COLLEGE OF HUMANITIES

UNIVERSITY OF GHANA

BANK CAPITAL AND LIQUIDITY CREATION IN GHANA: DOES
OWNERSHIP STRUCTURE MATTER?

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF
MASTER OF PHILOSOPHY (MPHIL) FINANCE DEGREE.

JULY, 2018
DECLARATION

This is to certify that this thesis is the product of research undertaken by JULIA AGYEIWAA ANARFI towards the award of a MASTER OF PHILOSOPHY IN FINANCE in the Department of Finance, College of Humanities, University of Ghana, Legon. All references used in this work have been accordingly acknowledged.

I bear sole responsibility for any shortcomings.

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DEDICATION

This work is dedicated to my parents, siblings, lecturers, MPhil colleagues, friends and all those who in diverse ways and efforts, contributed to the success of this work.
ACKNOWLEDGEMENTS

My utmost appreciation goes to the Almighty God for giving me the strength, guidance, wisdom and perseverance to finish this work successfully. Immense gratitude also goes to my supervisors, Prof K. A. Osei and Dr A. Gyeke-Dako whose guidance and rich advice saw me through the whole thesis process.

Special thanks go to my parents, Prof. John K. Anarfi and Mrs Agnes Anarfi; as well as all my siblings for the inspiration and motivational force they have provided for me throughout my academic life.

I am very thankful to Seyram Ahiekpor and Mr Emmanuel Abbey of the Economics Department, University of Ghana, for their unique assistance. I am also grateful to all my MPhil colleagues and friends out there who supported me in one way or the other to make this thesis a successful one.

God richly bless you all.
ABSTRACT

Two central roles performed by banks, according to the modern theory of financial intermediation, are liquidity creation and risk transformation, making the banking sector a highly regulated one. The Ghanaian banking sector over the past two decades has been undergoing major reforms. One of such reforms is the issue of bank recapitalisation. It is against this background that the study sought to investigate the relationship that exists between bank regulatory capital and liquidity creation in Ghana, using banks' ownership structure as a moderating variable.

To attain the above objective, the study made use of an unbalanced data set of 17 banks over a ten-year period spanning 2007 to 2016. Based on the Hausman Specification test, the random effects model was employed to estimate the panel regression model specified. Findings of the study confirmed that Ghanaian banks do not create much liquidity within the economy. Also, the study confirmed that the impact of banks' regulatory capital on liquidity creation is influenced by the bank's ownership structure.

The study recommended that the Central Bank puts in place a local Guarantee Scheme to help build relationships between the banks and potential borrowers. This scheme would help the government to allocate funds to productive but risky sectors within the economy thus, aiding liquidity creation. Also, the Bank of Ghana could liaise with the appropriate authorities, to consider granting tax incentives to banks who are willing to lend a certain percentage of available funds to earmarked productive sectors. This incentive would serve as a source of motivation and encouragement for banks willing to take on the additional risk of lending to such risky sectors.

Keywords: Bank Regulatory Capital, Liquidity Creation, Ownership Structure.
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CHAPTER ONE

INTRODUCTION

1.0 Background of the study

The modern theory of financial intermediation posits that banks exist to perform two central roles within the economy: liquidity creation and risk transformation. According to the risk transformation theory, banks transform risk by issuing riskless deposits to finance risky loans. The liquidity creation theory, on the other hand, states that banks create liquidity on the balance sheet by using illiquid assets to fund liquid liabilities. The intuition behind the liquidity creation theory is that banks create liquidity because they hold illiquid assets (through the provision of long-term loans to the public), and give the public liquid liabilities (an example being transaction deposits which are paid to customers on demand). On the other hand, banks destroy liquidity by holding illiquid liabilities (through long-term borrowing of funds from the public) and investing in liquid assets which the bank can easily convert to cash to meet their need for liquid funds. Capturing these opposing effects gives a comprehensive measure of liquidity created by banks operating within an economy (Berger & Bouwman, 2009).

The need for efficiency in the banking industry depends on banks' ability to spot and manage high-risk and high-return opportunities, and effectively control costs. For banks to sustain their growth and profitability, they need to introduce differentiated products and services; and this tends to expose them to various risks. As a result, banks need to recapitalise so they can absorb massive economic shocks and significantly contribute to the real growth of the economy (Morrison & Associates, 2016). The Basel Committee on Banking Supervision (BCBS), which was formed in 1974, is an international committee which develops standards for banking regulation. Over the years, it has developed a series of highly influential policy
recommendations known as the Basel Accords, and these have been adopted by central banks in various countries worldwide.

The Basel Committee on Banking Supervision (BCBS) in the aftermath of the recent global financial crisis, introduced new macro-prudential regulatory measures designed to address the systemic risk which results from banks’ interconnectedness in the global banking system. This regulatory framework, known as Basel III, requires banks to hold a higher amount of common equity in Tier 1 capital (4.5% of total risk-weighted assets). This percentage is a substantial increase in capital requirements from Basel I and II (which required that Tier 1 capital in total make up 4% of risk-weighted assets). Minimum total capital ratio, however, remains at 8%. Also, per the framework, additional capital requirements (ranging between 1% and 3.5%) can be imposed on banks that are seen to be very important within the financial system; thus, raising the minimum ratio to 13% of total risk-weighted assets in such conditions (9.5% common equity capital + 3.5% additional capital). Banks may also be required to build up capital buffers during periods of excessive credit growth for potential losses during economic downturns (Tran, Lin & Nguyen, 2016).

Berger and Bouwman (2009) posit two hypotheses that frame the causal link moving from banks' capital to liquidity creation: the risk absorption hypothesis and the financial fragility/crowding-out hypothesis. The risk absorption hypothesis predicts that increased capital enhances a bank's ability to create liquidity. As banks create more liquidity, they face a greater risk of becoming illiquid as an increasing share of their balance sheet becomes filled with illiquid assets. However, a larger capital base allows the bank to absorb any losses that may arise from the increased risk hence, enhancing the bank’s ability to create more liquidity. The "financial fragility/crowding-out" hypothesis, on the other hand, predicts that greater capital hampers liquidity creation. According to Diamond and Rajan (2001) financial fragility, which is characterised by lower capital and a higher share of liquid deposits, tends
to favour liquidity creation (since banks have more deposits to enable them to finance more loans). However, as the banks' capital base increases, they become less fragile, and this hampers the credibility of its commitment to depositors. This increase in the capital base may result in a fall in deposits and consequently, a fall in liquidity creation. Hence, greater capital tends to diminish liquidity creation.

Berger and Bouwman (2009) examined the effect of capital on liquidity creation using data on US banks. They found support for both the ‘risk absorption’ and the ‘financial fragility-crowding out’ hypothesis for various bank sizes. They further stated that, though the theories suggest a causal relationship from capital to liquidity creation, in practice both may be jointly determined, making it challenging to establish causation. Horvath, Seidler & Weill (2014) also proposed a mechanism through which the relation moves from liquidity creation to capital, using the illiquidity risk hypothesis. This hypothesis suggests that an increase in the amount of liquidity created by banks exposes them to a higher risk of becoming illiquid because illiquid assets tend to occupy a larger share of their total balance sheets; thus, incentivising banks to strengthen their solvency through an increase in capital.

A few other studies have been done on bank capital and liquidity creation following Berger and Bouwman (2009), and per the existing literature, a bi-causal relationship may exist between bank capital and liquidity creation. In the case of the causal link moving from capital to liquidity creation, most of the studies found support for the financial fragility-crowding out hypothesis (Berger & Bouwman, 2009; Fungacova, Weill & Zhou, 2017; Freitas, 2014); with a few finding support for the risk absorption hypothesis (Berger & Bouwman, 2009; Tran et al., 2016). For the causal link moving from liquidity creation to capital, a negative relationship is mostly reported (Casu, Di Pietro & Trujillo-Ponce, 2016; Horvath et al., 2014; Distinguin, Roulet & Tarazi, 2013), with a few studies reporting a positive relationship (Tran et al., 2016; Distinguin et al., 2013).
According to Laevine and Levine (2009), recent financial regulatory reforms target banks’ risk-taking behaviours without considering their ownership and governance. It is argued that bank governance influences how regulations alter a bank's incentives. Banks with more powerful owners tend to take more risks, and greater capital requirements tend to increase risk-taking in banks with influential shareholders. As such, bank regulations (an example being regulations on bank capitalisation) should condition on bank governance and the ownership structure of the banks.

1.1 Overview of the Ghanaian banking industry

Ghana, over the years, has seen a significant increase in the number of banks operating within the country; with a rapidly expanding deposit base. As a dynamic economy with regional importance and large infrastructural needs, Ghana can significantly benefit from and contribute to regional financial integration (Ackah & Asiamah, 2014). Currently, Ghana is home to 34 banks, of which 17 are foreign owned, and the remaining 17 are local banks. According to the Bank of Ghana, the banking industry has seen significant developments over the last few years. The industry continues to record growth in total assets despite challenges posed to some banks given the general economic problems (e.g. energy crisis, utility price increments etc.) emerging from the real sector to the banking sector.

In 2003, the Bank of Ghana (BOG) directed all banks to increase their stated capital to GH₵ 7million by the end of the year 2006. This increase in stated capital was to enable them to hold the universal banking licence that allowed them to undertake retail, merchant, development, and investment banking without the need to acquire separate licences. Most banks raised the additional capital required through transfers from retained earnings and income surpluses. In the process, the industry's stated capital was increased from GH₵ 29million (2003) to GH₵ 181million (2007), i.e. by more than five times the 2003 levels. A
key result of compliance with this directive was that bank lending increased from GH₵ 1.055 billion (2003) to GH₵ 2.464 billion (2007), representing a 66% increase in one year. Before the year 2007, industry net loans and advances had been growing at a simple average of 32% between 2003 and 2006. There was also an improvement in the industry’s liquidity position as the first phase of the mandatory capital injection was attained by 25 out of the 26 banks operating in the country (Ghana banking survey, 2008).

In 2008, the regulator further announced an upward revision of the minimum capital of banks to GH₵ 60 million in a bid towards making banks more resilient against unforeseen or unexpected losses (Ghana banking survey, 2017). As at the end of 2010, liquid funds held were 74% of the industry's total deposits. The Financial Stability Report released by the Monetary Policy Committee in September 2014 stated that the banking industry's liquid assets increased sharply between 2007 and 2014. In July 2007, liquid assets were GH₵ 1.55 billion, GH₵ 3.71 billion in July 2010 and by July 2014 had reached GH₵ 11.3 billion. The industry is being very cautious in maintaining liquid funds to meet its contractual obligations as and when they arise. The 2017 Ghana banking survey report also makes a similar claim: "The industry as a whole is risk-averse; holding short-term investments in placements and government securities."

As in the case of most developing countries in Africa that have pursued economic and structural reforms, Ghana is no exception. The Central Bank has been proactive in reforming the banking system and has also set itself to enhance the institutional infrastructure for prudential regulation, such as the establishment of a Deposit Insurance scheme and an orderly framework for dealing with problem banks in the future, among others (Ackah & Asiamah, 2014). The major banking reforms that have taken place in the banking industry since 2002 are as follows:
- The introduction of the universal banking license for banks that had met the minimum capital requirement of GH₵ 7 million. (2003)
- Abolition of the 15% secondary deposit reserve requirement. (2006)
- Redenomination of the Cedi. (2007)
- Introduction of the E-zwich card (2008)

These prudential and legal regulatory reforms, coupled with the upgrade in the skills and competencies of the supervisory staff have ensured that the Ghanaian banking system continues to be sound, well-liquid and adequately capitalised. According to the Ghana banking survey report (2017), though capital has improved over the years, the current level of capitalisation in the industry raises some concern because the risk exposure of banks both locally and globally is on the rise. As such, there is a need to mitigate this exposure by building up the capital base to better contain shocks. A Bank of Ghana letter dated November 14, 2017 states that the Bank of Ghana is giving immediate priority to Basel II pillar I risk (i.e. credit, operational and market risks) and the Basel III capital framework. The letter further stated that the Bank of Ghana would introduce other parts of the Basel framework (Basel II pillars 2&3 and Basel III liquidity requirements) when the Basel regulatory framework is in place.

