

**CAPITAL ADEQUACY, INCOME DIVERSIFICATION,
COMPETITION AND LIQUIDITY CREATION OF COMMERCIAL
BANKS IN KENYA**

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DECLARATION

This thesis is my original work and has not been presented elsewhere for a degree or any other award.

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DEDICATION

I dedicate this work to my mother, Teresah Wanjiru, for her endless love, support and encouragement throughout my pursuit for education.

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ABBREVIATIONS AND ACRONYMS

CAR	Capital Adequacy Ratio
CBK	Central Bank of Kenya
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HHI	Herfindahl-Hirschman Index
KBA	Kenya Bankers Association
KNBS	Kenya National Bureau of Statistics
OLS	Ordinary Least Squares

DEFINITION OF TERMS

Commercial bank	This is a financial institution which primarily serves customers by taking deposits, making various loans for consumption and investment purposes.
Capital adequacy	This is a bank's available capital, which is usually expressed as a ratio or percentage of its risk-weighted assets.
Competition	This is rivalry among two or more banks where they compete for banking customers to make more profit.
Income diversification	This is increasing the number of sources of income or maintaining a balance between them
Liquidity creation	It's a process where banks fund somewhat illiquid assets like business loans with comparatively liquid liabilities like demand deposits, hence generating liquidity in the market.

ABSTRACT

Banks create liquidity which in turn improves capital allocation and accelerates economic growth. Liquidity creation is essential and critical as it may lead to a stable financial system and provide growth opportunities. Liquidity has been observed to be more unstable in developing countries than in developed nations. Despite the rise in minimum deposits, commercial banks in Kenya, a developing country, struggle to optimize their profits due to reduced liquidity creation capacity. This study aimed to evaluate how capital adequacy, income diversification and competition impacted Kenyan commercial banks' ability to create liquidity. From 2001 to 2020, the study employed unbalanced panel data from Kenya's 36 licensed commercial banks. Data was extracted from published financial statements and reports from banks. The two-step system generalized method of moments approach was used in the study. To increase the robustness and prevent erroneous conclusions, cross dependence, serial correlation and instrumental validity tests were carried out. Berger and Bouwman's method was used to determine the liquidity creation levels of commercial banks. The capital adequacy-liquidity creation link of commercial banks was found to be significantly negative, supporting the financial fragility-crowding out hypothesis. The study found a positive linkage between income diversification and liquidity creation of commercial banks, implying that well-diversified banks have a high level of liquidity creation and vice versa. The study also found a significant negative effect of competition on liquidity creation, depicting competition's value-destroying effect. A tradeoff exists between capital adequacy and liquidity creation, which must be carefully evaluated as changes in capital requirements are considered. Due to this tradeoff, there is a need for an optimal level of capital. The findings suggest that reinforcement of the diversification drive in Kenyan commercial banks is necessary. The value-destroying effect on liquidity creation by competition presented a case for policymakers geared toward consolidating banks' operations through possible mergers and acquisitions. The study has important implications for Kenya's financial sector, as it guides managers and other stakeholders regarding measures that can be taken to increase commercial banks' liquidity creation through capital requirements, diversification, and consolidation of banks.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Banks contribute to the economy, by facilitating the financing of economic activities and supporting the exchange system through the provision of a transaction settlement mechanism (Beck et al., 2021). In order to finance relatively illiquid assets, such as loans, banks act as liquidity creators by using comparatively liquid liabilities, such as demand deposits (Sinha & Grover, 2021). Additionally, banks create liquidity outside of their balance sheets through activities that offer loan commitments and other claims to liquid funds, such as using standby letters of credit (Kashyap et al., 2002; Berger & Bouwman, 2009). These off-balance-sheet activities provide investment plans to investors. Therefore, the creation of liquidity is crucial for the smooth operation of the financial system, macroeconomic results, and economic expansion (Davydov et al., 2021). According to Sinha and Grover (2021), liquidity creation improves capital allocation and accelerates economic growth. However, there exists a tradeoff between benefits and cost of liquidity creation, since liquidity is essential and is needed by both depositors and borrowers. This makes liquidity creation a double-edged sword on financial stability (Gupta & Kashiramka, 2020).

Global liquidity creation increased substantially from the year 1987 to the year 2014, reaching USD 16.1 trillion – which included 4.6 trillion dollars off their balance sheet and 11.4 trillion dollars on their balance sheet (Kenya Bankers Association, 2020). Empirical studies also indicate that liquidity creation has been more unstable for developing countries than developed countries (D’avino et al., 2022). This is explained by the difference in the countries' stability and financial depth, which are very important drivers of liquidity creation. This is primarily due to the fact that developed countries typically have larger and more sophisticated financial systems, along with more advanced central banks that have the capacity to implement expansionary monetary policies. Commercial bank liquidity creation has been unstable in developing nations like those in Latin America and Africa. According to Cheruiyot and Nasieku (2022), the main challenge in these countries is the policies by the central banks. These include

policies on the bank rates and the interest rate capping, which, at times, are unfavorable, preventing commercial banks from engaging in activities that provide liquidity. Various structures of the economy such as exchange rates systems, interest rates, and inflation also contribute to the challenges in liquidity creation by commercial banks in developing economies (Onoh & Iheanacho, 2017).

Capital adequacy is another critical bank-specific factor that may influence liquidity creation. Capital is essential as it acts as a buffer during adverse situations and supports banks' businesses (Mohanty & Mahakud, 2021). During a crisis, capital adequacy measures the bank's internal strength and power to withstand adverse shocks. Adequate capitalization enables financial institutions to manage risks more effectively (Ndinda, 2022). With a strong capital base, banks can absorb losses and maintain stability during economic downturns, which, in turn, encourages lending and liquidity creation. Regarding how capital adequacy affects the creation of liquidity, there are two conflicting and contradicting hypotheses. First, there is the financial fragility-crowding out hypothesis, which claims bank's capital leads to a less fragile capital structure which impedes liquidity (Berger & Bouwman, 2019). Due to a fragile capital structure, banks are encouraged to keep watch on borrowers, allowing them to extend their loans. By increasing equity capital, it becomes more difficult for banks with less fragility to commit and conduct out monitoring. This situation becomes risky as it hampers the liquidity creation ability of these banks. According to Berger and Bouwman (2019), capital may also negatively affect liquidity creation since it "crowds out" deposits.

Secondly, an alternative view is that a bank's capacity to absorb risk is increased by having a high capital level, which increases the ability to create liquidity. Banks are usually exposed to risk by liquidity creation since as the liquidity created increases, there is a greater severity and likelihood of losses as illiquid assets are disposed of so that the customer's liquidity demands can be met (Mohanty & Mahakud, 2021). Banks will create more liquidity if the capital adequacy ratio is higher. This is referred to as the "risk absorption" hypothesis. The "risk absorption" and "financial fragility-crowding out" hypotheses apply differently to individual banks' creation of liquidity. Therefore, the critical, important issue is determining empirically the circumstances under which

each scenario dominates. Since the two hypotheses are determined jointly, establishing causation is difficult. This study sought to sort out the joint determination since it determines the real capital adequacy impact on the creation of liquidity by Kenyan commercial banks.

The importance of diversification in banks is well documented in the literature. It expands the investment opportunity set, enhancing the risk-return frontier. Consequently, it is bound to have an implication on liquidity creation. It enables the banks to realize gains from economies of scale, increased income streams, counteracting volatility, and reduced insolvency risks (Sinha & Grover, 2021). Banks focusing more on traditional banking activities have higher liquidity creation than those focusing on non-traditional banking activities. This is because traditional banking sticks to the relationship-oriented model with an association between the core deposits (highest value-added liabilities) and relationship loans (Hoang et al., 2020). This association generates stable and predictable cash flows and a stable source of funds. These funds can then be used for lending to individuals and businesses, generating interest income. The predictable nature of these activities allows banks to plan their liquidity positions more effectively. Therefore a high level of liquidity creation of a bank may come along with a high level of bank income diversification, indicating a positive relationship between the creation of liquidity and income diversification.

Contrarily, non-traditional actions, such the underwriting and brokerage of securities, are unconnected to the bank's primary intermediation function. Therefore, shifting to more of these activities may decrease the liquidity creation level (Hou et al., 2018; Hoang et al., 2020). This is because; non-traditional activities often require substantial capital investment. When banks allocate a significant portion of their capital to non-traditional activities, it reduces the amount of capital available for traditional lending. As a result, the ability of a bank to generate liquidity through lending is diminished. Non-traditional businesses, such securities brokerage or underwriting, can be subject to higher levels of volatility and liquidity demands compared to traditional banking activities (Hoang et al., 2020). Market fluctuations, changes in investor sentiment, or sudden shifts in the demand for securities can create liquidity pressures. These activities

may require banks to hold larger cash reserves or rely on short-term funding sources, potentially limiting their ability to create liquidity.

Banks that engage in non-traditional business practices could be impacted to different regulatory frameworks and capital requirements compared to traditional banking. Regulatory authorities often impose additional capital and liquidity requirements for riskier activities or complex financial instruments. Meeting these requirements may divert resources from traditional lending, impacting liquidity creation. Non-traditional activities are also influenced by market conditions, investor sentiment, and external factors compared to traditional banking. During periods of market stress or downturns, liquidity in these markets can dry up, making it difficult for banks to create liquidity from these activities. This dependence on market conditions introduces additional risks and uncertainties in liquidity creation. This therefore means a low level of liquidity creation of a bank may be accompanied by a high level of non-traditional activities, demonstrating a negative relationship between the creation of liquidity and income diversity.

Competition is likely to affect banks' liquidity creation. Two conflicting hypotheses exist on the competition's effect on the creation of liquidity. First, the "fragility channel hypothesis" argues that increased competition increases a bank's fragility. This is because an increase in competition decreases profits, which is usually a "buffer" in adverse situations. Reduced profits arising from intense competition weaken the risk absorption capability of banks in the event of a crisis. Consequently, due to reduced profits, banks are incentivized to reduce the deposits accepted and loans granted to minimize bank runs threat. Profits serve as a crucial source of capital for banks. When profits decline or turn into losses, it reduces the amount of capital available for banks to support their lending activities (Mohanty & Mahakud, 2021). With limited capital, banks may face constraints in extending loans, thereby reducing their ability to generate liquidity in the economy. Fragile banks may face difficulties in accessing funding or may be hesitant to extend credit due to concerns about their own stability or the potential creditworthiness of borrowers. This cautious lending behavior can limit the effectiveness of monetary policy in promoting liquidity creation and economic growth.

Therefore, according to the “fragility channel” view, a negative relationship exists as increased bank competition creates a decrease in liquidity (Horvath et al., 2016).

The second channel through which competition influences liquidity creation is the "price channel hypothesis." It posits that the competition level influences the banking pricing policies in the market. Increased competition motivates banks to increase their deposit rates and reduce lending rates to attract and retain customers (Cao et al., 2022) . Consequently, the demand for loans and deposits increases. Increased competition stimulates deposits and loan demand by alleviating pricing obstacles. When deposit rates are stimulated, it incentivizes individuals and businesses to deposit more funds into banks. Higher deposit rates attract more deposits, thereby increasing the pool of available funds for banks to lend. According to Cao et al. (2022), this increase in deposits enhances the liquidity creation capacity of banks as they have more funds to extend loans and support economic activity. Also, when lending rates are stimulated, it encourages borrowing by individuals and businesses. Lower borrowing costs can incentivize borrowers to seek loans from banks, leading to increased lending activity. As banks extend more loans, they inject liquidity into the economy, fostering economic growth and supporting liquidity creation. Therefore, the "price channel" view suggests that competition positively affects liquidity creation (Horvath et al., 2016).

