study recommends that banks in Ghana place particular importance into monitoring the indicators and determinants that were identified to impact liquidity positively or adversely, i.e., the size of the bank, the components of liquid assets which may be either risky or less risky liquid assets, non-deposit dependence, industry concentration and the change in inflation.

The study further recommends a yearly update of liquidity risk assessment in light of

the burgeoning competition among banks in Ghana.

As a follow up, the study also recommends measuring how liquidity risk relates or impacts on profitability among these listed banks.

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