1.2 Statement of the problem

Ghana’s financial system has gone through a rapid growth phase, as well as a significant structural transformation over the decades, and this has brought about new opportunities and risk within the financial system. This has improved the role that banks play as financial
intermediaries, and regulators of the banking industry have continued to implement reforms to help strengthen the banking sector (Abdallah, 2015). One of such reforms that have been implemented by the Bank of Ghana over the last two decades is the issue of bank recapitalisation.

According to Morrison and Associates (2016), before the recapitalisation exercises that have been going on in the banking industry since 2003, banks were vulnerable to significant swings caused by unpredictable macroeconomic indicators. Also, most local banks with a small capital base could not participate in annual syndication of cocoa purchases by the Cocoa Board, neither were they major players in the country's oil find. This situation was due to banking laws restricting banks from extending capital to individuals, or a single transaction to no more than 25% of their net worth.

Currently, the minimum capital requirement of universal banks in Ghana, as revised in September 2017 stands at GHC 400 million. The capital injections that have been made into the banking sector since the early 2000s have helped to strengthen the liquidity of banks operating within the country. According to the World Development Indicators (WDI) the liquidity ratio, measured by the ratio of liquid reserves to bank assets in Ghana, has continuously been above the world average since the year 2010. This suggests that banks operating in Ghana have been highly liquid over the last few years.

Further, the bank of Ghana is set out to implement the Basel II/III regulatory framework in 2018. Besides the fact that this would lead to more capital injections and hence improved liquidity, the Basel III accord includes liquidity requirements which discourage banks from creating liquidity; as banks are encouraged to hold more liquid assets and discouraged from holding illiquid loans and liquid deposits. These liquidity requirements could pose a problem if banks are already not creating enough liquidity within the system. This is because
holding excess liquidity (as data from the WDI shows) may imply that banks are forgoing their primary role as financial intermediaries (which includes liquidity creation), and this does not augur well for any economy as access to credit is hampered.

It is therefore vital that we measure how much liquidity has been created by banks over the sample period, to determine if it's the case that banks are holding on to excess liquidity at the detriment of effective financial intermediation. Also, there is the need to understand the relationship that lies between bank regulatory capital and liquidity creation in Ghana. This would serve as a guide for regulators of the banking industry by bringing out the impact that the recent increases in bank minimum capital requirements have had on the banks' liquidity creation function, and to also aid them in tailoring the Basel II/III framework to suit the Ghanaian banking system.

The ownership structure of a bank may influence the relationship that lies between bank regulatory capital and liquidity creation. Studies that have been done on banks' risk-taking activities have shown that concentrated ownership structure is associated with an increase in bank risk-taking (Hammami & Boubaker, 2015; Dong, Meng, Firth & Hou, 2014). As stated earlier, liquidity creation is a risk-taking venture in that, as banks create more liquidity, they face a higher risk of becoming illiquid. However, prior studies that have looked at the relationship between bank regulatory capital and liquidity creation have not considered the ownership structure of the banks. Also, most of the universal banks currently operating in Ghana have a concentrated ownership structure. Hence, there is the probability that this could influence the impact of regulatory capital on banks’ liquidity creation function in Ghana. This study, therefore, seeks to examine the relationship that lies between regulatory capital and liquidity creation of banks operating in Ghana; using ownership structure as a moderating variable.
1.3 Research Objectives

This study seeks to achieve the following objectives:

- To measure liquidity creation among universal banks in Ghana over the study period.
- To determine the relationship that lies between banks’ regulatory capital and liquidity creation.
- To determine if a bank’s ownership structure has any influence on the relationship that lies between bank’s regulatory capital and liquidity creation.

1.4 Research Questions

- How much liquidity has been created by universal banks operating in Ghana over the sample period?
- What is the relationship between regulatory capital and liquidity creation of universal banks in Ghana?
- Does a bank’s ownership structure influence the relationship that lies between bank regulatory capital and liquidity creation?

1.5 Significance of the Study

The findings of this study aim to:

i. Help the Central bank to formulate policies on capital requirements and other related areas of the banking industry in Ghana.

ii. Assist banks in determining how a range of factors (capital and ownership structure) affect their ability to create liquidity so they can best strategise in maintaining a balance
between their role as liquidity creators, governance issues and keeping adequate capital levels to help cushion them against various risks they face.

iii. Provide guidelines to other similar developing nations in Africa in maintaining a right balance between capital and liquidity creation.

1.6 Scope and Limitations of the Study

The study focuses mainly on universal banks in Ghana. It employs data on 17 banks over a ten-year period (2007-2016). A panel regression technique is used to determine if a bank’s ownership structure moderates the relationship between bank regulatory capital and liquidity creation. Analysis of the study is limited due to unavailability of complete data. However, this does not affect the study carried out and the results obtained. Also, findings of the study may not be generalized to other jurisdictions.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focuses on issues related to Bank Capital Regulations, and reviews relevant literature. The issues covered here include the evolution of bank capital requirements, theoretical and empirical review of literature on bank capital requirements and liquidity creation, and finally the conceptual review of the study.

2.1 Evolution of bank capital requirements

During the 1980s, international efforts were employed to achieve harmonisation of capital standards to provide an equal playing field for internationally active banks; and to strengthen the soundness and stability of the banking system. This equality was achieved through the Basel Capital Accord (Basel I), which was implemented in 1988. These frameworks, developed by the Basel Committee on banking supervision (BCBS), consisted of a set of principles used to measure and assess capital levels in relation to credit risk. The main advantage of the framework was the weighting of assets according to their risk; as such accounting for their likelihood to cause unexpected losses. The framework aided with the definition of regulatory capital, measurement of risk-weighted assets (including off-balance sheet exposures) and minimum metrics for regulatory capital to risk-weighted assets. The framework required that tier 1 capital make up 4% of risk-weighted assets; and the total capital adequacy ratio of 8% must consist of tier 1, tier 2 and tier 3 capital.

Although Basel I framework was a significant step forward in capital regulation, it had inherent weaknesses. Firstly, it was not sufficiently risk-sensitive to account for the shifting of the portfolio's composition from high quality towards lower quality credits; a practice
commonly referred to as "cherry picking". Secondly, securitisation, a process that involves the transformation of an illiquid asset or group of assets into a security, enabled banks to exploit differences between economic risk and Basel I capital requirements. Lastly, the limited disclosure under Basel I did not provide adequate transparency of risk and its relation to capital. Also, the accord did not place adequate focus on risk management. Due to these problems associated with the Basel I framework, the Basel Committee proposed in June 1999 a revised framework, which moved from a "one-size-fits-all" approach embodied in the Basel I capital Accord towards a more risk-sensitive approach. This revision led to the introduction of the Basel II Accord which was first published in 2004.

The purpose of the Basel II framework was to create an international standard that regulators of the banking industry can use as a benchmark when creating bank capital regulations. The main change in relation to the previous Accord was the introduction of a new capital adequacy based on the following three pillars:

- **Minimum regulatory capital requirements**: quantitative capital requirements for given risk levels. Basel II also requires banks to have a minimum capital adequacy ratio of 8%, and 4% of that should be in the form of Tier 1 capital. However, Basel II modified the risk weightings to account for the credit rating of an asset.

- **Supervisory review of an institution’s capital adequacy**: banks assess their overall capital adequacy in relation to their risk profile. Regulators review this assessment and are given the discretionary power to impose additional capital requirements in relation to risks not covered by pillar 1.

- **Internal assessment process and market discipline**: a supervisory review of banks' internal assessment of capital and risk.

The Basel II capital accord had the following aspirations:
• To maintain the overall level of capital within the system

• To ensure that capital regulations do not hurt competition among banks.

• To transfer the primary responsibility of assessing capital adequacy from industry regulators to the banks.

• To design a capital regime that covers all risk categories namely credit, market, operational and liquidity risks.

• To ensure there is greater risk sensitivity in the calculation of the minimum capital and the assessment of overall capital requirements.

Despite the improvement that had been made in the Basel accord under the Basel II framework, it didn't do much to improve the situation the banking system found itself in during the 2007/2008 financial crisis and global recession; which started in the United States of America (USA). This crisis had a massive impact on the global financial system as a result of excessive risk-taking by banks in the USA. It was triggered by a complex interplay of policies that encouraged home ownership; providing easier access to loans for subprime borrowers. However, banks and insurance companies lacked adequate capital holdings needed to back the financial commitments they were making. The BCBS, in the aftermath of the crisis, introduced some new macro-prudential regulatory measures (Basel III framework) designed to address the systemic risk which results from banks’ interconnectedness in the global banking system.

According to the Basel III framework (2010), a resilient and robust banking system is needed for sustainable economic growth; as banks are central to the credit intermediation process between surplus units and deficit units. Also, banks provide critical services to consumers, small-scale and medium-scale enterprises, corporate firms and governments who rely on them for funds to manage their daily affairs, both domestically and internationally. Hence, as part of its objectives to improve the banking sector's ability to
absorb shocks, the Basel Committee is strengthening the regulatory capital framework by building upon the three pillars of the Basel II framework, to help raise the resilience of the banking sector. The following objectives were outlined:

- Increasing the consistency, transparency and quality of the regulatory capital base
- Enhancing the risk coverage of the capital framework
- Supplementing the risk-based capital requirement with a leverage ratio
- Reducing procyclicality and promoting countercyclical buffers
- Addressing systemic risk and interconnectedness of banks within the global banking system.

Though the minimum total capital ratio remains at 8%, Basel III increased the amount of common equity in tier 1 to 4.5% from January 2015 till date (3.5% from January 2013 and 4% from January 2014). For banks that are deemed systematically important, the framework requires that they hold 13% of total risk-weighted assets. This includes 9.5% of common equity capital. The framework also introduced new liquidity requirements to ensure that banks have sufficient levels of high-quality liquid assets are available for a month; in the event of a severe stress scenario. The liquidity requirement is also to promote resilience over a long-time horizon to create incentives for banks to finance their activities with more stable sources of funding. Thus, the Basel committee does not only emphasise the importance of banks' solvency but liquidity creation as well. Banks function as key liquidity creators by financing relatively illiquid assets with relatively liquid liabilities; thereby contributing to financing the economy and facilitating transactions between economic agents. However, according to Horvath et al. (2014), the Basel committee seems to neglect the possibility that banks' solvency and liquidity creation might have a reverse causality.
2.2 Bank capital requirements and liquidity creation

This section reviews theoretical and empirical literature on the relationship that lies between Bank Regulatory Capital and Liquidity Creation in Ghana.

2.2.1 Theoretical Review

The existing literature on bank capital and liquidity creation shows that a bi-causal relationship exists between bank capital and liquidity creation. In the case of the causal link moving from capital to liquidity creation, two opposing hypotheses were proposed by Berger and Bouwman (2009): the risk absorption hypothesis and the financial fragility-crowding out hypothesis. For the causal link moving from liquidity creation to capital, we have the liquidity substitution hypothesis (proposed by Distinguin et al., 2013) and the illiquidity risk hypothesis (proposed by Horvath et al., 2014).

2.2.1.1 Risk absorption hypothesis

The risk absorption hypothesis predicts that higher capital enhances the ability of banks to create more liquidity. As a bank creates more liquidity, it faces increased exposure to risk. This is because, if they need more liquid funds to settle depositors, they will end up making greater losses if the situation demands that they sell illiquid assets to enable them to meet their liquidity needs. However, a broader capital base allows the bank to absorb greater risk hence the higher the amount of capital a bank holds, the greater its ability to create more liquidity.

2.2.1.2 Financial fragility-crowding out hypothesis

This hypothesis predicts that greater capital hampers liquidity creation. According to Funcagova et al. (2017), the financial fragility effect is the outcome of the following process: Banks collects funds from various depositors and lends these funds to long-term borrowers. After these loans have been given out, the bank must monitor the borrowers and ensure that
the loans are repaid. Through this monitoring process, the bank can obtain confidential information on its borrowers; and this gives the bank an advantage in assessing the profitability of these borrowers. This information asymmetry, however, creates an agency problem whereby the bank may be tempted to demand a greater share of the profits made on these loans; to the extent that it may threaten to curtail its monitoring activities if depositors refuse to pay the higher costs. Out of fear that the bank may abuse their trust, depositors may also feel reluctant to deposit their money with the bank.