1.1.1 Commercial Banks in Kenya

In Kenya, the Central Bank of Kenya (CBK) regulates commercial banks. Currently, 42 commercial banks are operating in Kenya, where 14 are foreign-owned with branches in the country and 28 are domestically owned (CBK, 2020). Commercial banks are crucial for the allocation of economic resources (Bowa, 2015). Commercial banks have the unique ability to create credit. This process expands the overall money supply in the economy and supports liquidity creation. According to Bowa (2015), they create liquidity to generate the necessary income, which helps them cover their operational costs. They cover their operational costs through various ways. First, commercial banks generate liquidity by extending loans to individuals, businesses, and other borrowers (Sahyouni & Wang, 2019). The interest charged on these loans generates income for the banks, helping to cover various expenses such as administrative costs, salaries,

technology investments, and other operational costs. Secondly, commercial banks generate liquidity through fee-based services where they charge fees for various services they offer, such as account maintenance fees, transaction fees, payment processing fees, advisory services, and other financial products. These fees contribute to the bank's revenue stream, helping to cover operational costs and generate income.

In Kenya's banking sector, customer deposits increased by 8.9% from USD 34.3 billion in 2019 to USD 37.3 billion in 2020 (Resilience, 2021). Kenyan bank deposits totaled about 4.6 trillion Kenyan shillings (Ksh), or about 38.6 billion dollars, in 2021. The amount of customer deposits has increased over the past few years. According to Resilience (2021), Kenyan commercial banks saw moderate growth in deposits during 2020 despite the COVID-19 pandemic economic impact. This is because many individuals and businesses continued to deposit their funds in banks for safety and liquidity purposes. There has been a noticeable trend towards digital banking and electronic transactions in Kenya. This shift has led to an increase in digital deposits, including mobile money deposits, online banking transfers, and electronic fund transfers.

Compared to the growth in customer deposits, the growth in gross loans and advances remained to be low (Resilience, 2021). This is due to a decrease in loan demand from individuals and businesses. Uncertainties and cautious lending practices by commercial banks especially in 2020 resulted in lower loan growth compared to previous years. Kenyan commercial banks collaborated with the government and the CBK to help and provide loans to sectors severely affected by the pandemic (Banks & Officer, 2020). This included loan restructuring programs, payment holidays, and new loan facilities to help businesses withstand the economic challenges. Commercial banks placed a greater emphasis on risk management and credit assessments in 2020. The economic uncertainties necessitated a more cautious approach to lending, resulting in stricter loan approval criteria and enhanced credit risk evaluation processes.

Capital adequacy is an essential aspect of prudential regulation for banks to ensure their financial stability and ability to absorb potential losses. In Kenya, the CBK is

responsible for setting capital adequacy requirements and monitoring banks' compliance. Historically, Kenyan banks have maintained relatively healthy capital adequacy levels. The CBK has implemented the Basel II framework, which sets minimum capital adequacy ratios for banks based on credit, market, and operational risks. To enhance the resilience of the banking industry, the CBK has increased its focus in recent years on strengthening capital adequacy standards. The adoption of Basel III standards has introduced stricter regulations, including higher capital ratios and additional capital buffers. The capital adequacy trends in Kenya have shown improvements, with banks taking measures to enhance their capital positions. Many banks have undertaken initiatives to raise additional capital through rights issues, private placements, or accessing international markets. According to Kenya Bankers Association (KBA), 2020), commercial banks' total capital adequacy ratio rose from 18.8% in 2019 to 19% in 2020. This was above the statutory minimum requirement of 14.5% (CBK, 2020).

Over the years, income diversification has evolved to be seen as crucial to enhancing the creation of liquidity by commercial banks (CBK, 2020). According to KBA (2020), Interest on loans and advances, interest on government securities, fees and commission income, gains from foreign exchange, and interest on placements and bank accounts are the primary sources of income for Kenyan commercial banks. Kenyan banks have diversified their businesses in several ways to expand their revenue streams and mitigate risks. Commercial banks in Kenya have been diversifying their operations by launching new services like faceless banking, agency banking, mobile banking, bank assurance, and microfinance into their banking systems (Ndungu & Muturi, 2019). Additionally, commercial banks have expanded beyond their primary roles of increasing deposit mobilization and loan making to engage in other financial non-interest-earning activities like the provision of financial guarantees and derivative contracts (Muriithi & Waweru, 2017). When banks diversify their income sources, they generate additional revenue streams beyond traditional lending activities. These services have increased the capital base of the banks, thus increasing liquidity in the economy.

In addition, commercial banks in Kenya have been facing various challenges in the income diversification. Central Bank of Kenya (CBK) sets guidelines and restrictions on permissible banking activities. Some of these restrictions have been restricting banks' ability to diversify into certain non-traditional areas, limiting their income diversification options. Many Kenyan commercial banks, especially smaller ones, lack the necessary resources to build and maintain the infrastructure required for diversification. Insufficient technological capabilities hinder their ability to enter new markets or offer innovative products and services. Diversifying into new income streams exposes banks to additional risks. Managing these risks effectively requires robust risk management systems and processes. However, some Kenyan banks have inadequate risk management frameworks, including the expertise to assess and mitigate risks associated with new business lines. This can prevent banks from pursuing income diversification strategies.

The market share levels show competition amongst Kenyan commercial banks. According to the KBA (2020), using the weighted composite index, the Kenyan commercial banks are divided into three peer groups: small, medium, and large. For the year 2020, large banks had a combined market share of 74.55%, which decreased from 74.68% in the previous year, 2019. Medium banks had a combined market share of 17.21% in 2020, increasing from 17.10% in 2019. Additionally, small banks' market share increased slightly from 8.20% in 2019 to 8.24% in 2020 (CBK, 2020). This signifies a decrease in competition amongst large commercial banks and an increase in competition for the small and medium-sized commercial banks. These large commercial banks often have significant resources and well-established customer bases, making it challenging for smaller banks to compete on an equal footing.

The competition for market share is fierce among commercial banks in Kenya. Each bank strives to attract and retain customers by offering competitive products, services, interest rates, and customer experience. Banks leverage their strengths and unique selling propositions to differentiate themselves in the market. Kenyan commercial banks operate in a competitive market with several players vying for market share. Intensifying competition make it challenging to enter new markets or establish a strong

foothold in non-traditional areas. Additionally, market dynamics, such as changing customer behavior and technological advancements, can further complicate income diversification efforts.

1.2 Statement of the Problem

Banks play a very important role in the economy and do this through liquidity creation. Liquidity creation improves capital allocation and accelerates economic growth (Sinha & Grover, 2021). Real sector productivity will increase, the financial system will be stable, and there will be economic growth if commercial banks are creating liquidity at a very high level. Liquidity creation is an activity that generates income for commercial banks but the whole process can also expose the banks to different risks of default and uncertainties which can lead to the collapse of the banks.

In modern Kenya, enormous growth has been witnessed in the banking sector with the capital reserves multiplying. Innovation and reinvention in value addition of their products is another strategy that the Kenyan banking sector has embraced. However the sector has been facing challenges such as asymmetry of information, high transaction costs due to the rising of interest rates, the changing regulations and low liquidity levels (Cheruiyot & Nasieku, 2022). Many banks in Kenya, despite the increase in the minimum deposits, struggle to maximize profits due to the reduced liquidity creation abilities.

On the creation of liquidity in developing countries, there is little empirical evidence. In the past, studies have assessed how capital and liquidity created relate in developed nations. (see, Fu et al., 2016; Chaabouni et al., 2018; Casu et al., 2019; Evans & Haq, 2021; Distinguin et al., 2013). Past studies have also evaluated how banks' income diversification affects liquidity creation in the case of developed economies (see for instance, Dang, 2020; Hoang et al., 2020; Sinha & Grover, 2021; Hou et al., 2018). Other studies have evaluated competition and liquidity creation (see for example, Abraheem et al., 2020; Chaabouni et al., 2018; Horváth et al., 2016; Jiang et al., 2019; Kick, 2022). However, to the best of our knowledge, no study has evaluated how capital adequacy, income diversification and competition interact to influence commercial

banks' creation of liquidity in the context of developing nations. Kenya lacks recent studies regarding the creation of bank liquidity. Due to opposing and conflicting views on capital adequacy, income diversification and competition effects on banks' liquidity creation, this study provides important empirical evidence to inform policy in a developing country context.

1.3 Research Objectives

This study was by both the general and specific objectives.

1.3.1 General Objective

The main objective of the study was to establish the effect of capital adequacy, income diversification, and competition on the liquidity creation of commercial banks in Kenya.

1.3.2 Specific Objectives

The specific objectives of this study were

- i. To evaluate the effect of capital adequacy on liquidity creation of commercial banks in Kenya.
- ii. To assess the effect of income diversification on liquidity creation of commercial banks in Kenya.
- iii. To examine the effect of bank competition on liquidity creation of commercial banks in Kenya.

1.4 Research Hypotheses

The following hypotheses guided this study

- i. Capital adequacy has no effect on liquidity creation of commercial banks in Kenya.
- ii. Income diversification has no effect on liquidity creation of commercial banks in Kenya.
- iii. Bank competition has no effect on liquidity creation of commercial banks in Kenya.

1.5 Significance of the Study

The study of the effects of capital adequacy, income diversification, and competition on the liquidity creation of banks contributes to the understanding of the behavior and operation of the banking industry. It provides valuable insights into the factors that influence a bank's capacity to generate and maintain liquidity, which is essential for financial stability and economic growth. The findings of the study will be advantageous to a number of groups on the relationship between commercial banks' competition, income diversification, capital adequacy, and liquidity creation. These groups include various economics scholars and researchers over the globe, including in Kenya, the nation at large, and various economic policymakers.

This study contributes to capital adequacy, income diversification, competition and liquidity creation literature in several ways. Firstly, it employs data from the Kenyan financial banking sector, a developing country, to provide empirical evidence on the effects of capital adequacy, income diversification and competition on liquidity creation. Secondly, the study covers twenty years (2001-2020), facilitating the identification of trends in capital adequacy, income diversification, competition and liquidity created to total assets over the period. This period is also significant since it is when various regulatory guidelines were implemented in Kenya. Lastly, the study has important implications for Kenya's financial sector, as it guides managers and other stakeholders regarding measures that can be taken to increase commercial banks' liquidity creation through capital requirements, diversification and consolidation strategies.

The findings of the study also have implications for banking regulations and policy frameworks. It provides evidence and insights for policymakers in formulating and adjusting regulations related to capital adequacy, income diversification, and competition. For example, informs the design of capital adequacy frameworks, guide policies on income diversification strategies, and help assess the value destroying effect of competition. Ultimately, it contributes to the development of robust regulatory frameworks that promote financial stability, liquidity creation, and sustainable banking practices. Economic policymakers also benefit since they will use the information to

formulate various policies to improve the liquidity creation of commercial banks in Kenya.