In order not to lose the trust of depositors, banks are forced to demonstrate their commitment to depositors by adopting a fragile financial structure characterised by a larger share of liquid deposits. In this way, the bank runs the risk of losing funding if it attempts to breach depositors' trust in any way. Hence, financial fragility favours liquidity creation since banks receive more deposits to enable them to finance more loans. However, an increase in bank capital tends to reduce the fragile nature of the bank; and this hampers the credibility of its commitment to depositors. This loss of credibility may lead to a decrease in deposits, and consequently a fall in liquidity creation. Gorton and Winton (2000) argue that deposits are more effective liquidity hedges for investors than investments in equity capital. However, higher capital ratios shift investor’s funds from deposits to bank capital. As such, there is a reduction in overall liquidity for investors when the capital ratio is higher; since deposits are liquid and bank equity is illiquid.

2.2.1.3 Illiquidity risk hypothesis

This hypothesis, as proposed by Horvath et al. (2014) contends that greater liquidity creation increases the risk of illiquidity for banks because illiquid assets occupy a larger share of their total balance sheets. As a result, banks are incentivised to strengthen their solvency by increasing their capital base; to enable them to absorb the increased risk associated with
creating more liquidity. As such, greater liquidity creation should lead to higher levels of capital.

2.2.1.4 Liquidity substitution hypothesis

This hypothesis suggests that when liquidity creation increases, banks may consider certain liquid liabilities as stable funding sources hence, reducing their capital levels. Liquid liabilities such as demand deposits and time deposits with maturities of less than one year may be perceived to be more stable sources of funding. As a result, when banks face liquidity risk, they can substitute these for capital. Hence a negative effect of liquidity creation on bank capital is expected (Distinguin et al., 2013).

2.2.2 Empirical Review

Berger and Bouwman (2009) examined the impact of capital on liquidity creation using data on US banks. They found support for both the risk absorption and the financial fragility-crowding out hypotheses for various bank sizes. They further stated that, though the theories suggest a causal relationship from capital to liquidity creation, in practice both may be jointly determined; making it challenging to establish causation. On the other hand, Horvath et al. (2014) proposed a mechanism through which the relation moves from liquidity creation to capital using the illiquidity risk hypothesis. The hypothesis argues that greater liquidity creation exposes banks to a higher risk of becoming illiquid since it leads to a larger share of their total balance sheets being occupied by illiquid assets. As a result, banks are incentivised to strengthen their solvency by increasing their capital.

Following the illiquidity risk hypothesis, Horvath et al. (2014) examined the effect of capital on liquidity creation, as well as the effect of liquidity creation on capital. They found that capital negatively granger-causes liquidity creation; mostly for small banks but also observed that liquidity creation granger-causes a reduction in capital. Hence, their finding
supports the view that Basel III can reduce liquidity creation and that greater liquidity creation can reduce banks' solvency. This suggests that the bi-causal relationship existing between capital and liquidity creation results in a trade-off between the benefits gained from stronger capital requirements and the benefits gained from an increase in liquidity creation. This reverse causality also supports the notion that an optimal level of liquidity creation might exist.

This is in accordance with the findings of Fungacova et al. (2017) who sought to examine if the introduction of deposit insurance affects the relationship between bank capital and liquidity creation. According to their findings, the introduction of the deposit insurance scheme did not change the negative impact that bank capital has on liquidity creation. This seems to suggest that, bank capital requirements implemented for safety reasons may harm liquidity creation and as such harm a country's economic performance. Hence, they also posited that there appears to be a trade-off between the benefits of financial stability and the costs of lower liquidity creation for greater bank capital. Studies have also shown that bank characteristics such as size can have a significant influence on liquidity creation. As stated above, Berger and Bouwman (2009) found support for both the risk absorption and the financial fragility-crowding out hypotheses for various bank sizes. Based on their preferred "cat fat" liquidity creation measure (which considers off-balance sheet items as well), they found a positive and significant relationship between capital and liquidity creation for large banks, insignificant relationship for medium banks, and a negative and significant relationship for small banks. In accordance with the observation made by Berger and Bouwman (2009) on US banks, Horvath et al. (2014) also found (in their study on liquidity created by Czech banks) that large banks are the primary contributors of liquidity creation.

Tran et al. (2016), in examining the interrelationships among liquidity creation, regulatory capital and bank profitability of US banks also found that the effect of regulatory capital on
banks' capacity to create liquidity is not homogenous across bank size, sample periods, capital measures or level of regulatory capital. They found a positive bi-directional relationship between liquidity creation and regulatory capital which applies mostly to small banks; and that this relationship holds true primarily during non-crisis periods. Hence their results suggest that an increase in capital requirements does not reduce a bank's capacity to create liquidity. They further posited that lower capitalised banks should increase their regulatory capital to reduce their default risk and enhance their performance. This is in opposition to the findings of Berger and Bouwman (2009) on their study on US banks stated above; in which they found a negative and significant relationship between bank capital and liquidity creation for small banks.

Table 2.1 gives a summary of the empirical evidence provided by the literature so far on bank capital and liquidity creation:
Table 2.1: Summary of empirical evidence

<table>
<thead>
<tr>
<th>CAUSAL LINK FROM CAPITAL TO LIQUIDITY CREATION</th>
<th>CAUSAL LINK FROM LIQUIDITY CREATION TO CAPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISK ABSORPTION HYPOTHESIS</td>
<td>FINANCIAL FRAGILITY-CROWDING OUT HYPOTHESIS</td>
</tr>
<tr>
<td>Tran et al. (2016): applies mostly to small banks</td>
<td>Fungacova et al. (2017): holds for small banks when other liquidity measures (other than the B&amp;B measure are used)</td>
</tr>
<tr>
<td>Umar et al. (2017): holds for all publicly listed banks</td>
<td>Distinguin et al. (2013): holds for all banks (using B&amp;B measure)</td>
</tr>
<tr>
<td>Freitas (2014): holds for large and small banks</td>
<td></td>
</tr>
<tr>
<td>Casu et al. (2016): holds for all banks</td>
<td></td>
</tr>
<tr>
<td>Horvath et al. (2014): holds for small banks</td>
<td></td>
</tr>
</tbody>
</table>

From table 2.1 above, not many studies have been done in this area. However, as earlier mentioned, empirical evidence suggests that there might be a bi-causal relationship between bank capital and liquidity creation. In the case of the causal link moving from capital to liquidity creation, most of the studies found support for the financial fragility-crowding out hypothesis (negative relationship); with a few studies finding support for the risk absorption hypothesis (positive relationship). For the causal link moving from liquidity creation to capital, support is mostly found for the liquidity substitution hypothesis (negative relationship); with a few reporting a positive relationship (in line with the illiquidity risk hypothesis).

2.3 Conceptual Review

One important variable that has mostly not been present in the literature on bank capital and liquidity creation is ownership structure (bank governance). “The emphasis on using official
regulations to induce sound banking while ignoring the role of bank governance is surprising because standard agency theory suggests that ownership structure influences corporate risk-taking” (Jensen & Meckling, 1976). According to Macey and O’Hara (2003), the intellectual debate on corporate governance has focused on two very different issues:

- Whether corporate governance should focus exclusively on protecting the interests of equity claimants or whether corporate governance should expand its focus to deal with the problems of other groups, called “stakeholders”.

- The second issue of importance assumes that corporate governance should concern itself solely with the challenge of protecting equity claimants; and attempts to specify ways in which the corporation can better safeguard those interests.

However, they posited that banks have specific problems that differ from other corporations and as such, the scope of the duties and responsibilities of directors and corporate officers of banks should be expanded. They argued that the unique corporate governance problems of banks tend to weaken the case for making shareholders the sole beneficiaries of fiduciary duties. The reason for their argument included the following:

2.3.1 The liquidity production role of banks:

Banks create liquidity for the economy by holding illiquid assets and issuing liquid liabilities. This function of the bank may cause a collective-action problem among depositors since banks keep only a percentage of deposits on reserve at any point in time. This maturity mismatch between the bank's assets and liabilities become an issue if a bank run occurs. As such, one argument used to justify the special regulatory treatment of banks is that the collective-action problem among bank depositors can cause even a solvent bank to fail.
2.3.2 The deposit insurance fund:

The creation of deposit insurance funds has been beneficial in the prevention of bank runs, and it has kept the failure of individual banks from affecting the broader economy. However, the presence of deposit insurance intensifies the ability and incentive of stockholders to increase risk. According to Macey and O'Hara (2003), this moral hazard occurs for two reasons:

- Bank shareholders can transfer some of their losses to innocent third parties. These third parties are healthy banks whose contributions to the central government is used to pay off depositors of failed banks; as well as taxpayers whose monies are used to replenish the deposit insurance fund when it is depleted.

- Deposit insurance premiums are not related to the increased risk posed by specific banks.

Higher capital requirements by regulators are usually used as a tool to reduce these moral hazards by forcing shareholders to put more of their money at risk. However, according to Laeven and Levine (2009), although capital regulations might induce the bank to raise capital, it may not force influential owners to invest more of their wealth in the bank. They also added that capital regulations may increase risk-taking even more since owners may compensate for the loss of utility by selecting a riskier investment portfolio.

2.3.3 The conflict between fixed claimants and shareholders

Investment strategies that increase risk tend to transfer wealth from the fixed claimants to the shareholders. This situation is worsened in the banking sector because of the high debt to equity ratio and the existence of deposit insurance. Bank managers are fixed claimants to their compensation (salaries and other bonuses). As such, their incentive for risk-taking is reduced since they have invested in the bank in the form of their human skills. However,
the presence of deposit insurance removes the incentive for depositors to control excessive risk taking since they are assured of their money in the event of any failure. This lack of motivation on the part of depositors tends to enhance the degree of influence exerted by shareholders who prefer to assume higher levels of risk.

The second and third points raise the issue of tension that lies between shareholders, managers and other stakeholders of a bank where the problem of risk-taking is concerned. Numerous studies have looked at the ownership structure of a bank and how it impacts on their risk-taking behaviour. Hammami and Boubaker (2015) looked at ownership structure and bank risk-taking among banks in the Middle East and North Africa. They found that concentrated ownership structure is associated with an increase in bank risk-taking. However, foreign banks were found to be associated with greater risk compared to domestic owned banks. Government-owned banks were found to be more stable. This contrasts with the findings of Dong et al. (2014) who found that banks controlled by the government tend to take more risk than those controlled by state-owned enterprises or private investors. The results are more pronounced among banks with concentrated ownership.

Jamil, Said and Nor (2014) also studied ownership structure and bank risk-taking among Malaysian banking institutions. In assessing the direct relationship that lies between ownership structure and a bank's risk (Z-score), they found no significance. However, their results showed significant findings for capital adequacy when used as a moderating factor between ownership structure and the Z-score. Lee (2008) also found that banks with higher insider ownership pursue less risky activities than the banks with lower insider ownership. This suggests that the net effect of insider ownership between the costs and benefits depend on how strict the surrounding regulations are; since the amount of risk inside owners (managers) are willing and able to take is dependent on the regulations binding them.
Laevine and Levine (2009) conducted an empirical assessment of theories concerning risk-taking by banks, their ownership structures and national banking regulations. They focused on conflicts between bank managers and owners over risk and found that bank risk-taking varies positively with the relative power of shareholders within the corporate governance structure of each bank. Their main findings are as outlined below:

- Banks with more powerful owners tend to take greater risks.
- The impact of bank regulations on a bank's risk-taking behaviour is critically dependent on each bank's ownership structure. As such, the relationship between regulation and bank risk can change sign depending on the ownership structure of the bank.
- More stringent capital regulations result in greater risk-taking when the bank has a sufficiently powerful owner. However, more stringent capital regulations have the opposite effect in widely held banks.

As such, the authors concluded that ignoring bank governance leads to erroneous conclusions about the risk-taking effects of banking regulations. Following from this conclusion, it can be proposed that the amount of liquidity created by banks is not only affected by the level of regulatory capital imposed on the banks by industry regulators but also, on the ownership structure of the various banks. This is because an increase in liquidity creation exposes the bank to higher risks of becoming illiquid. As such, if per the empirical evidence provided above ownership structure plays a role in the amount of risk that a bank is involved in, then in looking at how a bank's regulatory capital impacts on its liquidity creation function it's important that we factor in banks’ ownership structure.
CHAPTER THREE

DATA AND METHODOLOGY

3.0 Introduction

This chapter focuses on data sources, sample description, the model used for the study and how the variables in the model were measured.