1.6 Scope of the Study

All of Kenya's commercial banks with licenses were involved in the study. In Kenya, there were 42 commercial banks as of December 2020. For the analysis, data from 36 commercial banks was used. This is because after cleaning and removal of outliers, it was found that 6 commercial banks did not have sufficient data. The study covered the period 2001 to 2020 since it was available and well adjusted.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature relevant to this study. Sections 2.2 and 2.3 present theoretical and empirical literature on the connection between capital adequacy, income diversification, competition, and liquidity creation of commercial banks. Section 2.4 covers the summary of the literature reviewed and section 2.5 presents the research gaps.

2.2 Theoretical Literature Review

Three theories served as the basis for this study: the market power theory, the risk absorption theory, and the fragility channel theory.

2.2.1 Fragility Channel Theory

The fragility channel view was developed by Petersen and Rajan (1995). Additionally, it is known as the competition-fragility theory. According to the theory, more competition in the banking industry could increase financial fragility and instability, which in turn may reduce the creation of liquidity. This theory argues that intensified competition among banks can incentivize riskier behavior and undermine financial stability. According to this theory, heightened competition can squeeze banks' profit margins, making it harder for them to generate sustainable profits. In response, banks may search for higher-yield investments or engage in riskier lending practices to maintain profitability. These actions can lead to an accumulation of risky assets in their balance sheets, increasing the fragility of the banking system. Bank's profits are very essential as they normally act as "buffer" against various adverse shocks. Due to the decrease in banks' profits and an increase in financial fragility, banks are incentivized to reduce liquidity creation (Petersen & Rajan, 1995). If banks experience a decline in profits, they may become more cautious about extending new loans. Reduced lending capacity means less credit available to borrowers, which can restrict liquidity creation in the economy. As a result, businesses and individuals may find it harder to access funds, leading to reduced economic activity and potentially affecting liquidity levels.

The theory applies to this study because it states that banking system fragility caused by a reduction in profits may have a constraining influence on liquidity creation and credit availability. The concept applies to the current study since commercial banks may have decreased market power which may be against the wish of many banks. This is because a decrease in the market power signifies high competition which may make banks increase the deposit rates leading to bank fragility. The theory however fails to establish a clear causal relationship between bank competition and financial fragility is challenging. It is difficult to determine whether increased competition directly causes financial fragility or if fragility leads to intensified competition (Marsh, 2019). The relationship between these variables can be influenced by various other factors, making it challenging to isolate the specific impact of competition on fragility of banks. This warrants an understanding of the connection between bank competition and bank fragility, which has an impact on how banks create liquidity.

Fragility Channel theory is a theoretical proposition and its empirical evidence is mixed. While some researchers have found strong evidence supporting the idea that bank competition and financial instability are positively correlated, other studies have not. The impact of competition on financial stability and liquidity creation is influenced by various factors, including the effectiveness of regulatory frameworks, macroeconomic conditions, and the overall market structure. To further understand the connection between bank competition and liquidity creation, more research is therefore required.

2.2.2 Risk Absorption Theory

This theory was developed by Diamond and Dybvig (1983). The theory is usually tied to and connected to the roles that banks play in risk transformation, where high capital increases the bank's capacity to generate liquidity. According to Berger and Bouwman (2009), the risk absorption theory insight comprises of two literature strands. According to the first strand of risk absorption theory, having more capital makes banks better at creating liquidity (Allen & Gale, 2004). The other strand is that bank capital allows the bank to absorb greater risk (Repullo, 2004). Risks that banks encounter include operational risk, market risk, liquidity risk, and credit risk (Ismail & Ahmed, 2023). The ability of a bank to absorb these risks depends on its financial strength, capital

adequacy, risk management practices, and the quality of its assets. A bank with a lower risk absorption capacity may be more vulnerable to shocks and may struggle to absorb losses, potentially leading to financial instability or even failure.

Liquidity creation raises the bank's risk exposure since banks that create more liquidity may face bigger losses when compelled to sell illiquid assets to meet client liquidity needs, whereas bank capital permits the bank to absorb more risk (Wójcik-Mazur & Szajt, 2015). This theory contends that increased capital enhances banks' capacity to absorb risk and, consequently, their capacity to generate liquidity. The more liquidity created, the higher the chance and severity of losses associated with having to sell illiquid assets to satisfy customer's liquidity demands. This puts banks at risk (Mohanty & Mahakud, 2021). This means that banks may be able to generate more liquidity if their capital adequacy ratios are greater. This theory is additionally known as the "risk absorption" hypothesis.

The theory applies to this study and is essential since it indicates that high bank capital increases the rate of absorbing greater risks and increases the ability to create liquidity. Despite how crucial this theory is to the current area of research, it has some weaknesses. Diamond's model assumes that banks have perfect monitoring abilities, allowing them to effectively assess and manage risks. In reality, perfect monitoring is difficult to achieve, and banks face challenges in obtaining accurate and timely information about borrowers. The capacity of banks to effectively absorb and manage risks may be constrained by imperfect monitoring. According to theory, large banks often experience a stronger risk absorption effect than medium-sized and smaller banks (Wójcik-Mazur & Szajt, 2015). This is due to the fact that large banks have higher risk-absorbing buffers and are subject to more regulatory markets and market discipline. The theory, therefore, does not advise accordingly on what is done to the small banks with fewer buffers to absorb greater risk.

2.2.3 Market Power Theory

This theory is based on Porter's (1980) notion of strategically positioning a firm in its environment by employing a variety of methods that set it apart from its rivals. This

viewpoint holds that diversification increases opportunity and lessens industry competition, as observed by Caves (1981) and Miller (1973). In accordance with this notion, diversification is one of the key strategies used by firms to beat back competition, establish market dominance, and obtain access to conglomerate powers. By using this tactic, they overcome the competition and generate profits that are higher than the average profits that the market offers (Hassan, 2017). Because diversity lessens competition among commercial banks in this environment, this theory views it as a tool for increasing profitability. According to this perspective, noted that diversification increased opportunities and reduces the competition of industries.

The market power theory is relevant to this study because through diversification, commercial banks are able to enter new markets and thereby gain a competitive edge over their rivals, not just because of their specific standing in the market but also because of their standing in other different markets (Hassan, 2017). Diversification can indeed be seen as a strategy that allows commercial banks to expand their presence into new markets and potentially gain a competitive edge. Through diversification, banks can achieve a larger market share and increase their bargaining power with customers, suppliers, and other market participants (Mulwa & Kosgei, 2016). This increased market power can lead to better terms, pricing advantages, and access to critical resources, further strengthening their competitive position. Banks with a competitive advantage, such as a strong brand reputation or a widespread branch network, may have better market access and a larger customer base. This increased market presence allows them to attract more deposits and funding, which can be utilized to create liquidity by lending to borrowers or investing in liquid assets. This eventually increases the liquidity creation level of these commercial banks.

2.3 Empirical Literature Review

Previously, various studies showed different results and findings on capital adequacy, income diversification, and competition on the liquidity creation of commercial banks.

2.3.1 Capital Adequacy and Liquidity Creation of Banks

There is a consensus among scholars and regulators that capital adequacy is significant

and plays a crucial role in the stability of the banking system. However, empirical evidence on the relationship between capital adequacy and liquidity creation is mixed. For example, Tran et al. (2016) using USA commercial banks assessed the link between capital and liquidity creation and discovered that they are positively related. A study on 14 economies from 2005 to 2012 in the Asia-Pacific region discovered a positive correlation between bank capital and liquidity creation (Mohanty & Mahakud, 2021). Berger and Bouwman (2009) found evidence that higher levels of capital adequacy positively affect liquidity creation of banks. They examined a wide sample of banks in the United States and found that banks with greater capital ratios were more likely to generate liquid assets and offer liquidity to the economy.

Boamah et al. (2023) studied the link between capital ratios and credit creation using a sample of banks from 90 emerging economies. They discovered that higher levels of capital adequacy increased liquidity creation in a positive way, implying that well-capitalized banks were better equipped to provide liquidity to the financial system. (Beccalli & Frantz, 2016) study looked at how capital adequacy affected liquidity creation in a sample of European banks before and after the financial crisis that followed. Higher capital adequacy ratios were found to be connected with increased liquidity creation. The authors concluded that capital adequacy is critical for increasing bank liquidity and stability. More studies have discovered a positive relationship between capital and liquidity creation (see, Evans & Haq, 2021; Zelenyuk et al., 2021; Le, 2018).

On the other hand, Berger et al. (2016) used a sample of European banks to investigate the influence of capital adequacy on bank liquidity creation. Contrary to the positive relationship typically found in other studies, they found evidence that capital adequacy negatively affects the liquidity creation. The study suggests that highly capitalized banks may allocate a larger proportion of their capital to low-risk, liquid assets, which can reduce their incentives to engage in higher-risk, liquidity-creating activities. Horváth et al. (2014) found that capital negatively affects liquidity creation in the Czech banking sector. A study conducted in the Vietnamese banking system from 2007 to 2015 revealed a negative bidirectional link between capital and liquidity (Le, 2018). More

studies have discovered a negative relationship between commercial banks' capital and liquidity creation (see, Casu et al., 2019; Fu et al., 2016; Xie, 2016; Distinguin et al., 2013). According to the reviewed literature, there is a two-way interaction between capital and liquidity creation that varies by time, country, and bank type. As a result, it is clear that the majority of these studies have mostly concentrated on developed economies (see, for instance Fu et al., 2016; Casu, 2019; Fungáčová et al., 2017; Xie, 2016; Distinguin et al., 2013). This study therefore analyzed bank capital and liquidity creation in Kenyan commercial banks.

2.3.2 Income Diversification and Liquidity Creation of Banks

The empirical evidence on the influence of income diversification on liquidity creation is mixed. Several studies document an inverse linkage. For example, from 2007-2018, in a study of Vietnamese commercial banks, Dang (2020) found that diversification into non-traditional banking that generates non-interest income reduced liquidity creation. Similar results were recorded for commercial banks in Vietnam from 2007-2017 by Hoang et al. (2020). Gropp and Heider (2010) using a sample of European banks, researchers investigated the impact of income diversification on liquidity creation. According to the findings, greater income diversification was inversely connected to liquidity creation. According to the authors, banks with more diversified income sources may have lower incentives to provide liquidity, as they can rely on alternative income streams and may face less pressure to maintain high levels of liquidity. Furthermore, the same negative relationship between income diversification and liquidity creation has been recorded for large US-holding banks (Tran, 2020) and Indian banks (Sinha & Grover, 2021). However, considering diversification within non-traditional banking activities, Hou et al. (2018) discovered a positive relationship between diversification and liquidity creation in China.

Besides the direct linkage between diversification and liquidity creation, studies have focused on other diversification aspects. For example, using banks in Malaysia, Toh et al. (2020) discovered that income diversity had a positive impact on bank liquidity creation from 2001 to 2017. The study found that the income diversification of banks acts as a buffer that ensures liquidity creation from the competition, thus enhancing their

tolerance from various compressions. Butzbach and Mettenheim (2015) investigated the effect of income diversification on the creation of liquidity for a sample of European banks. The findings revealed a positive link between income diversification and liquidity creation. The authors argued that diversified banks are better positioned to generate internal liquidity due to their ability to tap into different income sources and mitigate idiosyncratic risks.

Using a sizeable sample of U.S. banks, Berger and Bouwman (2009) found evidence of a positive correlation between income diversification and liquidity creation. The authors argued that income diversification allows banks to generate stable and diversified revenue streams, which can enhance their ability to create and maintain liquidity. For a sample of Vietnamese banks, Nguyen and Nghiem (2015) evaluated the effect of income diversification on liquidity formation. The findings showed that income diversification and liquidity creation are positively correlated. The study suggested that diversified income sources enable banks to generate more stable and predictable cash flows, enhancing their capacity to provide liquidity. Other studies showed that diversity aids in increasing profits, achieving scale benefits, minimizing volatility, and lowering insolvency risks (see, Sanya & Wolfe, 2011; Meslier et al., 2014). Such benefits strengthen the banks' foundation, enhancing the liquidity creation function. Due to the contradicting views and results on the effect of income diversification on the liquidity creation of banks, this study sought to find out which view applies in Kenya.

2.3.3 Competition and Liquidity Creation of Banks

Regarding the effects of bank competition and liquidity creation, banks, regulators and academics have reached various findings. The empirical evidence on how competition affects liquidity creation is equally conflicting. Horvath and Seidler (2013) employed GMM panel estimation to determine the impact of bank competition on the creation of liquidity by Czech banks. A negative correlation between the two was identified by the study. Horváth et al. (2016) study found that an increase in competition results in a market power decrease, which leads to a liquidity creation decrease. A decrease in market power results in a reduction of banks' incentives meant to create long-term relationships with new borrowers, which can lead to the creation and sharing of future

surpluses. Agarwal and Hauswald (2010) utilized a sample of U.S. commercial banks to investigate the effect of competition on bank liquidity creation. The findings suggested that increased competition was associated with reduced liquidity creation. The authors argued that competitive pressures can lead banks to engage in riskier lending practices, reducing their ability to provide liquidity.

Similarly, Jiang et al. (2019) used the new identification strategy and found that the competition intensification among banks leads to decreased liquidity creation. Liquidity creation among the banks with fewer profits or the so-called less risk-absorbing capacity banks is reduced by competition. Alhomaiddi et al. (2019) employing a sample of commercial banks from the Gulf Cooperation Council (GCC) nations, looked into how competition affected the creation of bank liquidity. The results indicated a negative relationship between competition and the creation of liquidity. The authors stated that fierce competition could result in a concentration on short-term profits, which would decrease banks' willingness and capacity to create and maintain liquidity. Huang et al. (2018) studied the connection between market competitiveness and the creation of liquidity for a sample of Taiwanese banks. The findings showed that competition and liquidity creation are negatively correlated, especially for smaller banks. The authors argued that intense competition can lead to riskier lending practices and reduced liquidity buffers, hindering the ability to create and provide liquidity. Ali et al. (2019) found that competition reduces bank liquidity creation. More studies have found a negative correlation between bank competition and liquidity creation. They include Toh et al. (2020), Ali et al. (2019), Berger (2019) and Ali et al. (2022).

In contrast, Horvath et al. (2016) and Sinha and Grover (2021) found that bank competition positively affects liquidity creation. Wang et al. (2021) also looked into how competition affected the amount of bank liquidity created in the Chinese banking sector. The findings showed that competition has a positive effect on the creation of liquidity. The relationship confirms the price channel hypothesis. According to this hypothesis, banking pricing policies are influenced by increased competition, leading to increased rates of deposits and decreased loan rates. The demand for both deposits and loans eventually increases liquidity creation. Ali et al.(2022) examined the connection

between competition and the creation of bank liquidity in the Saudi banking industry. The results showed that competition had a positive effect on the creation of liquidity. The authors attributed this effect to the impact of competition on bank pricing policies, which led to more competitive deposit rates and increased liquidity creation. Due to the contradicting views and results on the effect of competition on the banks liquidity creation, this study sought to find out which view applies in Kenya.

2.4 Summary of Literature Review

Only a small number of studies have been conducted in developing economies despite the extensive literature (see, for instance Shahchera, 2015; Toh et al., 2020; Hoang et al., 2020; Le, 2018; Kusi et al., 2021; Abraheem et al., 2020; D'avino et al., 2022; Umar et al., 2018; Yahaya et al., 2021). In the reviewed literature, studies yielded different results. It was clear that the studies differed in terms of the study periods and regional context. Both industrialized economies and emerging economies around the world were involved in these studies. The varying results made it difficult to come up with a clear and robust conclusion on whether capital adequacy, income diversification, and competition have a positive or a negative effect on the commercial banks liquidity creation.

2.5 Research Gaps

There is a significant gap in the research on Kenyan banking when examining the size and impact of some emerging nations, such as Kenya, on the global economy: to date, no empirical study has examined the relationship between income diversification, capital adequacy, competition and liquidity creation in Kenya. This therefore means that there exists scarce empirical evidence on liquidity creation in the Kenyan banking industry. Some Kenyan studies have focused on and dealt with the relationship between capital adequacy and other banks aspects, such as operating efficiency, performance, financial distress, and working capital, but failed to explore liquidity creation (see, Nyaundi, 2015; Musyoka, 2017; Karugu et al., 2018). Similarly, studies in Kenya have investigated the relationship between diversification and other commercial bank factors, such as performance and earnings volatility (see, for example Ndungu & Muturi, 2019; Githaiga & Yegon, 2019; Kiweu, 2012).

Other studies in Kenya have explored the link between competition and other aspect of commercial bank performance, such as stability, efficiency, and profitability but failed to look into liquidity creation (see, for example Gudmundsson et al., 2013; Kiemu & Kamau, 2019; Agung et al., 2019; Fu et al., 2016). Due to this reason, the study sought to fill this gap by giving empirical evidence from an emerging frontier economy such as Kenya. More detailed information on the research gaps can be found in Appendix I on page 61.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The study's design and methods are presented in this chapter. Sections 3.2 and 3.3 present the study's research design and target population, respectively. Section 3.4 discusses the study's theoretical framework, Section 3.5 presents the empirical model, and Section 3.6 discusses data collection methods. Section 3.7 discusses data processing and analysis methods, whereas Section 3.8 discusses operationalization and measurement of study variables.

3.2 Research Design

The causal research design was used in this study. This research design was preferred in this study since it determines the extent, nature, and effect of relationships of variables. A causal research design enables the researcher to tell the independent variables overall effect on the dependent variable (Erickson, 2017).

3.3 Target Population

A panel dataset of all licensed commercial banks in Kenya operating between 2001 and 2020 was used in the study. Thus, the study comprised a census of all banks with extensive analytical data from 2001 to 2020. Kenya had 42 commercial banks as of December 2020. Data used for analyses was from 36 commercial banks, since 6 banks were dropped due to lack of sufficient data. The list of the 36 commercial banks is provided in Appendix III on page 62.

3.4 Theoretical Framework

This research was based on Petersen and Rajan's (1995) fragility channel theory. According to Petersen and Rajan (1995), bank competition reduces the creation of liquidity. Increased competition diminishes bank profitability, increasing the fragility of these banks. The fragility channel theory posits that liquidity creation is a function of competition as shown in equation (3.1).

that affect the dependent variable, but it does not explicitly model or account for specific unobserved individual effects. These specific effects lead to endogeneity problems for the regressors, and to curb these, GMM estimators were considered. These estimators are considered more efficient than the OLS estimators since they control the correlation between the error term and independent variables. The GMM estimator, the Arellano Bond (AB) estimator, contains both the levels and first difference equations. The regressors (independent and control variables) were put together, and equation (3.6) was transformed into equation (3.7), as shown

$$LC_{it} = \rho LC_{it-1} + \beta_1 X_{it} + \eta_i + \mu_t + \varepsilon_{it} \dots \dots \dots (3.7)$$

Where X represented all the regressors, this equation correlates the bank-specific effects (η_i) with LC_{it-1} (lagged dependent variable). Due to this reason, the fixed effects estimator within the model becomes inconsistent. To solve this problem, the first difference equation, advocated by Arellano and Bond (1991), was used to do away with the bank-specific effects, as shown in equation (3.8).

$$LC_{it} - LC_{it-1} = \rho(LC_{it-1} - LC_{it-2}) + \beta_1 (X_{it} - X_{it-1}) + (\mu_t - \mu_{t-1}) + (\varepsilon_{it} + \varepsilon_{it-1}) \dots \dots \dots (3.8)$$

Replacing LC in equation (3.8) with Y yielded;

$$Y_{it} - Y_{it-1} = \rho(Y_{it-1} - Y_{it-2}) + \beta_1 (X_{it} - X_{it-1}) + (\mu_t - \mu_{t-1}) + (\varepsilon_{it} + \varepsilon_{it-1}) \dots \dots \dots (3.9)$$

In equation (3.9), the lagged dependent variable ($Y_{it-1} - Y_{it-2}$) is linked to the error term ($\varepsilon_{it} + \varepsilon_{it-1}$), leading to endogeneity bias. Due to this problem, the study first considered using a differenced GMM (DIF GMM) by Arellano and Bond (1991). However, the study found that this method was not also efficient. According to Blundell and Bond (1998), DIF GMM estimators suffer from weak instrumentation as data gets more persistent. The instruments for the level equations are the lagged differences in the regressors. Due to this reason, Blundell and Bond (1998) recommended the system GMM (SYS GMM) estimators since their instruments are usually good predictors of the variables even after the series gets persistent. To decide on whether to use the

differenced gmm or system gmm, two rules of thumb by Blundell and Bond (1998) and Blundell et al. (2001) were used. From the results obtained, the study used SYS GMM since it is efficient and helps solve the problem of weak instrumentation.

3.6 Data Collection

Firm-level data was extracted from individual banks' audited financial statements, and various internet sources. The collected data was carefully cleaned to remove outliers and short panels. This process resulted in an unbalanced panel dataset with for 36 commercial banks over 20 years. The data collection sheet in Appendix II on page 62 helped during the data collection of this study.

3.7 Data Processing and Analysis

The study adopted the System Generalized Method of Moments (SYS GMM) model. GMM model solves the problem of endogeneity, provides a computationally and convenient method of obtaining asymptotically normally distributed and consistent estimators of the parameters in the model. To obtain this, various pre and post diagnostic tests were carried out.

3.8 Diagnostic tests

3.8.1 Unit Root Test

Unit root tests play a crucial role in panel data analysis by assessing the stationarity of variables over time. In panel data, which involves both cross-sectional and time-series dimensions, unit root tests are important as it help determine whether a variable is stationary or exhibits a unit root, indicating non-stationarity. Fisher Type Unit Root Test was used to check if the study variables were integrated of order zero (stationary at level). Using a significance level of 5%, the test null hypothesis was that all panels contained unit roots. The decision rule was to reject H_0 if the p-values from z (t) tests were less than 0.05. The Im-Pesaran-Shin test was also conducted to determine if the study variables were stationary at level. The test's null hypothesis at a 5% significance level was that all panels contained unit roots, and the decision rule was to reject if the critical values derived from the IPS T-bar statistics were less than 0.05. The two tests were used simultaneously to increase the robustness of the results.

3.8.2 Multicollinearity Test

A correlation analysis was conducted to show the correlation coefficients and to detect the presence of multicollinearity. A correlation matrix provides a comprehensive overview of the relationships between variables in a dataset. By examining the values in the matrix, researchers can quickly identify variables that are strongly correlated, weakly correlated, or not correlated at all. This helps in understanding the patterns and associations among variables. The presence of high correlation (multicollinearity) was shown by an absolute correlation coefficient value greater than 0.75 at 5 % significance level.