3.1 Data

Annual bank level ten-year data from 2007 to 2016 is used for the study. Data on bank-specific variables and off-balance sheet items are derived from the financial statements and annual reports of the various banks. Macroeconomic variables are obtained from the world development indicators database on the World Bank website (inflation and GDP growth) and the Bank of Ghana website (91-day Treasury bill rates). The study makes use of an unbalanced panel data on 17 banks operating in Ghana over the ten-year period (2007 to 2016). The number of banks and the time frame were chosen based on the availability and ease of obtaining the needed data. The sample comprises 135 bank-year observations.

Panel regression technique is employed to determine if a bank’s ownership structure influences the relationship between bank capital and liquidity creation. Panel data has some advantages over pure cross-section or pure time series data. Panel data enables you to obtain a large sample hence more degrees of freedom, more variability and less collinearity among the explanatory variables. This improves the efficiency of econometric estimates. Panel data also allows one to analyse several important economic questions that cannot be addressed using only cross-section or time series data. It also helps to resolve the magnitude of econometric problems that often arise in empirical studies; due to the presence of omitted variables that are correlated with explanatory variables. Last but not the least, it allows for
easier estimation and inference; and makes it possible to control for individual or time heterogeneity within the sample.

3.2 Methodology

The methodology used for the study is outlined as follows:

3.2.1 Econometric technique

There are two broad classes of panel estimator approaches that can be employed in financial research. These are fixed effects models and random effects models. For the fixed effects model, the individual-specific effect is a random variable that is allowed to correlate with the explanatory variables. According to Brooks (2008), the simplest form of the fixed effects model allows the intercept in the regression model to differ cross-sectionally but not over time; while all the slope of the estimates is fixed both cross-sectionally and over time.

In the random-effects model (also known as the error components model), the individual specific effect is a variable which is random and not correlated with the explanatory variables. As with fixed effects, the random effects approach proposes different intercept terms for each entity; and these intercepts are constant over time. The relationships between the independent and dependent variables are also assumed to be the same both cross-sectionally and temporally. However, under the random effects model, the intercepts for each cross-sectional unit are assumed to arise from a common intercept \( \alpha \) (which is the same for all cross-sectional units and over time), plus a random variable \( \epsilon_1 \) that varies cross-sectionally but is constant over time (Brooks, 2008).

When then is it appropriate to use a fixed or random effects model? According to Brooks (2008), the random effects model is more appropriate when the sampled entities have been selected from the population on a random basis, but a fixed effect model is preferable when
the sampled entities constitute the whole population. However, one major problem with the random effects model is that it is only valid when the composite error term is uncorrelated with all the explanatory variables; as such both \( e_i \) and \( \upsilon_{it} \) are required to be independent of all of the \( x_{it} \). If there is any correlation between the error terms and the explanatory variables, the fixed effect model is preferable. Alternatively, the choice between the fixed and random effects model can be made based on the results of a Hausman test for endogeneity. The null hypothesis states that the preferred model is random effects and the alternative hypothesis says that the preferred model is fixed effects. It tests whether the unique errors \( (\mu_i) \) are correlated with the regressors.

3.2.2 Model Specification

The standard linear specification for a panel regression model is as follows:

\[
L_{it} = \beta X_{it} + \mu_{it}
\]

Where:

\( L_{it} = \) the dependent variable with \( i=1…N \) (number of observations) and \( t=1…T \) (time periods)

\( X_{it} = \) a vector of explanatory variables for bank \( i \) at time \( t \)

\( \beta = \) the coefficients which represent the slope of the variables

\( \mu_{it} = \) random disturbance that is assumed to be normally distributed with mean 0 and variance \( \sigma^2 \)

To determine whether ownership structure has an influence on the relationship that lies between regulatory capital and liquidity creation among universal banks in Ghana, the following model is estimated:
$L_{it} = \beta_1 CAR_{it} + \beta_2 ltotal\_asset_{it} + \beta_3 LOTARATIO_{it} + \beta_4 MARKETSHARE_{it}$

$+ \beta_5 INFLATION_t + \beta_6 GDP_t + \beta_7 tb\_91_t + \beta_8 OWNERSHIP\_CONC_{it}$

$+ \beta_9 interactCar_{it} + \gamma_i + \lambda_t + \epsilon_{it}$

Where:

$L_{it} = \text{liquidity creation ratio of bank } i \text{ at time } t$.

$\beta_i = \text{the parameters of the independent variables to be estimated}$

$\gamma_i = \text{represents the unobserved individual effect that varies across banks but not over time}$

$\lambda_t = \text{time-varying effect}$

$\epsilon_{it} = \text{error term}$

### 3.2.3 Liquidity creation measure (Dependent Variable)

Two liquidity creation measures are created following Berger and Bouwman (2009). According to Berger and Bouwman (2009), Stage 1 groups all bank activities into three classes, namely, liquid, semi-liquid and illiquid. The next stage weights these class of activities and finally, the weights are multiplied by the cedi amount of activities in each class and then summed up for each category. These amounts are then summed across to obtain the total amount of liquidity created for each bank. It is then summed across the banks to obtain the total liquidity created by the industry. Four liquidity measures were created by Berger and Bouwman (2009): “Cat fat”, “Mat fat”, “Cat nonfat” and “Mat nonfat”. The ‘cat’ measures classify loans based on their category while the ‘mat’ measures classify loans based on their maturity. Other than loan classification, all other classifications of assets and liabilities are the same for all measures. The only additional difference is that, the measures categorized as ‘fat’ include off balance sheet items (OBS), while the measures categorized as ‘nonfat’ do not take off balance sheet items into consideration. Due to the unavailability
of detailed data required for creating all four measures, only two of the measures are used: “Cat fat” and “Cat nonfat”. The process involved is outlined below:

3.2.3.1 Step 1: Grouping activities as liquid, semi-liquid, or illiquid

Classify all assets as liquid, semi-liquid or illiquid based on the ease, cost and time for banks to dispose of their obligations to obtain liquid funds to meet customers’ demands. All liabilities are also classified based on the ease, cost and time for customers to obtain liquid funds from the bank. Off-balance sheet guarantees and derivatives are classified consistently with treatments of functionally similar on-balance sheet items.

- **Assets:**
  - Classifying loans:
    - Illiquid: business loans and leases. Banks are usually unable to dispose off these items with ease, when the need arises for them to get cash to meet their liquidity needs.
    - Semi-liquid: residential mortgages, consumer loans, loans to depositories and governments. Residential mortgages and consumer loans can often be securitized by banks and sold to meet their liquidity needs. Loans to governments and other depository institutions are also relatively easier to sell or dispose off.
  - Classifying assets other than loans:
    - Illiquid: premises and investments in unconsolidated subsidiaries.
    - Liquid: cash, securities and other marketable assets that the bank can use to meet liquidity needs quickly without incurring major losses.

- **Liabilities plus equity:**
  - Classifying liabilities:
    - Liquid: transaction deposits, savings deposits, overnight federal funds purchased.
- Semi-liquid: deposits that can be withdrawn with slightly more difficulty or penalty (all time deposits irrespective of maturity).
- Illiquid: long-term liabilities

✔ Classifying equity:

Equity is categorised as illiquid because investors cannot easily demand their investment from the banks, and its maturity is in the long-term. Some banks, however, are listed on the Ghana Stock Exchange hence, their equity may be sold relatively easier. Investors in such banks can retrieve liquid funds through the capital market, not from the bank. Thus, while traded equity may be liquid from an individual investor's point of view, such liquidity is provided by the capital market and not the bank.

❖ **Off-balance sheet activities:**

✔ Classifying guarantees:

- Illiquid: loan commitments, letters of credit. The bank must provide the funds to the customers upon demand.

- Semi-liquid: net credit derivatives and net securities lent.

- Liquid: net participations acquired from other institutions.

✔ Classifying derivatives:

- Liquid: interest rate, foreign exchange, equity and commodity derivatives.

Data on off-balance sheet activities are limited. Hence, they could not be classified as shown. Thus, all off-balance sheet items are categorised as illiquid and given a positive weight; as banks are usually unable to sell such items quickly.
3.2.3.2 Step 2: Assigning weights to the activities classified in step 1

At this stage, weights are assigned to the classes of liquid, semi-liquid, and illiquid assets, liabilities plus equity, and off-balance sheet activities as classified in step 1. The weighting is done based on the Liquidity Creation Theory. According to this theory, liquidity is created when liquid liabilities (e.g. deposits) are used to finance illiquid assets (e.g. business loans); and liquidity is destroyed when illiquid liabilities or equity is used to fund liquid assets (e.g. securities). Hence, illiquid assets and liquid liabilities (items that enhance liquidity creation) are given positive weights of +1/2 each as each category contributes equally towards liquidity creation. Liquid assets, illiquid liabilities and equity, on the other hand, are assigned negative weights of -1/2 each because they destroy liquidity created. A weight of zero is applied to semi-liquid assets and liabilities since these do not affect liquidity creation.

The magnitudes of the weights are based on simple cedi-for-cedi adding-up constraints, such that Ghana Cedi (GH₵) 1 of liquidity is created when banks finance GH₵1 of illiquid assets with GH₵1 of liquid liabilities. Likewise, when a bank finances GH₵1 of a liquid asset with a GH₵1 of illiquid liability, liquidity is damaged. Based on these constraints, a weight of ½ is allocated to both illiquid assets and liquid liabilities and a weight of −½ to both liquid assets and illiquid liabilities. Thus, when a cedi of liquid liabilities (such as deposits) is used to fund a cedi of illiquid assets (such as business loans), liquidity created equals ½ * GH₵1 + ½ * GH₵1 = GH₵1, thus, creating maximum liquidity of GH₵1.

The various classifications and their weightings (steps 1 and 2) are shown in the table below:
Table 3.1: Liquidity Classification of Bank Activities

<table>
<thead>
<tr>
<th>LIQUIDITY CLASSIFICATION OF BANK ACTIVITIES</th>
<th>ASSETS</th>
<th>LIABILITIES PLUS EQUITY</th>
<th>OFF BALANCE SHEET GUARANTEES (NOTIONAL VALUES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILLIQUID ASSETS (WEIGHT = 1/2)</td>
<td>SEMI-LIQUID ASSETS (WEIGHT = 0)</td>
<td>LIQUID ASSETS (WEIGHT = -1/2)</td>
<td>ILLIQUID GUARANTEES (WEIGHT = 1/2)</td>
</tr>
<tr>
<td>Corporate, commercial and industrial loans</td>
<td>Residential real estate loans</td>
<td>Cash and due from other institutions</td>
<td>Unused commitments</td>
</tr>
<tr>
<td>Other loans and lease financing receivables</td>
<td>Consumer/retail loans</td>
<td>All securities (regardless of maturity)</td>
<td>Net standby letters of credit</td>
</tr>
<tr>
<td>Loans to finance agricultural production</td>
<td>Loans to depository institutions</td>
<td>Trading assets</td>
<td>Commercial and similar letters of credit</td>
</tr>
<tr>
<td>Investment in unconsolidated subsidiaries</td>
<td>Loans to state and local governments</td>
<td>Government securities</td>
<td>Other off balance sheet liabilities</td>
</tr>
<tr>
<td>Intangible assets</td>
<td>Loans to foreign governments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premises</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other assets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: BERGER AND BOUWMAN (2009)

3.2.3.3 Step 3: Constructing liquidity creation measures by combining activities as classified in step 1 and as weighted in step 2

In step 3 the various activities, as classified and weighted in step 1 and step 2 are combined in diverse ways to construct the two liquidity measures. The measures differ in that alternatively off-balance sheet items (OBS) are included or excluded (fat and nonfat); to gauge how much liquidity banks create off the balance sheet. For all measures, the weights of the various classes (1/2, -1/2, 0) are multiplied by the respective cedi amounts of their corresponding bank activities; and the weighted cedi amounts are added up to arrive at the total cedi value of liquidity created by a bank. The total cedi values for all banks are then summed up to obtain the total cedi value of liquidity created by the entire industry.
The liquidity creation measures are shown in the table below:

Table 3.2: Liquidity creation measures

<table>
<thead>
<tr>
<th>CAT FAT (PLUS OBS)</th>
<th>+1/2 * illiquid assets</th>
<th>+0 * semi liquid assets</th>
<th>-1/2 * liquid assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1/2 * liquid liabilities</td>
<td>+0 * semi liquid liabilities</td>
<td>-1/2 * illiquid liabilities</td>
</tr>
<tr>
<td></td>
<td>+1/2 * off-balance sheet items</td>
<td>-1/2 * illiquid liabilities</td>
<td>-1/2 * equity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAT NONFAT</th>
<th>+1/2 * illiquid assets</th>
<th>+0 * semi liquid assets</th>
<th>-1/2 * liquid assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1/2 * liquid liabilities</td>
<td>+0 * semi liquid liabilities</td>
<td>-1/2 * illiquid liabilities</td>
</tr>
<tr>
<td></td>
<td>+1/2 * liquid liabilities</td>
<td>-1/2 * illiquid liabilities</td>
<td>-1/2 * equity</td>
</tr>
</tbody>
</table>

The liquidity creation measures above are rough approximations. Although activities are classified as liquid, semi-liquid or illiquid, differences in liquidity exist within each of the three classifications. However, data available does not allow for much finer distinctions; and there are no other unambiguous weights to apply. The use of the weights $\frac{1}{2}$, $-\frac{1}{2}$ and 0 are the clear demarcations of full liquidity, full illiquidity and neutrality (Berger and Bouwman, 2009).