3.8.3 Cross Dependence Test

This test is particularly useful for analyzing the interdependencies and lagged relationships between variables over time. Pesaran CD test was carried out to test for cross dependence. At 5% significance level, the null hypothesis of this test was that there was no cross-sectional dependence among the variables in the panel dataset. The null hypothesis was to be rejected if the Pesaran CD test statistic was greater than 0.05. Ignoring cross-sectional dependence can lead to biased and inefficient estimation results. The Pesaran CD test allows researchers to account for this dependency and obtain reliable and robust inference.

3.8.4 Serial Correlation Test

In dynamic panel data analysis, where observations are collected on multiple entities over time, it is important to account for serial correlation to obtain valid and efficient estimation results. Arellano Bond test (AR) was used to test for serial correlation in levels. The Arellano-Bond test is specifically designed for serial correlation in dynamic panel data models, where lagged dependent variables are included as explanatory variables. At a 5% significance level, the null hypothesis for AR (2) test was that there was no autocorrelation in levels. The HO was to be rejected if the p-values were < 0.05 .

3.8.5 Instrumental Validity Test

This test helps researchers to evaluate the validity of instrumental variables in GMM estimation and ensure the reliability of the estimated parameters. They provide insights

into the strength, relevance, and efficiency of the instruments used to address endogeneity. Sargan and Hansen's J test was carried out to test for instrumental validity. This test was essential for the justification of the instrument's selection (over-identification of various restrictions). At a 5% significance level, the null hypothesis was that the instruments were well justified (exogenous). The null hypothesis was to be rejected if the Hansen statistic p-values of the test were less than 0.05.

3.8 Operationalization and Measurement of Study Variables

The study variables were measured in different ways as shown.

3.8.1 Liquidity Created

In this study, liquidity creation was the dependent variable Berger and Bouwman's (2009) method was used to measure the creation of liquidity by commercial banks. To increase the robustness of the results, both the “cat fat” (LCCF) and “cat nonfat” (LCCNF) liquidity creation measures were used. LCCF is also called the liquidity creation broad measure since it includes both the off and on-balance sheet items. LCCNF is a narrow measure of measuring liquidity created since it does not include off-balance-sheet assets. For this approach, the liquidity created is calculated as a function of assets (A), liabilities (L), and the shareholder equity (S) and modelled as:

$$LC_{i,t} = w_a A_{i,t} + w_l L_{i,t} + w_s S_{i,t} \dots \dots \dots (3.11)$$

Where w_a , w_l are the weights assigned to liquid and illiquid assets respectively while w_s is the weight assigned to surplus. Equity, assets, and liabilities were used to calculate the liquidity created, where weights were assigned to each. Both liabilities and assets were further categorized into illiquid and liquid, whereas shareholder equity/surplus was classified as illiquid alone. LCCNF and LCCF are shown in equations (3.12) and (3.13).

$$LCCNF_{i,t} =$$

$$[(-0.5 * liquidassets) + (0.5 * illiquidassets) + (0 * semi liquidassets) +$$

$$(0 * semi liquidliabilities) + (0.5 * illiquidliabilities) +$$

$$(-0.5 * illiquidliabilities) + (-0.5 * illiquidsurplus)] \dots \dots \dots (3.12)$$

$$\begin{aligned}
LCCF_{i,t} = & \\
& [(-0.5 * liquidassets) + (0.5 * illiquidassets) + (0.5 * illiquid OBS assets) + \\
& (0 * semi liquidassets) + (0 * semi liquidliabilities) + (0.5 * liquidliabilities) + \\
& (-0.5 * illiquidliabilities) + (-0.5 * liquid OBS assets) + (-0.5 * \\
& illiquidsurplus)]..... (3.13)
\end{aligned}$$

LC Represents the liquidity creation. *LCCF and LCNCF* Positive values represented liquidity creation, and negative values represented de creation of liquidity. *OBS* represented the off-balance sheet items. Liquid assets and illiquid liabilities were assigned a weight of -0.5, illiquid assets and liquid liabilities 0.5 weights, and -0.5 to the surplus. 0 weights were assigned to the semi-liquid assets and liabilities. The items which were placed under each of the categories are shown in Table 3.1;

Table 3.1: Bank activities classification

Assets		
Illiquid (w = 1/2)	Semi-liquid (w = 0)	Liquid (w = -1/2)
Loans and advances; pledged assets; financial assets; other assets; investment in properties; equipment and property; other investments.	subsidiary companies' investments, and associated companies; goodwill; banks' share of provision for unearned income and outstanding income; deferred acquisition costs and tax assets	Cash and due from banks and other financial institutions; available for sale securities; government securities; trading securities
Liabilities		
Illiquid (w = -1/2)	Semi-liquid (w = 0)	Liquid (w = 1/2)
Other liabilities; long terms loans and bonds; other funding; reserves; medium-term borrowing		Demand deposits (current and savings); other deposits; tradable derivatives; trading liabilities; current tax liabilities; deferred taxation; other liabilities and interest payable; provisions and short-term borrowings
OBS items		
Illiquid (w= 1/2)	Semi-liquid (w = 0)	Liquid (w = -1/2)
Inclusive of credit lines commitments, acceptances, documentary credits, guarantees, and other contingent liabilities		
Equity(surplus)		
Illiquid (w= -1/2)		

3.8.2 Capital Adequacy

Capital adequacy was an independent variable in this study. Capital adequacy was used in this study to measure the banks' capacity to absorb risks, especially in adverse situations. It is a measure of the financial strength and resilience of a bank's balance sheet. Capital adequacy is crucial for ensuring the stability of the banking system and protecting depositors and creditors. It was measured using two indices which increased the robustness of the results. These are the tier 1 leverage ratio (TLR) and capital adequacy ratio (CAR). The TLR was computed by dividing the tier 1/core capital by the bank's total assets. The (CAR) was computed by dividing a bank's total capital by the risk-weighted assets. The CAR and TLR were computed as shown in equations (3.14) and (3.15).

$$CAR = \frac{\text{Total Capital}}{\text{Risk Weighted Assets}} \dots\dots\dots (3.14)$$

$$TLR = \frac{\text{Core \ Tier 1 Capital}}{\text{Total Assets}} \dots\dots\dots (3.15)$$

When the values of TLR and CAR are high, the more the bank can withstand losses and shocks to the balance sheet. A high value of CAR and TLR means that the banks have a high risk-absorbing capacity.

3.8.3 Income Diversification

Herfindahl Hirschman Index (HHI) was used to measure Income diversification (ID). The HHI index is the standard measure of income diversification. HHI is efficient since it exposes all the sources of income equally, and it explains various breakdowns of income into non-interest (NONII) and net interest income (NII). HHI ranges from 0 to 1. When the HHI is high, it means that the bank concentrates on one income source and thus is less diversified. On the other hand, a lower HHI value shows that the bank focuses on both the non-interest and net interest income, thus being well diversified. The HHI index was expressed as shown by equation (3.16).

$$HHI_{it} = 1 - \left[\left(\frac{\text{net interest income}_{it}}{\text{operating income}_{it}} \right)^2 + \left(\frac{\text{non interest income}_{it}}{\text{operating income}_{it}} \right)^2 \right] \dots\dots\dots (3.16)$$

HHI index alone does not provide a complete picture of income diversification. It should be complemented with other measures and analysis to gain a comprehensive

understanding of the income diversification strategies and risks associated with them. Due to this reason, study adopted the entropy index (EI) to increase the robustness of the results. According to Jiang and Han (2018), a combination of entropy and the HHI index has a threshold effect, resulting in a more efficient study that is essential for the sustainable development of banks. The Entropy index was expressed as shown by equation (3.17)

$$EI_{it} = \left[NII \times \left(\ln \frac{1}{NII} \right) + NONII \times \left(\ln \frac{1}{NONII} \right) \right] \dots \dots \dots (3.17)$$

NONII and NII represent the non-interest and net interest incomes, respectively. According to Jiang and Han (2018), both the HHI and EI reach their maximum when the NII share is equal to that of NONII.

3.8.4 Competition

Competition is an independent variable in the study. The Lerner and Herfindahl-Hirschman Index (HHI) measured bank competition. Banks' market concentration was measured by HHI, where high concentration implied low competition. The formula of the HHI is shown in equation (3.18):

$$HHI = \sum_{i=1}^n s_i^2 \dots \dots \dots (3.18)$$

Where s_i is the bank i market share in the banking segments' total assets. The market power degree was measured through Lerner Index by representing the price markup over the marginal cost. When the Lerner Index value is high, it indicates a high degree of market power. The use of a translog function derived marginal cost. The translog log function contains one output which was measured by three inputs (labour, borrowed fund, and physical capital prices) and total assets as follows:

$$TC = \partial_0 + \partial_1 Lny + \frac{1}{2} \partial_2 (Lny)^2 \sum_{j=1}^3 \beta_j Lnw_j + \sum_{j=1}^3 \sum_{k=1}^3 \beta_{jk} Lnw_j Lnw_k + \sum_{j=1}^3 y_j \beta_{jk} Lny Lnw_j + \varepsilon \dots \dots \dots (3.19)$$

Where TC, y , w_1 , w_2 , and w_3 represented total cost, total assets, labour price, operating expenses/physical capital price, and borrowed funds costs, respectively. To calculate the marginal cost (MC), equation (3.19) was differentiated and gave rise to equation (3.20),

as shown below.

$$MC = \frac{\partial y}{\partial x} TC \dots\dots\dots (3.20)$$

After the MC was calculated, each bank’s Lerner Index was computed as follows:

$$Lerner_{it} = \frac{Price_{i,t} - MC_{i,t}}{Price_{i,t}} \dots\dots\dots (3.21)$$

Price and *MC* represented the price of total assets and the marginal cost of producing an additional output unit, respectively. Lerner index usually ranges from 0 to 1. When the Lerner index value of a firm is high, the monopoly power is also greater. This relationship is because the firm can charge over its marginal cost.

3.3.4 Control Variables

The study used different control variables to take care of macroeconomic and other banks' specific effects. These variables are credit risk (CR), bank size (BS), the growth rate of gross domestic product (GDP), and profitability (P). The annual growth rate of the real GDP was used to measure GDP growth. This measure includes all the inflation adjustments, and therefore, it helped control the macroeconomic effects. Return on assets (ROA), as shown in equation (3.22), was used to measure profitability to show the bank's performance.

$$ROA = \frac{Net\ Income}{Total\ Assets} \dots\dots\dots (3.22)$$

Total assets measured the size of the bank as shown in equation (3.23)

$$BS = \log Total\ Assets \dots\dots\dots (3.23)$$

CR was measured as shown in equation (3.24)

$$CR = \frac{RWA/OBS}{TOTAL\ ASSETS} \dots\dots\dots (3.24)$$

RWA and OBS represented the risk-weighted and off-balance sheet assets, respectively. The definitions of study variables and their measurements are well summarized in Table

3.2

Table3.2: Operationalization and Measurement of Study Variables

Variable	Type	Measurement
Liquidity creation	Dependent	Berger and Bouwman's (2009) approach (cat nonfat(LCCNF) and cat fat measures(LCCF))
Capital Adequacy	Independent	Natural log of total equity Capital adequacy ratio (CAR) Tier 1 leverage ratio (LR)
Income diversification	Independent	Herfindahl Hirschman Index (HHI) Entropy index (EI)
Competition	Independent	Lerner index Hirschman Herfindahl index (HHI)
Credit risk	Control variable	The ratio of the risk-weighted assets and the off-balance sheet activities divided by the total assets
Bank size	Control variable	Logarithm of total assets
Profitability	Control variable	Net income over the total assets (ROA)
GDP	Control variable	Growth rate of gross domestic product

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings and discussions. Section 4.2 and 4.3 presents the descriptive statistics, and the trends of study variables respectively. Section 4.4 and 4.5 presents the stationarity test and correlation analysis test respectively. Section 4.6 covers the discussion of the regression results while section 4.7 presents various robustness checks carried out in the study.

4.2 Descriptive Statistics

The summary statistics of this study are presented in Table 4.1. In Kenya, on average, commercial banks' liquidity creation is 46.9% and 38.3% when the off balance sheet items are included and excluded, respectively. This finding indicates that banks create more liquidity when they have off-balance sheet assets. According to the broad measure (LCCF), the highest and lowest percentage of liquidity created to total assets was 149.0% and -34.7%, respectively. The narrow measure (LCNCF) indicates that the lowest and highest percentage of liquidity created within the research period was -35.8% and 149%, respectively. Additionally, the standard error of LCNCF (0.177) was less than LCCF's (0.194). This observation meant that failure to include the OBS assets decreases the diversity of commercial banks.

The TLR and CAR were 13.8% and 23.7%, respectively. Since all banks must have a TLR and CAR of at least 6% and 8% respectively according to the Basel III, the Kenyan commercial banks performed relatively well. HHI (ID) and EI averaged at 25.8% and 8.3%, respectively. The low levels of HHI and EI meant that Kenyan commercial banks were well diversified since they relied on non-interest and net interest income in conducting their activities. HHI (COMP) index was 0.916 indicating a high market concentration and, thus, low competition within the commercial banks. The average Lerner index was 0.247 indicating a low market power degree within the commercial banks in Kenya. The bank size (log of total assets) had an average measure of 4.316. The averages of the other three control variables, namely credit risk, profitability

(ROA), and real GDP, were 0.007, 0.012, and 0.047(4.7%), respectively.

Table 34.1: Descriptive Statistics of the Study Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
LCCF	698	0.469	0.194	-0.347	1.491
LCCNF	698	0.383	0.177	-0.358	1.490
CAR	697	0.237	0.119	-0.480	0.904
TLR	698	0.138	0.072	-0.474	0.603
HHI(ID)	699	0.258	0.114	0.025	0.500
EI	698	0.062	0.039	0.001	0.360
HHI(COMP)	698	0.916	0.076	0.313	0.998
LERNER	697	0.247	0.157	0.001	0.804
BANKSIZE	698	9.939	1.525	6.568	13.540
ROA	698	0.012	0.029	-0.180	0.350
CREDITRISK	698	0.007	0.048	0.000	0.753
GDP	698	0.047	0.022	-0.003	0.084

4.3 Study Variables Trends

A trend of the study variables from 2001 to 2020 was generated. From Figure 4.1, there has been an unstable trend of liquidity creation of commercial banks in Kenya. From the two measures, it is evident that liquidity created to total assets was at its lowest in the year 2020, which could be attributed to Covid 19 pandemic, which significantly affected global economic activities. Both LCCF and LCCNF showed that during the study period, liquidity creation peaked in 2008. This meant that the banks were equally affected by the global financial crisis in 2008/2009. However, from 2015, liquidity creation started to decline until 2020. This may have been caused by Kenya's interest rate caps in 2016, which constrained the banks' pricing policies, reducing private-sector lending.

From Figure 4.1, TLR and CAR showed a decreasing trend from 2002, attributed to the regulator's continuous revision of capital requirements. This decrease in CAR and LR meant that the internal financial strength of the banks to withstand any adverse situation, such as losses, had been decreasing over time which was not healthy for the commercial banks in Kenya. On the other hand, HHI index for income diversification increased from 2000 to 2010, indicating that commercial banks in Kenya were less diversified. However, from 2010 to 2020, the value of the HHI index decreased gradually, depicting a focus on the non-interest and net interest income, evidence of gradual diversification. The Entropy index portrayed a similar behavior, which meant that Kenyan commercial banks were increasingly diversified in the recent past.

The HHI index for competition increased gradually from 2000-2010, then decreased gradually. This meant that the market concentration amongst commercial banks in Kenya increased in earlier years and then reduced from 2010, which depicted increased competition in the banking industry in the recent past. The Lerner index portrayed a similar trend with an increase in market power from 2000-2010, signaling increased market power as competition reduced until 2010 when the tide changed in favor of more competition in the industry. This increase in market power resulted in competition for the commercial banks in Kenya.

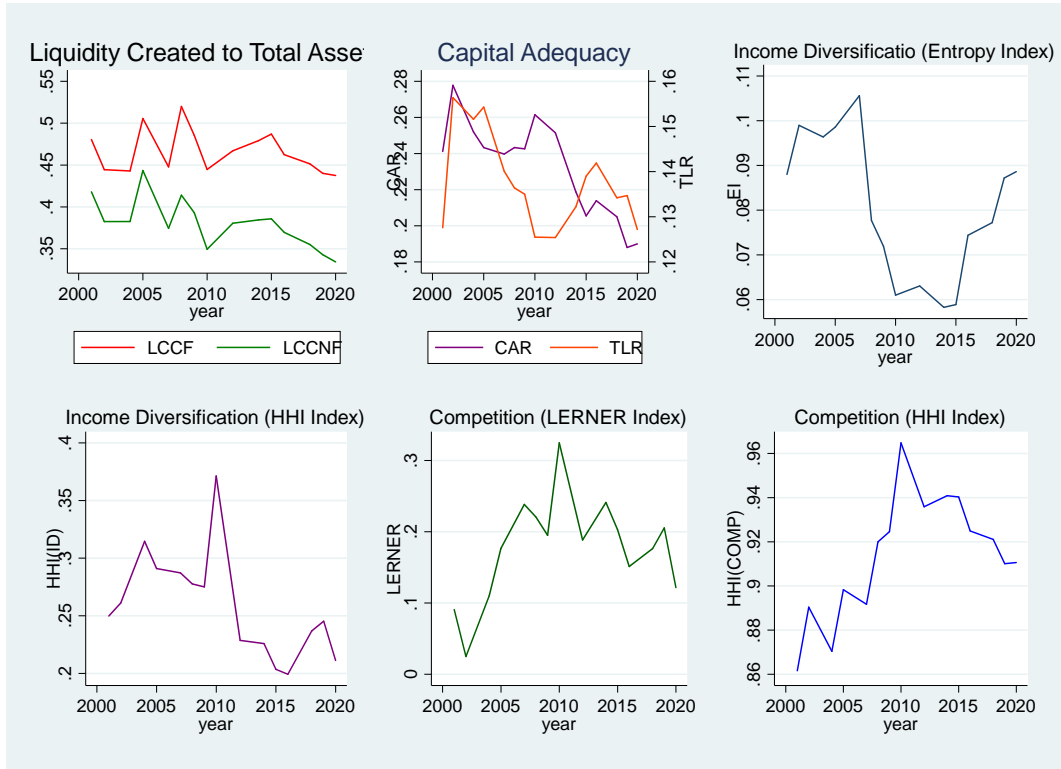


Figure 4.1: Trends of the Study Variables

4.4 Unit Root Test

The Fisher-type test was used to check if the study variables were integrated of order zero (stationary at level). Using a significance level of 5%, the test null hypothesis (H_0) is that all panels contained unit roots. The decision rule was to reject H_0 if the p-values from z (t) tests were less than 0.05. The Fisher-type stationarity test results are shown in Table 4.2;

Table 4.2: Fisher-Type Unit Root Test

Variable	z(t) at level	p-value for z(t) at I(0)	p-value at I(1)	Decision
LCCF	175.139	0.000		I (0)
LCCNF	179.649	0.000		I (0)
CAR	187.179	0.000		I (0)
TLR	206.968	0.000		I (0)
HHI(ID)	178.784	0.000		I (0)
EI	157.894	0.000		I (0)
HHI(COMP)	266.807	0.000		I (0)
LERNER	165.385	0.000		I (0)
CREDITRISK	202.591	0.000		I (0)
ROA	149.685	0.000		I (0)
BANKSIZE	30.168	1.000	0.000	I (1)
GDP	115.987	0.001		I (0)

H_0 : All panels contain unit roots.

I (0) mean stationary at level

I (1) mean stationary at first difference

Additionally, the Im-Pesaran-Shin test was conducted to determine if the study variables were stationary at level. The test's null hypothesis (H_0) at a 5% significance level was that all panels contained unit roots, and the decision rule was to reject if the critical values derived from the IPS T-bar statistics were less than 0.05. The results of the Im-Pesaran-Shin stationarity test can be found in Table 4.3.

Table 4.3: Im-Pesaran-Shin Unit Root Test

Variable	IPS statistic	T-bar	Critical value at I(0)	Critical value at I(1)	Decision
LCCF	-2.841		0.000		I (0)
LCCNF	-2.918		0.000		I (0)
HHI(ID)	-3.074		0.000		I (0)
EI	-2.609		0.000		I (0)
CAR	-2.743		0.000		I (0)
TLR	-2.653		0.000		I (0)
HHI(COMP)	-3.212		0.000		I (0)
LERNER	-2.375		0.000		I (0)
CREDIT RISK	-2.993		0.000		I (0)
ROA	-2.888		0.000		I (0)
BANK SIZE	-1.355		0.874	0.000	I (1)
GDP	-2.777		0.000		I (0)

H_0 : All panels contain unit roots.

I (0) mean stationary at level

I (1) mean stationary at first difference

Table 4.2 and Table 4.3 show that bank size as a control variable had unit roots at level but became stationary at first difference. On the other hand, LCCF, LCCNF, HHI (ID), EI, TLR, CAR, HHI (COMP), LERNER, Credit risk, ROA, and GDP were stationary at the level. The estimation used I (0) variables with the first 1(1) variable difference.

4.5 Correlation Analysis

While running a regression model, multicollinearity should be avoided as it makes it difficult to determine the individual effect of each independent variable on the dependent variable. This makes it hard to explain and interpret the model. Therefore, a multicollinearity test was necessary to show the correlation coefficients and measure the

linear relationship between the study variables. The correlation analysis results are shown in Table 4.3. The presence of high correlation (multicollinearity) was shown by an absolute correlation coefficient value greater than 0.7.

Table 4.3: Pairwise Correlation Matrix

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)
(1) LCCF	1.000									
(2) LCCNF	0.903***	1.000								
(3) CAR	-	-	1.000							
(4) TLR	0.609***	0.596***	-	1.000						
(5) HHID	-	-	0.776***	-	1.000					
(6) EI	0.360***	0.402***	0.123***	0.043***	-	1.000				
(7) HHICOM	0.173***	0.167***	0.121***	0.1104	0.155***	-	1.000			
(8) LERNER	-	-	-0.008**	-	-0.209**	-0.014	1.000			
(9) D.BANKSIZE	0.180***	0.276***	0.075***	0.110**	0.010***	0.193***	0.344*	1.000		
(10) ROA	0.001***	-0.059*	0.115	-	0.197***	0.046	0.081	0.188	1.000	
(11) CREDITRISK	-0.119	0.235***	-0.029	-	0.106***	0.207***	0.587	0.146	1.000	
(12) GDP	-0.014	0.006	0.314***	0.349***	0.023	-0.063*	-0.043	-0.014	0.009	1.000
	-	-	0.094***	0.074*	-0.001	0.108***	0.061***	0.127	0.088	0.060
	0.206***	0.236***	-0.040	-0.028	0.080***	0.108***	0.127	0.088	0.060	-0.006

*** $p < 0.05$, ** $p < 0.01$, * $p < 0.1$

From Table 4.3, at a 5% significance level, most of the correlation coefficients of the study variables were less than 0.75, indicating absence of multicollinearity. As expected, LCCF and LCCNF had a high correlation coefficient (0.903), showing a strong positive relationship. This was the same with TLR and CAR, which had a correlation coefficient of 0.776. To solve this problem, the study did not enter these variables simultaneously in the regression.