The dependent variable for the study is the cedi amount of liquidity a bank generates (calculated using the steps above) relative to its total assets.

\[
CAT \ FAT = \frac{\text{liquidity created (plus OBS)}}{\text{total assets}}
\]

\[
CAT \ NONFAT = \frac{\text{liquidity created}}{\text{total assets}}
\]

However, the preferred measure is CAT FAT as it includes off-balance sheet items; as these activities provide liquidity in similar ways to on-balance sheet items.
3.2.4 Main Independent Variables and their measurement

The two main independent variables for the study are bank regulatory capital and ownership structure. These two variables are interacted to form the variable ‘interactcar’ specified in the model. Bank regulatory capital is proxied by the capital adequacy ratio of the bank, measured as the ratio of the banks' regulatory capital to its risk-weighted assets. For ownership structure, the study concentrates on the concentration of ownership within the bank. It is first determined if the bank has an owner with significant influence or controlling power (large owner), or is a widely held bank. According to International Accounting Standards (IAS) 28, ‘significant influence is the power to participate in the financial and operating policy decisions of an entity; but not control them.’ A holding of 20% or more of the voting power (but less than 50%) indicates significant influence. IAS 27 also defines control as the power to govern the financial and operating policies of an entity to obtain benefits from its activities. Control is presumed when a parent company acquires more than half of the voting rights of the entity.

Section 50 of the Companies Act 1963 (Act 179) states that any equity shares issued by an entity carry the right on a poll at any general meeting of the company to one vote, and to one vote only, in respect of each share. As a result, the study assumes that every shareholder's voting rights are equivalent to his/her shareholding percentage. Hence, ownership structure, proxied by ownership concentration has the following threshold:

**Large owner:** shareholder who holds 20% or more of the shares of the company. Such owners can influence, or control certain key decisions made by management and the board.

**Widely held bank:** a bank which does not have a large owner (all shareholdings are below 20%).
None of the banks used in the study were found to be widely held. A value equal to the percentage shareholding of the large owner was used as a proxy for ownership concentration.

### 3.2.5 Justification of control variables and their measurement

- **Bank size:** several empirical studies have shown that bank size may affect liquidity creation. A positive relationship could be expected between bank size and liquidity creation as larger banks could create more liquidity than smaller banks. This is because larger banks have easier access to the lender of last resort and they would be the first to benefit from the safety net (Distinguin et al., 2013). Nonetheless, Horvath et al. (2014) observe a significantly negative coefficient of bank size on their liquidity creation equation, suggesting that smaller banks create more liquidity (per total assets) than larger ones. Controlling for bank size is also important as larger banks may benefit from greater diversification, which reduces their risk exposure and thus their capital needs. Larger banks are also usually viewed as "too big to fail", and therefore, they don't require much capital.

- **Bank risk:** as stated by Berger and Bouwman (2009), it is important to control for risk because it helps to isolate the role of capital in supporting the liquidity creation of banks from its role of supporting banks' risk transformation function. Also, per the Risk Absorption hypothesis, it is important to appropriately control for bank risk because the main reason why banks hold capital is to absorb risk.

- **Market share:** this looks at the share of the industry’s deposits held by each bank. It is expected that this variable would have a positive relationship with liquidity creation; as it is assumed that banks with a larger share of industry deposits have more funds that they could lend out as loans.
• **GDP, Inflation and Interest rate:** in good economic cycles when there is a boom in economic activities and inflation is reasonable, the risk of default of bank facilities tends to be low. This will result in lower risk-weighted assets of banks. Since banks are required to hold a percentage of their risk-weighted assets as capital, lower risk-weighted assets will lead to banks holding less capital. On the other hand, when economic activities are on the low side, coupled with high and volatile inflation, it leads to higher risk-weighted assets among banks and consequently, higher levels of capital.

How liquidity creation is affected by the level of capital depends on whether the risk absorption hypothesis or the financial fragility-crowding out hypothesis holds for banks in Ghana. Hence, real GDP growth is expected to be either negatively or positively related to liquidity creation. For inflation, when it is high and volatile, banks may have difficulty bearing liquidity risk; and this may hamper liquidity creation. Thus, a negative relationship is expected between inflation and liquidity creation. Low interest rates may also lead to the search for higher yields by banks and consequently, more risky behaviour.

Table 3.3 below shows the control variables used for the study, their measurements and expected coefficient signs.
### 3.3 Multicollinearity

Multicollinearity is the situation where the independent variables have a high correlation with each other, making it difficult to disentangle the partial effect of one from the other on the dependent variable. Some of the common methods that help with the detection of multicollinearity are:

- The estimates of the coefficients are different from one model to the other.
- The t-tests for each slope does not show significance ($p>0.05$), although the overall F-test shows significance ($p<0.05$).
- A correlation matrix. The correlation coefficients and their signs indicate the direction and degree of the relationship between two variables without implying causality.

According to Sweeney et al. (2006), a sample correlation coefficient greater than 0.7 is a warning that there may be problems with multicollinearity. However, looking at correlations among independent variables alone is limiting when it comes to detecting multicollinearity. This is because it is possible that the pairwise correlations are small but there could be a

<table>
<thead>
<tr>
<th>CONTROL VARIABLES</th>
<th>MEASUREMENT</th>
<th>EXPECTED SIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank size</td>
<td>Natural log of total assets</td>
<td>+/-</td>
</tr>
<tr>
<td>Bank risk (credit risk)</td>
<td>( \frac{Total \ loans}{Total \ assets} )</td>
<td>+</td>
</tr>
<tr>
<td>Market share</td>
<td>( \frac{Bank's \ total \ deposits}{Total \ deposits \ of \ all \ universal \ banks} )</td>
<td>+</td>
</tr>
<tr>
<td>GDP</td>
<td>GDP growth rate (annual)</td>
<td>+/-</td>
</tr>
<tr>
<td>Inflation</td>
<td>Year on year change in consumer prices</td>
<td>-</td>
</tr>
<tr>
<td>Interest rate</td>
<td>91-day Treasury bill rate</td>
<td>+/-</td>
</tr>
</tbody>
</table>

---

**Table 3.3: Control variables and their measurement**

---

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linear dependence existing among three or more variables. Hence, a better way of detecting multicollinearity is by using the variance inflation factor.

The variance inflation factor (VIF) quantifies how much the variance is inflated. It measures how much a variable is contributing to the standard error in the regression. As a rule of thumb, a VIF greater than or equal to 10 may merit further investigation. Tolerance, measured as one divided by the VIF, is used to check on the degree of collinearity. A value lower than 0.1 means that the variable could be considered as a linear combination of other independent variables. However, Allison (2012) posited that there are three situations in which a high VIF is not a problem and can be safely ignored:

- If the variables with high VIF are control variables; and the variables of interest do not have high VIF. In such a situation, the coefficient of the variables of interest are not affected; and the performance of the control variables as controls are not impaired.
- The high VIF is caused by the inclusion of powers or products of other variables.
- The variables with high VIF are indicator (dummy) variables that represent a categorical variable with three or more categories.

3.4 Heteroscedasticity

Heteroscedasticity is the situation where the variance of the error term is not constant across some observations. The following hypothesis test is carried out:

\[ H_0: \text{error term has constant variance (homoscedastic)} \]

\[ H_1: \text{error term has no constant variance} \]

Decision rule: reject \( H_0 \) if the p-value is less than 0.05.
3.5 Conclusion

This chapter presents the detailed methodology used for the study; including the construction of the liquidity creation measures (dependent variable). A panel data on banks in Ghana and other macroeconomic variables are used to achieve the study’s objectives. The estimation is done using a random effects model. The unbalanced panel used is based on data from 17 banks over the period 2007 to 2016. The Stata 14.0 statistical package is used for all the estimations.
CHAPTER FOUR

ESTIMATION OF RESULTS

4.0 Introduction

The objective of this study was to measure liquidity created among universal banks in Ghana over the period 2007 to 2016, and also to determine the relationship that lies between banks’ regulatory capital and liquidity creation, using ownership structure as a moderating variable. The results of the study are presented in this chapter.

4.1 Discussion on descriptive statistics

Table 4.1: Descriptive statistics of variables

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>OBS.</th>
<th>MEAN</th>
<th>STD. DEV.</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATFAT</td>
<td>135</td>
<td>0.2608</td>
<td>0.1852</td>
<td>-0.6585</td>
<td>0.5674</td>
</tr>
<tr>
<td>CATNONFAT</td>
<td>135</td>
<td>0.2039</td>
<td>0.1783</td>
<td>-0.6840</td>
<td>0.5040</td>
</tr>
<tr>
<td>CAR</td>
<td>135</td>
<td>0.2251</td>
<td>0.2571</td>
<td>0.0826</td>
<td>1.95</td>
</tr>
<tr>
<td>ltotal_asset</td>
<td>135</td>
<td>20.8470</td>
<td>1.004</td>
<td>17.5344</td>
<td>22.8059</td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>135</td>
<td>0.4748</td>
<td>0.1599</td>
<td>0.0304</td>
<td>0.7664</td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>135</td>
<td>0.0515</td>
<td>0.0337</td>
<td>0.0005</td>
<td>0.14</td>
</tr>
<tr>
<td>INFLATION</td>
<td>135</td>
<td>0.1363</td>
<td>0.3663</td>
<td>0.0873</td>
<td>0.1925</td>
</tr>
<tr>
<td>GDP</td>
<td>135</td>
<td>0.0687</td>
<td>0.0329</td>
<td>0.0358</td>
<td>0.1405</td>
</tr>
<tr>
<td>tb_91</td>
<td>135</td>
<td>0.1933</td>
<td>0.0536</td>
<td>0.106</td>
<td>0.2579</td>
</tr>
<tr>
<td>OWNERSHIPCONC</td>
<td>135</td>
<td>0.6795</td>
<td>0.2861</td>
<td>0.25</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.1 reports the mean, standard deviation, minimum and maximum values of the dependent and independent variables. The first dependent variable which is the ratio of liquidity created by banks (including off-balance sheet items) to their total assets, CATFAT, has a mean score of 0.2608 with minimum and maximum values of -0.6585 and 0.5674 respectively. A standard deviation of 0.1852 accounted for the variation between the minimum and maximum values stated above. The second dependent variable, CATNONFAT, which is also a ratio of liquidity created by banks (excluding off-balance
sheet items) recorded a mean score of 0.2039. A standard deviation of 0.1783 accounted for the variation between the minimum value of -0.6840 and the maximum value of 0.5040. The mean values for both measures suggest that banks on the average did not create much liquidity both on and off the balance sheet but held, on average, almost 80% of their total assets in liquid funds.