To decide on whether to use the differenced gmm or system gmm, two rules of thumb were used. The first rule of thumb is from Blundell and Bond (1998) and second rule of thumb is from Blundell et al. (2001). According to Blundell and Bond (1998), the coefficients of the lagged dependent variable should not tilt towards one and should not be greater than one. According to Blundell et al. (2001), the model should be estimated initially by OLS and fixed effects approach, where the OLS estimate should be considered an upper bound estimate while the corresponding fixed effect estimate should be considered a lower bound estimate. If the difference GMM estimate obtained is close to or below the fixed effect estimate, this suggests that the former estimate is downward biased because of weak instrumentation and a system GMM should be preferred instead. Table 4.4 shows the coefficients of the, fixed effect and difference GMM estimates.

Table 4.4: Coefficients of the Fixed Effect and Difference GMM Estimates

Model	(1)	(2)	(3)	(4)	(5)
Fixed effect	0.458	0.487	0.445	0.467	0.555
Difference GMM	0.459	0.461	0.449	0.465	0.549

From Table 4.4 it is evident that the coefficients of the difference GMM estimates are close or below that of the fixed effect estimates. This indicated that there existed weak instrumentation in the two-step difference GMM. Due to this reason, the study embarked on using two step system GMM, as it solves the problem of weak instrumentation.

4.6 Regression Analysis Results and Discussions

The results of a two-step system GMM regression are shown in Table 4.5.

Table 4.5: Two-step System GMM Regression Results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	CFM	CNFM	CFM	CNFM	CFM	CNFM
L.LCCNF	0.474*** (0.089)		0.626*** (0.092)		0.603*** (0.100)	
L.LCCNF		0.430*** (0.105)		0.525*** (0.122)		0.405*** (0.117)
CAR	--0.610*** (0.125)	-0.564*** (0.123)				-0.574*** (0.128)
TLR			-0.304* (0.173)	-0.416*** (0.171)	-0.320* (0.174)	
HHI(ID)	-0.122 (0.076)	0.059 (0.082)	0.153 (0.096)			
EI				-0.339*** (0.147)	-0.257 (0.165)	-0.262* (0.181)
HHI(COMP)	0.403*** (0.196)	0.326*** (0.104)			0.370*** (0.131)	
LERNER			0.004 (0.058)	0.042 (0.085)		0.082 (0.064)
D1.BANKSIZE	-0.052 (0.046)	-0.024 (0.052)	-0.046 (0.065)	-0.029 (0.059)	-0.037 (0.062)	-0.026 (0.052)
ROA	0.199 (0.242)	-0.174 (0.231)	0.102 (0.293)	0.098 (0.269)	0.094 (0.284)	0.181 (0.253)
CREDIT RISK	0.136*** (0.066)	0.244*** (0.070)	0.056 (0.054)	0.154*** (0.056)	0.047 (0.047)	0.247*** (0.072)
GDP	-0.177 (0.151)	-0.145 (0.157)	-0.119 (0.147)	-0.055 (0.184)	0.042 (0.192)	-0.066 (0.195)
Constant	5.027 (3.016)	6.883*** (2.765)	0.747 (2.929)	4.851 (2.070)	2.740 (2.468)	7.762*** (2.517)
Observations	661	661	662	662	662	661
Number of bank id	36	36	36	36	36	36
AR(1)	0.002	0.009	0.001	0.010	0.001	0.015
AR(2)	0.190	0.280	0.079	0.124	0.068	0.255

Hansen		0.143	0.133	0.111	0.106	0.103	0.106
Sargan		0.000	0.000	0.000	0.000	0.000	0.000
Number of instruments		29	28	29	29	29	29

*** = $p < 0.05$

* = $p < 0.1$

(.) Represents the standard errors

From the results, the coefficients of the lagged dependent variable were positive and significant. This provides evidence, as expected that liquidity created in the current years depended on the liquidity created in the previous years. The study also found that, at a 5% significance level, both the Capital Adequacy Ratio (CAR) and Tier 1 Leverage Ratio (TLR) negatively and significantly impacted the creation of liquidity by commercial banks in Kenya. This meant an increase in the capital adequacy ratio of commercial banks in Kenya reduced liquidity creation. In other words, it meant that the liquidity creation of commercial banks decreased as the internal strength of dealing with adverse conditions decreased. The findings affirm the financial fragility crowding out hypothesis, which states that a bank's capital leads to a less fragile capital structure which impedes liquidity creation (Xie, 2016; Casu et al., 2019; Distinguin et al., 2013; Fu et al., 2016; Berger & Bouwman, 2009). According to the theory, capital may negatively affect liquidity creation since it "crowds out" deposits. Comparing the findings of this study with other studies, the findings are consistent with some studies but differ from other studies as well. For example, the study confirms the work of Xie (2016), Casu et al. (2019), Distinguin et al. (2013), Fu et al. (2016), Berger and Bouwman (2009) while Tran et al. (2016), Mohanty and Mahakud (2021), Evans and Haq (2021), Zelenyuk et al. (2021) and T. Le (2018) found a positive relationship between capital adequacy and liquidity creation.

On income diversification, two measures were employed; the HHI (ID) index and the Entropy index. The results show that the Entropy index coefficient was negative and significant. An increase in the Entropy index always means that commercial banks are less diversified such that they concentrate on the interest income sources alone, and the

inverse is true. Therefore, this suggests a positive relationship between income diversification and liquidity creation in Kenyan commercial banks, meaning that well-diversified banks generate more liquidity. In Kenya, commercial banks have been diversifying their businesses by introducing new services such as agency banking, mobile banking, faceless banking, bank assurance, integrating microfinance, and other financial non-interest earning activities such as financial guarantees and derivative arrangements (Ndungu & Muturi, 2019). This indicates that income diversification in Kenya mitigates the system and insolvency risks facing commercial banks, thus increasing liquidity creation. The results were consistent with the findings of Toh et al. (2020) and Meslier et al (2014) but deferred with the works of Dang (2020), Hoang et al. (2020) and Sinha and Grover (2021) who found a negative relationship between income diversification and liquidity creation. The HHI index was insignificant for both the broad and narrow measures.

The HHI index coefficient for competition was significant and positive. This positive relationship implied that a decrease in market concentration reduced liquidity creation by commercial banks. A decrease in market concentration indicates high competition amongst commercial banks, while the reverse is true. Therefore, increased competition reduced commercial banks' liquidity creation in Kenya. This result agrees with the fragility channel theory, which states that an increase in the competition of banks increases the financial fragility of banks by reducing margins, thus reducing liquidity creation. This is because high competition leads to banks reducing their lending and deposit rates (Horvath et al., 2016; Berger et al., 2017; Beck et al., 2013). These results were in line with the works of Horvath and Seidler (2013), Jiang et al. (2019), Ali et al. (2019), Toh et al. (2020), and Ali et al. (2022) but deferred with the works of Horvath et al. (2016) and Sinha and Grover (2021) who found a positive relationship between bank competition and liquidity creation. As measured by the Lerner index, competition was insignificant for all models. This outcome implied that the commercial banks' market power in Kenya had no significant influence on liquidity creation. This result confirmed the work of Toh et al.(2020) and Kick (2022).

Results in Table 4.5 also show that the log of total assets and ROA used to measure bank size and profitability were insignificant in the study. The credit risk coefficients were significant, showing a negative relationship between credit risk and liquidity creation of Kenyan commercial banks. A negative relationship between credit risk and liquidity creation implies that as credit risk increases, the ability of banks to create liquidity decreases. It is a crucial consideration for commercial banks as they lend funds to individuals, businesses, and other entities. Higher credit risk indicates a greater likelihood of loan defaults or delayed repayments. These results confirmed the works of Chaabouni et al. (2018), Le and Pham (2021), and Sahyouni and Wang (2019). This relationship indicated that the losses arising from borrowers not paying loans and meeting certain obligations decreases the liquidity created to the total assets of commercial banks in Kenya.

4.7 Robustness Checks

First, the robustness of the study was enhanced by using two measurements for each of the main study variables (income diversification, capital adequacy, and liquidity creation). HHI and entropy index were used for income diversification, CAR and TLR were used for measuring capital adequacy, and broad and narrow measures were used to measure the commercial banks' liquidity creation.

Secondly, various robustness checks were carried out to ensure that the results achieved were reliable. Cross dependence, serial correlation and instrumental validity tests were carried out.

4.7.1 Cross Dependence Test

Pesaran CD test was carried out to test for cross dependence. This test directly tests if the cross-correlations of the errors are zero. This test requires that the cross section correlation to be different from zero on average. At 5% significance level, the null hypothesis of this test was that there was no cross-sectional dependence among the variables in the panel dataset. The null hypothesis was to be rejected if the Pesaran CD test statistic was greater than 0.05. The Pesaran CD test statistic was 0.0449 which was less than 0.05. The study therefore accepted the null hypothesis that there was no cross dependence among the variables in the panel data set.

4.7.2 Serial Correlation Test

Arellano Bond test (AR) was used to test for serial correlation in levels. The test included AR (2) and AR (1) tests. This test made it easy to observe whether the orthogonality requirements of Arellano and Bond were all met. The study concentrated on the AR (2) test since it efficiently tests the autocorrelation in levels. At a 5% significance level, the null hypothesis for AR (2) test was that there was no autocorrelation in levels. The H_0 was to be rejected if the p-values were < 0.05 . Table 4.5 shows the AR (2) values were all >0.05 . The H_0 was, therefore, not rejected, meaning there was no autocorrelation in levels.

4.7.3 Instrumental Validity Test

Sargan and Hansen's J test was carried out to test for instrumental validity. This test was essential for the over-identification of various restrictions. At a 5% significance level, the null hypothesis was that the instruments were well justified (exogenous). The H_0 was to be rejected if the Hansen statistic p-values of the test were less than 0.05. From Table 4.5, the Hansen statistic p-values were greater than 0.05. The H_0 was therefore accepted that the instruments used were exogenous. These results, therefore, justified the instrument selection of this study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusion and various policy implications of the study. Section 5.2 and 5.3 presents the summary, and conclusion and policy implications of the study respectively. Section 5.4 covers the suggestions of areas for further studies.