The capital adequacy ratio (CAR) recorded a mean of 0.2251, and this is above the prudential and statutory requirement of 10%. Thus, on average, banks held capital amounting to about 22.51% of their total risk-weighted assets. The least ratio recorded was 0.0826, and the highest ratio was 1.95. The high ratio of 1.95 is because of banks which had just started operations and hence were still in the process of growing their assets. As a result, they had excess capital over assets. Such high capital adequacy ratios, however, dropped drastically during the first few years of operation as the banks' assets began to grow and they began to face increased risk exposure. Overall, the descriptive statistics suggest that on average, banks in Ghana hold adequate capital.

Ownership structure, proxied by ownership concentration within the banks (OWNERSHIPCONC), recorded a mean concentration of 0.6795. Thus, the average percentage shareholding of the largest shareholders among universal banks studied over the period was 67.95%. The lowest block shareholding recorded is 25%, and the highest is 100%. None of the banks was found to be widely held. Out of the 135 observations, 31.85% had the shareholding percentage of the large owner lying between 20% and 50% (representing significant influence in the affairs of the bank). The remaining 68.15% had the shareholding percentage of the large owner being above 50% (representing controlling power over the affairs of the bank).
Bank size, measured by the log of total assets, has a mean value of 20.8470; with a standard deviation of 1.004. The minimum and maximum values recorded are 17.5344 and 22.8059. The ratio of total loans to total assets, which measures the risk-taking behaviour of banks, shows a mean value of 0.4748 and a standard deviation of 0.1599. The mean value of bank risk tells us that on average, Ghanaian banks have a minimal risk appetite. Some banks gave out as low as about 3% of their total assets as loans. The highest risk-taking bank had total loans forming about 76.64% of its total assets. Market share, a measure of a banks’ total deposits to total industry deposits, recorded a mean value of 0.0515; with a standard deviation of 0.0337. The bank with the least market share recorded value of 0.0005 whereas the bank with the highest market share recorded value of 0.14.

Average inflation recorded for the period under study is 13.63%. Lowest inflation recorded for the period is 8.73% and the highest inflation recorded is 19.25%; with a variation of 3.66%. Inflation rates over the study period are quite on the high side. When inflation rates are high and volatile, banks may have difficulty bearing liquidity risk; and this may hamper liquidity creation. Economic growth rates (GDP) had an average of 6.87% over the study period. Minimum and maximum growth rates recorded were 3.58% and 14.05%; with a variation of 3.29%. Interest rates (91-day T-bills) also recorded an average of 19.33% over the period, with the lowest and highest rates of 10.6% and 25.79% respectively.

4.2 Liquidity created by the Ghanaian banking industry

Table 4.2 below shows the number of banks studied for each year, their total assets, total liquidity created, and the ratio of liquidity created to banks’ total assets.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>OBS.</th>
<th>TOTAL ASSETS</th>
<th>LIQ. CREATED (FAT)</th>
<th>FAT RATIO</th>
<th>LIQ. CREATED (NONFAT)</th>
<th>NONFAT RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>7</td>
<td>2,487,495,340.00</td>
<td>1,069,070,660.50</td>
<td>0.43</td>
<td>940,739,528.00</td>
<td>0.38</td>
</tr>
<tr>
<td>2008</td>
<td>9</td>
<td>4,385,922,625.00</td>
<td>1,661,395,018.50</td>
<td>0.38</td>
<td>1,429,140,131.50</td>
<td>0.33</td>
</tr>
<tr>
<td>2009</td>
<td>11</td>
<td>8,244,060,394.00</td>
<td>2,169,356,213.00</td>
<td>0.26</td>
<td>1,647,770,040.00</td>
<td>0.20</td>
</tr>
<tr>
<td>2010</td>
<td>13</td>
<td>12,037,436,159.00</td>
<td>2,700,891,668.00</td>
<td>0.22</td>
<td>1,922,156,993.50</td>
<td>0.16</td>
</tr>
<tr>
<td>2011</td>
<td>15</td>
<td>16,239,763,541.00</td>
<td>4,495,202,176.50</td>
<td>0.28</td>
<td>3,387,196,163.00</td>
<td>0.21</td>
</tr>
<tr>
<td>2012</td>
<td>15</td>
<td>21,469,055,157.00</td>
<td>6,681,998,545.00</td>
<td>0.31</td>
<td>5,224,552,804.00</td>
<td>0.24</td>
</tr>
<tr>
<td>2013</td>
<td>17</td>
<td>29,255,583,250.00</td>
<td>9,129,484,145.50</td>
<td>0.31</td>
<td>7,159,853,625.50</td>
<td>0.24</td>
</tr>
<tr>
<td>2014</td>
<td>17</td>
<td>41,116,128,522.00</td>
<td>12,895,802,900.50</td>
<td>0.31</td>
<td>10,306,221,313.00</td>
<td>0.25</td>
</tr>
<tr>
<td>2015</td>
<td>17</td>
<td>48,739,728,868.00</td>
<td>15,355,018,897.50</td>
<td>0.32</td>
<td>12,691,710,432.00</td>
<td>0.26</td>
</tr>
<tr>
<td>2016</td>
<td>14</td>
<td>50,095,807,152.00</td>
<td>11,841,803,456.50</td>
<td>0.24</td>
<td>9,710,498,348.00</td>
<td>0.19</td>
</tr>
</tbody>
</table>

For the CATFAT measure, liquidity created by banks for the year 2007 as a ratio of their total assets was 43%. This percentage dropped to 38% in 2008 and continued with the downward trend to 22% of total assets in the year 2010. However, from 2011 onwards, the ratio began to rise again to 28%, then to 31% over the three-year period 2012 to 2014. After a recorded ratio of 32% in 2015, there was a sharp decline in the ratio of liquidity created to total assets of banks to 24%.

A similar trend was seen for the CATNONFAT liquidity measure. The year 2007 recorded a ratio of liquidity created to banks' total assets of 38%, and this dropped to 33% in 2008 and continued to trend downwards to 16% in the year 2010. The ratio began to rise again in 2011, was stable at 24% for the years 2012 and 2013, and then fell to 19% in 2016; after recording a ratio of 26% in 2015.
The graph below shows the trend in liquidity creation over the study period. The blue line depicts the ratio of liquidity created by banks (including off-balance sheet items) to total assets, and the orange line depicts the ratio of liquidity created by banks (excluding off-balance sheet items) to Total Assets.

**Figure 4.1 Ratio of liquidity created to total assets**

According to the 2008 Ghana banking survey report, the industry's liquid assets to deposits ratio fell from 0.88 to 0.55 between the years 2003 to 2007; suggesting that more of liquid deposits were loaned out rather than placed in less risky assets. Though there was a growth in liquid assets from GHC1.4 billion in 2003 to GHC3.1 billion in 2007, the rate of increase was relatively slower. This increase may be due to the fairly-stable economy over the survey period (2003 to 2007); characterised by a steady growth of real GDP, drop in inflation rates as well as interest rates. This accounts for the higher ratio of liquidity created (CATFAT) to total assets of 43% over the study period 2007 to 2016.

Over the four-year period ending 2010, there was a growing trend for banks to hold more funds in less risky assets; despite the favourable macroeconomic condition of lower inflation and greater stability of the cedi experienced in the year 2010 (Ghana banking survey, 2011). According to the report, half of the banks in the industry remained risk-averse and held
funds in money market securities. This risk-averse attitude may be due to the increase in inflation rates which were experienced over the two-year period 2008 to 2009. According to the Word development indicators, inflation stood at 10.73% in December 2007, 16.52% in December 2008 and 19.25% in December 2009. The year 2010 began with an inflation rate of 16.9% but then fell throughout the year to 8.6% by December 2010. This fall, however, did not do much to change the risk-averse attitude of the banks; hence the drop in the liquidity creation ratio (CATFAT) to 38% in 2008 and the continual decline of the ratio down to 22% as at the end of the year 2010. The same trend was seen for the liquidity creation ratio excluding off-balance sheet items.

The industry’s liquidity cover to meet deposit remained fairly-stable in the year 2013. However, the tendency for banks to hold money market financial instruments was greater than carrying out the core activity of lending (Ghana banking survey, 2014). Though liquidity creation ratio began to rise in 2011, it is still on the low side (28%) and was stable at 31% over a 3-year period. According to the 2014 Ghana banking survey report, the industry, on the whole, remained risk averse; with over 80% of banks holding enough liquid funds to meet at least 50% of customer deposit withdrawal demands. This stance may have been prudent considering the economic challenges faced by businesses due to adverse macroeconomic trends.

In 2016, the industry's total assets grew by 28% from 2015; and 38% of the increase was in liquid assets. This growth demonstrates the industry's continued strategy of holding investments in placements and government securities (Ghana banking survey, 2017). This display of a risk-averse attitude on the part of the banks could be due to the high rates of inflation recorded over the two-year period 2015 to 2016 (17.15% and 17.47% per the World Development Indicators) and accounts for the drop in the liquidity creation ratio from 32% to 24%.
The figure below shows the trend in average liquidity created per total assets and average liquid funds held per total assets of banks over the study period:

**Figure 4.2: Trend Analysis: Liquidity Creation and Bank Liquidity**

![Trend Analysis: Liquidity Creation and Bank Liquidity](image)

### 4.3 Multicollinearity

**Table 4.3: Correlation matrix**

<table>
<thead>
<tr>
<th></th>
<th>CATFAT</th>
<th>CATNONFAT</th>
<th>CAR</th>
<th>ltotal_asset</th>
<th>LOTARATIO</th>
<th>MARKETSHARE</th>
<th>INFLATION</th>
<th>GDP</th>
<th>tb_91</th>
<th>OWNERSHIP</th>
<th>CONC</th>
<th>interactCar</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATFAT</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CATNONFAT</td>
<td>0.97</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR</td>
<td>-0.62</td>
<td>-0.62</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ltotal_asset</td>
<td>0.34</td>
<td>0.32</td>
<td>-0.38</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>0.74</td>
<td>0.76</td>
<td>-0.55</td>
<td>0.29</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>0.32</td>
<td>0.30</td>
<td>-0.27</td>
<td>0.71</td>
<td>0.26</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFLATION</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.02</td>
<td>0.20</td>
<td>0.04</td>
<td>-0.01</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-0.02</td>
<td>-0.04</td>
<td>0.04</td>
<td>0.26</td>
<td>-0.04</td>
<td>0.01</td>
<td>-0.74</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tb_91</td>
<td>0.05</td>
<td>0.05</td>
<td>-0.07</td>
<td>0.25</td>
<td>0.11</td>
<td>0.00</td>
<td>0.59</td>
<td>-0.49</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OWNERSHIP</td>
<td>-0.03</td>
<td>-0.09</td>
<td>0.11</td>
<td>0.03</td>
<td>-0.01</td>
<td>0.02</td>
<td>-0.07</td>
<td>0.08</td>
<td>-0.01</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interactCar</td>
<td>-0.56</td>
<td>-0.57</td>
<td>0.97</td>
<td>-0.37</td>
<td>-0.48</td>
<td>-0.25</td>
<td>-0.03</td>
<td>0.06</td>
<td>-0.08</td>
<td>0.31</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3 presents the correlation matrix for all the variables used in the econometric model. The correlation coefficients and their signs give an indication of the direction and the degree of the relationship between two variables without implying causality. The pairs of
independent variables that have a correlation of 0.7 or more are CAR & interactCar (0.97), INFLATION & GDP (-0.74) and ltotal_assets (bank size) & MARKETSHARE (0.71). The capital adequacy ratio and the interaction term have such a high correlation because the interaction term consists of the product of the capital adequacy ratio and the percentage shareholding of the largest shareholder (ownership concentration). Inflation and GDP have a high correlation and may pose collinearity problems; as well as bank size and market share. However, looking at correlations alone among pairs of independent variables is limiting, and so the study employs the use of the variance inflation factor to help detect any multicollinearity problems.

Table 4.4: Variance inflation factors

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>interactCar</td>
<td>54.85</td>
<td>0.02</td>
</tr>
<tr>
<td>CAR</td>
<td>52.65</td>
<td>0.02</td>
</tr>
<tr>
<td>OWNERSHIPCONC</td>
<td>3.57</td>
<td>0.28</td>
</tr>
<tr>
<td>ltotal_asset</td>
<td>2.77</td>
<td>0.36</td>
</tr>
<tr>
<td>INFLATION</td>
<td>2.74</td>
<td>0.36</td>
</tr>
<tr>
<td>GDP</td>
<td>2.41</td>
<td>0.41</td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>2.30</td>
<td>0.44</td>
</tr>
<tr>
<td>tb_91</td>
<td>1.68</td>
<td>0.60</td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>1.65</td>
<td>0.60</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>13.85</td>
<td></td>
</tr>
</tbody>
</table>

A VIF greater than ten may call for further investigation. The variables with VIF greater than 10 are interactCar and CAR. However, Allison (2012) posited that, if the high variance inflation factors are caused by the inclusion of powers or products of other variables, then the high VIF is not a problem and can be safely ignored. Hence, in this case, we can safely ignore the high VIF since the interaction term is a product of CAR and ownership concentration hence its high correlation with the capital adequacy ratio. Market share, inflation and GDP all have normal variance inflation factors. Therefore, they pose no multicollinearity issues.
4.4 Hausman Specification test

The Hausman specification test detects endogenous regressors in a regression model. It is used to differentiate between fixed effects model and random effects model in a panel data. The null hypothesis for the Hausman test states that all exogenous variables are uncorrelated with all disturbance terms.

\[ H_0: \text{preferred model is random effects} \]

\[ H_1: \text{preferred model is fixed effects} \]

Decision rule: Reject \( H_0 \) if \( p\)-value < significance level (0.05)

The results of the Hausman specification test using our preferred liquidity creation measure as the dependent variable (CATFAT) is shown below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>(b) fixed</th>
<th>(B) random</th>
<th>(b-B) Difference</th>
<th>sqrt(diag(V_b-V_B) S.E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>-0.8325</td>
<td>-0.8623</td>
<td>0.0298</td>
<td>0.1013</td>
</tr>
<tr>
<td>Itotal_asset</td>
<td>0.0082</td>
<td>0.0061</td>
<td>0.0021</td>
<td>0.0053</td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>0.5536</td>
<td>0.5382</td>
<td>0.0154</td>
<td>0.0506</td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>-0.2308</td>
<td>0.0744</td>
<td>-0.3052</td>
<td>0.5485</td>
</tr>
<tr>
<td>INFLATION</td>
<td>-0.8446</td>
<td>-0.8023</td>
<td>-0.0424</td>
<td>0.0872</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.5094</td>
<td>-0.5318</td>
<td>0.0224</td>
<td>0.0899</td>
</tr>
<tr>
<td>tb_91</td>
<td>0.0717</td>
<td>0.0655</td>
<td>0.0062</td>
<td>0.0494</td>
</tr>
<tr>
<td>OWNERSHIPCONC</td>
<td>-0.2709</td>
<td>-0.1737</td>
<td>-0.0972</td>
<td>0.0845</td>
</tr>
<tr>
<td>interactCar</td>
<td>0.7127</td>
<td>0.7443</td>
<td>-0.0317</td>
<td>0.1161</td>
</tr>
</tbody>
</table>

\( b \) = consistent under \( H_0 \) and \( H_a \); obtained from xtreg
\( B \) = inconsistent under \( H_a \), efficient under \( H_0 \); obtained from xtreg

Test \( H_0 \): difference in coefficients not systematic

\[
\text{chi2}(9) = (b-B)'[(V_b-V_B)^{-1}](b-B)\]

1.95

\[
\text{Prob} > \text{chi2} = 0.9922
\]

The Hausman specification test above shows a \( p\)-value of 0.9922, which is greater than 0.05.

We, therefore, do not reject the null hypothesis and conclude that the random effect model is preferable.
4.5 Autocorrelation and Heteroskedasticity tests

Autocorrelation is a representation of the degree of similarity between a given time series and a lagged version of itself over successive time intervals. It measures the relationship between a variable's current and past values.

4.5.1 Wooldridge test for autocorrelation in panel data:

H_0: No 1st order autocorrelation

F (1, 16) = 16.800

Prob > F = 0.0008

The Wooldridge test for autocorrelation shows a p-value of 0.0008, which is lesser than 0.05. Hence, we fail to reject the null hypothesis and conclude that no first-order autocorrelation exists between the variables in the panel and their lagged values.

Heteroskedasticity occurs when the standard deviations of a variable, monitored over a period, are non-constant.

H_0: the model is homoscedastic

4.5.2 Likelihood-ratio test for heteroskedasticity

\[
\text{LR test hetero homosk, df ('df ')} \\
\LR \text{Chi2(16) = 96.20} \\
\text{(Assumption: homosk nested in hetero)} \\
\text{Prob > chi2 = 0.0000}
\]

The test for heteroskedasticity above shows that there is a problem with heteroskedasticity; since the p-value is less than 0.05. To solve this issue, the study makes use of robust standard errors.
4.6 Regression results.

Table 4.6 below presents the regression results for the regression model, with our preferred liquidity creation measure (CATFAT) as the dependent variable. The random effects model (with robust standard errors) was used to estimate the model coefficients.

Table 4.6: regression results on bank capital, liquidity creation and ownership concentration

<table>
<thead>
<tr>
<th></th>
<th>COEFFICIENT</th>
<th>ROBUST STD. ERROR</th>
<th>Z</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>-0.8623***</td>
<td>0.2956</td>
<td>-2.92</td>
<td>0.004</td>
</tr>
<tr>
<td>ltotl_asset</td>
<td>0.0061</td>
<td>0.0286</td>
<td>0.21</td>
<td>0.832</td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>0.5382***</td>
<td>0.0745</td>
<td>7.23</td>
<td>0</td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>0.0744</td>
<td>1.1687</td>
<td>0.06</td>
<td>0.949</td>
</tr>
<tr>
<td>INFLATION</td>
<td>-0.8023*</td>
<td>0.4205</td>
<td>-1.91</td>
<td>0.056</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.5318</td>
<td>0.3993</td>
<td>-1.33</td>
<td>0.183</td>
</tr>
<tr>
<td>tb_91</td>
<td>0.0655</td>
<td>0.1454</td>
<td>0.45</td>
<td>0.652</td>
</tr>
<tr>
<td>OWNERSHIPCONC</td>
<td>-0.1737*</td>
<td>0.0981</td>
<td>-1.77</td>
<td>0.077</td>
</tr>
<tr>
<td>interactCar</td>
<td>0.7443**</td>
<td>0.3455</td>
<td>2.15</td>
<td>0.031</td>
</tr>
</tbody>
</table>

R-squared: Wald Chi2(9) = 7029.25
within = 0.5283
between = 0.7537
overall = 0.6303
Prob > chi2 = 0.0000

NB: *, **, *** means significant at 10%, 5% and 1% respectively

Table 4.6 presents the regression results with CATFAT (liquidity creation including off-balance sheet items) as the dependent variable. An overall $R^2$ of 0.6303 shows that the independent variables explain about 63.03% of the variation in liquidity creation of banks (including off-balance sheet items). A significant Wald Chi2(9) of 7029.25 shows the overall fitness of the model.

The main independent variable, capital adequacy ratio (CAR), showed a significant and negative relationship with CATFAT. On average, a one unit increase in the capital adequacy
ratio leads to a 0.86 unit decrease in liquidity created; holding all other factors constant. This outcome supports the financial fragility-crowding out hypothesis which predicts that greater capital hampers liquidity creation. Ownership concentration (OWNERSHIPCONC) also shows a significant and negative relationship with the dependent variable; though a positive relationship was expected. On average, a one unit increase in ownership concentration leads to a 0.17 unit decrease in liquidity creation; holding all other factors constant. This result implies that the more concentrated ownership within the bank is, the lesser the liquidity that is created.

However, when the capital adequacy ratio and ownership concentration are interacted together (interactCar), we have a significant and positive relationship existing between the interaction term and the dependent variable, a strong coefficient of 0.74. This suggests that the more concentrated ownership is within the bank, the weaker the negative impact of an increase in capital on liquidity creation. It could also be interpreted that as capital increases, the negative impact of an increase in ownership concentration on bank liquidity creation is weakened. Hence, though the individual effects of increases in capital adequacy ratio and ownership concentration on liquidity creation are negative, the combined effect of the two variables moderates the negative impact that they have on liquidity creation. This supports the findings of Laevine and Levine (2009) which posits that the impact of bank regulations (e.g. capital regulations, activity restrictions and deposit insurance) on bank's risk-taking behaviour (in this case liquidity creation) depends on each bank's ownership structure. In this case, though the impact is negative for both capital and ownership concentration, the level of ownership concentration within the bank determines the extent to which liquidity creation is affected by increases in capital.
The only bank-specific variable which showed significance is bank risk. Per the results, bank risk (LOTARATIO) measured by the ratio of total loans to total assets, has a significant and positive relationship with CATFAT. This is to say that on average, a one unit increase in the risk-taking behaviour of banks leads to a 0.54 unit increase in liquidity created. This result was expected as greater liquidity creation goes hand in hand with greater risk. Bank size (ltotal_asset) and market share, though not significant, both showed a positive relationship.

Inflation also showed a significant and negative relationship with CATFAT. Per the results, on average, a one unit increase in inflation causes a 0.80 unit decrease in liquidity creation; holding all other factors constant. From the descriptive statistics, inflation rates recorded over the study period were quite on the high side. When inflation is high, banks may have difficulty with bearing liquidity risk and hence, may hurt liquidity creation as shown by the results. Real GDP growth rates and interest rates (tb_91) showed a negative and positive relationship respectively with CATFAT; though these were not significant.

4.7 Robustness checks

The study employs the Hausman Taylor model to test the robustness of the results. Per empirical literature on bank capital and liquidity creation, there seems to be a bi-directional relationship between bank capital and liquidity creation; and this can cause endogeneity problems. The Hausman and Taylor model is employed to enable us to treat the capital adequacy ratio as an endogenous independent variable; to help deal with any endogeneity issues that may be present. Also, two more regression models were run using the CATNONFAT (liquidity creation measure excluding off-balance sheet items) as the dependent variable. We employ the random effects model with robust standard errors and the Hausman Taylor model to check if the results are consistent with results shown above.
Table 4.7: Hausman Taylor test for CATFAT and regression results for CATNONFAT liquidity measure

<table>
<thead>
<tr>
<th></th>
<th>CATFAT (H. TAYLOR)</th>
<th>RANDOM EFFECTS (ROBUST S.E.)</th>
<th>HAUSMAN TAYLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR</td>
<td>-0.8378***</td>
<td>-0.8446***</td>
<td>-0.8604***</td>
</tr>
<tr>
<td></td>
<td>(0.2812)</td>
<td>(0.2823)</td>
<td>(0.2623)</td>
</tr>
<tr>
<td>ltotal_asset</td>
<td>0.0070</td>
<td>0.0093</td>
<td>0.0100</td>
</tr>
<tr>
<td></td>
<td>(0.0150)</td>
<td>(0.0274)</td>
<td>(0.0139)</td>
</tr>
<tr>
<td>LOTARATIO</td>
<td>0.5549***</td>
<td>0.5808***</td>
<td>0.5775***</td>
</tr>
<tr>
<td></td>
<td>(0.0944)</td>
<td>(0.0756)</td>
<td>(0.0877)</td>
</tr>
<tr>
<td>MARKETSHARE</td>
<td>0.0684</td>
<td>-0.2713</td>
<td>-0.1932</td>
</tr>
<tr>
<td></td>
<td>(0.6147)</td>
<td>(1.0672)</td>
<td>(0.5677)</td>
</tr>
<tr>
<td>INFLATION</td>
<td>-0.7967**</td>
<td>-0.6867**</td>
<td>-0.6767**</td>
</tr>
<tr>
<td></td>
<td>(0.3739)</td>
<td>(0.3339)</td>
<td>(0.3491)</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.5128</td>
<td>-0.5691*</td>
<td>-0.5581</td>
</tr>
<tr>
<td></td>
<td>(0.3916)</td>
<td>(0.3380)</td>
<td>(0.3656)</td>
</tr>
<tr>
<td>tb_91</td>
<td>0.0579</td>
<td>0.0130</td>
<td>0.0114</td>
</tr>
<tr>
<td></td>
<td>(0.2020)</td>
<td>(0.1644)</td>
<td>(0.1885)</td>
</tr>
<tr>
<td>OWNERSHIPCONC</td>
<td>-0.1844**</td>
<td>-0.1898**</td>
<td>-0.1803**</td>
</tr>
<tr>
<td></td>
<td>(0.0914)</td>
<td>(0.0945)</td>
<td>(0.0845)</td>
</tr>
<tr>
<td>InteractCar</td>
<td>0.7191**</td>
<td>0.7754**</td>
<td>0.7951***</td>
</tr>
<tr>
<td></td>
<td>(0.3256)</td>
<td>(0.3247)</td>
<td>(0.3038)</td>
</tr>
<tr>
<td>local_dummy</td>
<td>-0.0207</td>
<td>0.0126</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0509)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rho = 0.4015    
R-squared: 
within = 0.5376  
between = 0.7848  
overall = 0.6561

Rho = 0.3854

NB: *, **, *** means significant at 10%, 5% and 1% respectively

The results for the Hausman Taylor test (CATFAT) showed similar results as recorded under the random effects model with robust standard errors. Capital adequacy ratio and ownership concentration both showed a negative relationship with the dependent variable; but the relationship turns positive when the two variables are interacted, as was shown under the random effects model. The only bank specific variable that showed significance was bank risk (LOTARATIO) with a coefficient of 0.5549, a slight difference from the
coefficient of 0.5382 recorded under the random effects model. For the macroeconomic variables also, the only significant one, as seen under the random effects model also is inflation with the same negative relationship as recorded earlier.