5.2 Summary

The main objective of this study was to determine how capital adequacy, income diversification and competition affect liquidity creation of commercial banks in Kenya. The study employed secondary panel data from 2001 to 2020 to achieve the research objectives. Two step system GMM was used in the regression to establish the effects of capital adequacy, income diversification and competition on the liquidity creation of commercial banks in Kenya. The trends of the main study variables from 2001 to 2020 were conducted. The trends found that the liquidity created to total assets have been declining from the year 2015 up to 2020. This could have been attributed by various reasons but the main one could have been the interest rate caps in 2016 which could have affected the banking pricing policies leading to a reduction of private lending. Capital adequacy measured by CAR and TLR have shown a decreasing trend right from the year 2002 to 2020. This showed that continuous revisions of capital requirements have been taking place in the Kenyan banking sector. This decrease in the capital adequacy is not healthy for the commercial banks as it signifies that their internal financial strength meant to withstand the adverse situations decreased over time.

From the study, as shown by the entropy index, it is evident that Kenyan commercial banks were less diversified from 2001 to 2007. Gradual diversification was experienced onwards, which is shown by a gradual decrease of the Entropy index. This showed that from 2007 onwards, the commercial banks in Kenya started focusing on both the interest and non interest sources of income thus increasing the income diversification amongst them. As shown by the HHI (COMP) index, the competition amongst the commercial banks in Kenya has been showing an increasing trend from 2010. Fisher

type unit root test was used to test for stationarity to ensure that the data was stationary to avoid erroneous results. A correlation analysis was carried out to detect multicollinearity amongst the study variables. Various post diagnostic tests were carried out to ensure that the results were reliable and robust. Arrelano Bond (2) test was carried out to test for serial correlation/autocorrelation in levels, while the Sargan and Hansen test was carried out to test instrumental validity.

5.3 Conclusion

This study investigated the effect of capital adequacy, income diversification and competition on the liquidity creation of Kenyan commercial banks. The Capital adequacy ratio and tier 1 leverage ratio measures were significant in the study. The findings on the effect capital adequacy on the liquidity creation of commercial banks in Kenya revealed that there exists a negative relationship between the two. The negative effect suggests that higher levels of capital adequacy in commercial banks are associated with reduced liquidity creation. This indicates a tradeoff between risk and return. Banks with higher capital adequacy ratios tend to prioritize maintaining a strong capital base to absorb potential losses, which may result in a more conservative approach to liquidity creation.

A positive relationship between income diversification and liquidity creation of commercial banks in Kenya was depicted. This meant that the diversification of banks in terms of income sources have a positive impact on the creation of liquidity by the commercial banks. This means that, by diversifying their sources of income, banks can reduce their reliance on a single revenue stream, making them more resilient to financial shocks. This allows them to allocate resources towards liquidity creation activities with greater confidence. Banks with diversified income streams are less susceptible to sudden disruptions in specific sectors or economic conditions. This stability enables them to have a more predictable and consistent cash flow, which facilitates liquidity creation and reduces the risk of liquidity shortages. HHI index for income diversification was insignificant, while the entropy index was significant in the study. The entropy index was therefore considered as the best measure of income diversification of commercial banks in Kenya.

On the other hand, the study results indicated that an increase in bank competition reduces the liquidity creation of banks in Kenya. The results show that intense competition can create pressure on banks to prioritize profit maximization and risk-taking, potentially diverting resources away from liquidity creation activities. When banks face strong competition for deposits and other funding sources, they may prioritize attracting and retaining funds, potentially at the expense of liquidity creation. This can limit their ability to build up sufficient liquidity buffers and engage in liquidity creation activities. HHI index for competition in this case was significant while the Lerner index was insignificant. Therefore, the HHI index for competition was regarded as the best measure of competition amongst commercial banks in Kenya.

5.4 Policy Implications

The study established a negative relationship between capital adequacy and liquidity creation. These findings show that the “financial fragility crowding out” is present in the commercial banks in Kenya. This finding has a significant policy stance; while capital requirements are essential in alleviating financial fragility, it discourages liquidity creation, consequently hampering business investment and household consumption. Due to this tradeoff between capital adequacy and liquidity creation, there is a need to determine optimal capital requirements to alleviate the financial fragility of Kenyan commercial banks. Policymakers need to strike a balance between capital adequacy regulations and the incentives for banks to create and maintain sufficient liquidity buffers.

The study found that income diversification positively affects liquidity creation, showing that well-diversified banks have high liquidity creation. This supports those Kenyan commercial banks should continue focusing on both interest (traditional) and non-interest (non-traditional) sources of income. This is because, diversifying income a stream is a prudent strategy for banks to reduce reliance on a single source of revenue and mitigate risks. Relying solely on interest income can expose banks to interest rate risk and economic fluctuations. Non-interest income, such as fees, commissions, and service charges, can provide a stable and diversified revenue stream that is less dependent on interest rate movements. By balancing interest and non-interest income,

banks can mitigate risks and enhance their overall financial stability. Expanding revenue sources will help commercial banks increase their profitability, liquidity creation and sustain long-term economic growth.

Bank managers should emphasize bank income diversification as an avenue of generating new income sources, which could help in buffering and profit maximization. Policymakers should encourage banks to pursue income diversification strategies as a means of risk management. Promoting a diversified revenue base reduces the reliance on a single income stream and can enhance the stability and resilience of banks' liquidity positions. Policymakers can provide guidance and incentives for banks to explore diverse business lines while ensuring appropriate risk management practices are in place.

The study also found that increased competition has a value-destroying effect on liquidity creation due to its impact on the fragility of banks. These findings present a case for policy geared toward consolidating banks' operations through possible mergers and acquisitions. Policymakers can encourage collaboration and coordination among banks to address the negative effect of competition on liquidity creation. Collaboration mechanisms, such as interbank lending facilities or liquidity sharing arrangements, can help mitigate liquidity shortages and enhance overall liquidity resilience in the banking system. Policymakers can facilitate the establishment of such mechanisms and provide incentives for banks to participate. Striking a balance between promoting competition and ensuring adequate liquidity provision is crucial for maintaining financial stability and resilience in the banking sector.

5.5 Areas for Further Studies

The study findings suggested a tradeoff exists between capital requirement and liquidity creation. Future research can focus on the optimal levels of regulatory capital necessary to provide a buffer against shocks without negatively impacting liquidity creation, a key channel through which banks contribute to the economy. The study findings suggested a positive relationship between income diversification and liquidity creation. However, further studies may consider various income diversification strategies and their impact

on the liquidity creation of commercial banks in Kenya. Despite the positive relationship between income diversification and liquidity creation, further studies can also consider the trade-off between income diversification, risk management practices, and banks' ability to effectively allocate resources towards liquidity creation.

Additionally, with empirical evidence suggesting that competition impairs credit creation, a careful analysis of the optimal levels of consolidation in light of possible losses in consumer welfare is imperative to inform policy. Future research can explore the role of bank-specific characteristics in the relationship between competition and liquidity creation. They should analyze how different types of banks (large vs. small, domestic vs. international) are affected by competition in terms of liquidity provision.

This study was confined and limited to commercial banks, but they are other players in the Kenyan financial sector. Therefore, there is need for future researchers to concentrate on the effect of capital adequacy, income diversification and competition on the liquidity creation of commercial banks, and other non-bank financial institutions in Kenya. A comparative analysis across different jurisdictions or banking systems is necessary. This is to examine how the relationship between capital adequacy, income diversification, competition and liquidity creation varies in different contexts.

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APPENDICES

Appendix I: Research Gaps

Author	The focus of the Study	Methodology used	Major Findings	Research Gap
Fu et al., (2016)	Bank capital and liquidity creation in the Asia Pacific region	Simultaneous equations model with a generalized method of moments (GMMs) estimator. Used Panel secondary data from 2005-2012.	The findings revealed that there is a bicausal relationship between liquidity creation and regulatory capital	Failed to look at capital adequacy and its effect on liquidity creation.
Hoang et al. (2020)	The impact of income diversification on liquidity creation and financial performance of Vietnamese commercial banks	Panel OLS with fixed effects and GMM estimation model. Used secondary data of 21 Vietnamese commercial banks from 2007 to 2017.	The results show that diversification had a negative impact on both bank profitability and bank liquidity creation.	The study failed to include competition and capital adequacy

Horvath & Seidler (2013)	How bank competition influences liquidity creation of banks.	Dynamic GMM panel estimations on a dataset of Czech banks from 2002 to 2010	The findings revealed that an increase in bank competition reduces the liquidity creation of banks.	Failed to include capital adequacy and income diversification in the study
Jiang et al (2019)	Competition and bank liquidity creation	Used a new identification strategy and used secondary data of 15,081 banks during the period 1984–2006	The findings revealed that regulatory-induced competition reduces liquidity creation	Did not include capital adequacy and income diversification.
Nyaundi (2015)	Effects of capital adequacy requirements on the liquidity of commercial banks in Kenya	Descriptive research design and GMM on secondary data covering 2010-2014.	The findings revealed that there was a strong correlation between bank liquidity ratio and all the independent variables.	Did not check on the relationship between capital adequacy and liquidity creation of commercial banks in Kenya.
Sinha & Grover (2021)	Interrelationship among competition,	Fixed effect model on panel data of Indian	The findings revealed that high diversified	Failed to include capital adequacy in the study

	diversification and liquidity creation: evidence from Indian banks.	banks. Used secondary data from 2005 to 2018.	banks create less liquidity than less diversified banks.	
Toh et al (2020)	Bank diversification, competition, and liquidity creation: Evidence from Malaysia	Dynamic GMM panel estimations on a dataset of Malaysian banks from 2001 to 2017	. The findings revealed that liquidity creation of banks decreases when their market power drops, suggesting an adverse effect of bank competition on bank liquidity creation.	Did not include income diversification in the study.
Xie (2016)	The relationship between bank liquidity creation and capital in China	Simultaneous equation model on panel data of Chinese banks. Used secondary data of 28 commercial banks from 2004-2014.	Liquidity creation has a negative impact on capital	. Did not check the effect capital has on liquidity creation.

Appendix II: Data Collection Sheet

Name of the Bank.....

		2001	2006	2020
Liquidity creation	Liquid assets				
	Illiquid assets				
	Semi-liquid assets				
	Liquid liabilities				
	Illiquid liabilities				
	Semi-liquid liabilities				
	Shareholder equity/ surplus.				
Competition	Total assets				
	Total costs				
Capital adequacy	Equity				
	Total assets				
	Risk-weighted assets				
Income diversification	Nontraditional interest-bearing activities				
	Traditional interest-bearing activities				
	Operating income				
Credit risk	Risk-weighted assets				
	Off-balance sheet				
	Total assets				
Profitability	Net income (after tax)				
	Total assets				
Bank size	Total assets				

Appendix III: List of Commercial Banks

1. Absa Bank
2. African Banking Corporation Bank
3. Bank of Africa
4. Bank of Baroda Kenya
5. Bank of India
6. Chase Bank Kenya
7. Citibank N.A
8. Commercial Bank of Africa
9. Consolidated Bank
10. Co-operative Bank of Kenya
11. Credit Bank
12. Development Bank of Kenya
13. Diamond Trust Bank
14. Ecobank
15. Equity Bank
16. Family Bank
17. Giro Commercial Bank
18. Guardian Bank
19. Habib Bank AG Zurich
20. Housing Finance Group
21. I&M Bank
22. KCB Bank
23. Kenya Post Office Savings Bank
24. Middle East Bank
25. M Oriental Bank
26. National Bank of Kenya
27. NIC Bank
28. Paramount Bank
29. Prime Bank
30. SBM Bank

31. Sidian Bank
32. Spire Bank
33. Stanbic Bank
34. Standard Chartered Bank
35. Transitional Bank
36. Victoria Commercial Bank