Table 4.7 also presents the regression results for the random effects model with robust standard errors; using CATNONFAT (liquidity creation excluding off-balance sheet items) as the dependent variable. An overall $R^2$ of 0.6561 shows that the independent variables explain about 65.61% of the variation in liquidity creation of banks (excluding off-balance sheet items). A significant Wald Chi2(9) of 3938.72 shows the overall fitness of the model.

The main independent variable, capital adequacy ratio (CAR) and ownership concentration both showed a significant and negative relationship with CATNONFAT. However, when the two variables are interacted (interactCar), it records a significant and positive relationship existing between the interacted term and the dependent variable; same as with the CATFAT model. The coefficient of the interaction variable, 0.7754, is a slight increase from the coefficient reported in the CATFAT model (0.7443). This may suggest that the weakened negative impact of the interacted variables on liquidity creation is greater in the case of liquidity created on the balance sheet.

The only bank-specific variable which showed significance, as with the CATFAT model is bank risk. Per the results, on average, a one unit increase in the risk-taking behaviour of banks leads to a 0.58 unit increase in liquidity created; not much of a difference from the coefficient of 0.54 recorded for bank risk in the CATFAT model. Likewise, bank size ($ltotal Asset$), though insignificant, showed a positive relationship. Market share, however, showed an insignificant and negative relationship; compared to the positive relationship recorded under the CATFAT model. Another model was run with off-balance sheet items as the dependent variable, to check what could have accounted for this change in sign. The
results showed a positive relationship (still insignificant) between market share and off-balance sheet items. This may imply that as a bank's market share increases, they tend to shift from creating liquidity on the balance sheet to creating liquidity off the balance sheet; explaining the negative relationship recorded under the CATNONFAT model. However, due to the insignificance of the results, it cannot be justified that is the case.

Inflation also showed a significant and negative relationship with CATNONFAT. On average, a unit increase in inflation causes a 0.69 unit decrease in liquidity creation; a slight drop in the coefficient of -0.80 recorded for inflation in the CATFAT model. Real GDP growth rates and interest rates (tb_91) again showed a negative and positive relationship respectively with CATNONFAT; though these were not significant.

The results of the Hausman Taylor test for the CATNONFAT liquidity creation measure also followed a similar trend. The interaction term showed more significance (positive and significant at 1%) as compared to the significance of the interaction term under the Hausman Taylor model for CATFAT and the random effect models for both liquidity measures (positive and significant at 5%). It also records the highest coefficient of 0.7951, indicating that on average, a one unit increase in regulatory capital leads to a 0.7951 unit increase in liquidity created (excluding off-balance sheet items). This seems to suggest as reported earlier that, though the concentration of ownership within the banks weakens the negative impact that increased regulatory capital has on liquidity creation, it seems to influence on-balance sheet liquidity creation much more than it influences off-balance sheet liquidity creation. Besides, from the results presented on liquidity creation in Ghana, it is evident that the chunk of liquidity created by the banks is in relation to on-balance sheet items. This may account for the results as shown in the regression models.
4.8 Conclusion

The liquidity creation measures constructed in this study (CATFAT and CATNONFAT) show that generally, banks do not create much liquidity within the economy. The industry seems to display a risk-averse attitude through its continued strategy of holding investments in placements and government securities.

The random effects regression results revealed that using the CATFAT liquidity creation measure, bank risk has a significant and positive relationship with liquidity creation. Bank size and market share, though not significant, both showed positive relationships with liquidity creation. For the macroeconomic variables, only inflation showed a significant and negative relationship with liquidity creation. GDP and 91-day Treasury bill rates showed no significance.

The CATNONFAT model also had similar results except for GDP, which showed a significant and negative relationship with liquidity creation; though it showed no significance under the CATFAT model. The independent variables of interest: capital adequacy ratio, ownership concentration and their interaction term all showed significance under both models (negative, negative and positive respectively).

The Hausman Taylor model was used as a robustness check to enable us to treat the capital adequacy ratio as an endogenous variable; to take care of any possible endogeneity issues. The results for both liquidity creation measures using this model were similar to the results under the random effects model. All independent variables showed the same significance and direction of relationship as recorded under the random effects model using the CATFAT measure.
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

A summary of the study's findings are presented in this chapter, as well as the recommendations made based on the findings.

5.1 Summary

Banks perform essential activities on both sides of their balance sheets. On the asset side, they give out loans to long-term borrowers (illiquid assets), thus enhancing the flow of credit in the economy. On the liability side, they provide liquidity on demand to depositors. If initial depositors have liquidity needs at an interim stage, the banker can refinance by issuing fresh demand deposits to meet the needs of depositors claiming their funds. In this way, the bank shields long-term borrowers from the liquidity demands of depositors, resulting in the creation of liquidity on both sides of the balance sheet (Diamond and Rajan, 2001). The maturity mismatch between these illiquid assets and liquid liabilities, however, expose banks to liquidity risk. As such it's vital that banks find a balance between maintaining adequate levels of liquidity and playing their role as financial intermediates.

Due to the vital role that banks play in the economy, the industry is a highly regulated one to ensure the soundness and stability of the banking system. The Basel Committee on banking supervision (BCBS), an international committee set up under the supervision of the Bank of International Settlements situated in Basel (Switzerland), has developed highly influential policy recommendations known as the Basel Accords over the years. These accords are centred on bank capitalisation and risk management issues within the banking sector, and they have been adopted by central banks worldwide.
One goal of capital regulations is to reduce the risk-taking incentives of owners by forcing them to pledge more of their wealth at risk in the bank. However, Laevin and Levine (2009) posit that, although capital regulations may induce the bank to raise capital, it does not necessarily mean influential owners would invest more in the bank since banks can increase their capital through other means other than issuing new share capital. In effect, capital regulations may increase risk-taking since owners might compensate for the loss of utility from more stringent capital regulations by selecting a riskier investment portfolio. Hence, the actual impact of bank regulations (e.g. capital requirements, activity restrictions and deposit insurance) on risk taking depends on the relative power of the shareholders relative to managers within each bank's corporate governance structure.

Considering the recapitalisation exercises that have been ongoing in the Ghanaian banking sector since 2003, this study sought to determine the relationship that lies between bank regulatory capital and liquidity creation in Ghana, using the bank's ownership structure as a moderating variable. The intuition behind the use of ownership structure as a moderating variable is that liquidity creation exposes banks to risk, and literature suggests that bank's ownership structure influences the risk-taking behaviour of banks. The random effects model was the estimation model employed, and Hausman Taylor tests were employed as robustness checks. The Stata 14.0 statistical package was used for all estimations.

5.2 Findings

The first objective of the study was to measure liquidity creation among universal banks in Ghana over a ten-year period (2007-2016). The study confirms that banks do not create much liquidity within the economy. The industry seems to display a risk-averse attitude through its continued strategy of holding investments in placements and government securities. A regression model was estimated to address the second and third objectives. The
independent variables of interest: capital adequacy ratio, ownership concentration and their interaction term all showed significance (negative, negative and positive respectively) for both measures of liquidity creation. This suggests that increases in banks’ regulatory capital tend to reduce the amount of liquidity created by universal banks operating in Ghana. This negative relationship is however moderated by the ownership structures within the banks, which was found to be mostly concentrated.

For the control variables used, the random effects regression results revealed that using the CATFAT liquidity creation measure, bank risk has a significant and positive relationship with liquidity creation. Bank size and market share, though not significant, both showed positive relationships with liquidity creation. For the macroeconomic variables, only inflation showed a significant and negative relationship with liquidity creation. This negative relationship suggests that as the inflation rate increases, banks create less liquidity. This finding explains why banks rather prefer to hold investments in short term or government securities, than to give out these monies in the form of long term loans to businesses (which helps to boost liquidity creation within the economy). GDP and 91-day Treasury bill rates showed no significance.

The CATNONFAT model also showed equivalent results except for GDP, which showed a significant and negative relationship with liquidity creation; though it showed no significance under the CATFAT model. The Hausman Taylor model, used as a robustness check, also showed equivalent results for both liquidity creation measures; as was established under the random effects model. All independent variables showed the same significance and direction of relationship as recorded under the random effects model using the CATFAT measure.
5.3 Policy recommendations

Based on the results derived and the conclusions made, the following recommendations are suggested for consideration:

As shown by the results, banks do not create much liquidity within the system. Though increases in the regulatory capital have a negative impact on liquidity creation of banks, when interacted with the concentrated ownership found within the banks, the negative impact is reduced as ownership gets more concentrated. Also, high and unstable inflation seems to make it difficult for banks to increase their lending to businesses and productive sectors of the economy, which tend to be risky due to a volatile macroeconomic environment; which is common in our part of the world. Lending out to such productive sectors (e.g. commercial, industrial and agricultural loans) for the medium to long term is what aids with liquidity creation within the economy; and in turn drives economic growth. These suggest that, if the banks are provided with a more favourable environment to help them manage the higher risk that goes with lending to such risky sectors, coupled with the increased capitalization and concentrated ownership within the industry, it could improve liquidity creation within the economy. These would in turn impact positively on economic growth.

One initiative that can be put in place by the central bank is a Credit Guarantee scheme. Guarantee schemes aim to create a level of trust between financial intermediaries and borrowers. Through such schemes, relationships can be established between lenders and borrowers; and these relationships have the potential of surviving after some time without the involvement of the guarantee mechanism. As more clients demonstrate their ability to repay their loans to the banks, more banks will be willing to offer funds to help people grow their businesses to support our growing economy.
One such guarantee scheme currently in place is the ARIZ guarantee scheme designed by the French Development Agency; with the aim to fight poverty and promote sustainable development in various countries. Though useful, it may not be able to provide the required collateral. It is therefore important that the central bank considers putting in place local schemes to target productive sectors within the economy, and businesses that have growth potential that can be achieved, if access to long term funds are readily available.

The Bank of Ghana can also liaise with the appropriate authorities to consider granting tax incentives to banks who agree to lend a certain percentage of their available funds to specific earmarked productive sectors within the economy. This incentive would serve as a source of motivation and encouragement for the various banks; and grant them some tax relief as a bonus for taking on additional risk for the greater good. However, for all these to work smoothly, there is the need to continually ensure that the best is done to provide a stable macroeconomic environment (especially with the issue of inflation). If a favourable environment is created for banks to play their financial intermediation role effectively, the benefits to be gained from increased bank capitalisations can be fully realised through improved liquidity creation.

5.4 Future Research Directions

An important extension of this study will be to determine if the nature of the major shareholder within the bank influences the extent to which ownership concentration moderates the relationship between bank regulatory capital and liquidity creation. Another important extension would be to determine an appropriate minimum concentration threshold for which ownership structure does influence the effect of regulatory capital on liquidity creation.
REFERENCES


Emerging Developments in the Banking Industry of Ghana.
icagh.com/file/Developments_in_Financial_Services_Industry_in_Ghana_01.pdf


International Accounting Standards (28). Investments in Associates and Joint Ventures.


http://www.morrisonassociatesgh.com/recapitalisation-banks-ghana/


