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Research Paper

Capital Adequacy, Bank Size and Liquidity Risk of Deposit Taking Microfinance Banks in Kenya

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ABSTRACT
Microfinance banks liquidity has been sustained by massive slowdowns in lending that accompanied moratoria on repayments, but should this be extended beyond the initial months, it would effectively push the liquidity crunch onto the low-income communities they are supposed to serve and put the sustainability of the MFBs themselves into question by exposing them to liquidity risks. This study aimed to establish capital adequacy,bank size and the liquidity risk of deposit taking microfinance banks in Kenya. Specifically, the study sought to assess whether capital adequacy influenced the liquidity risk of deposit taking microfinance banks in Kenya with bank size as the moderating variable. The study was guided by the trade-off theory and capital buffer theory. The study employed the longitudinal research design and targeted 13 microfinance banks. The study utilized panel data extracted from the financial reports of the banks for the period 2018 to 2023. The study summarised and analysed data using descriptive and inferential statistics. Descriptive statistics included mean and standard deviations while inferential statistics included correlation and regression analysis. The research hypotheses were tested using panel data regression analysis. Data was presented using statistical output tables and discussions there off. The study found that capital adequacy positively but insignificantly influenced liquidity risk ($p = 0.851 > 0.05$, $t = 0.19 < 1.96$, $\beta = 0.2639$). Bank size moderated positively and insignificantly the association between capital adequacy and liquidity risk ($p = 0.423 > 0.05$, $\beta = 0.6680$). Bank size explained 5.54% variance in liquidity risk. The study concluded that capital adequacy do not influence the liquidity risk of deposit taking microfinance banks in Kenya, while the moderator variable bank size does not moderate the relationship between capital adequacy and liquidity risk. Recommendations to the bank regulators is to avoid a one-size-fits-all approach and instead develop capital regulations for banks with different characteristics as increasing capital requirements on all banks may not affect liquidity creation to the extent that regulators expect. Also, banks be allowed to participate in regulatory forbearance in times of liquidity distress to increase their stability through the extension of low provisioning on restructured loans . Further, bank managers should also combine bank funding diversification and liquidity creation in a mixed strategy to help regulate and balance capital adequacy.

Key terms: Capital adequacy,liquidity risk,bank size,deposit taking microfinance banks,risk for capital adequacy theory

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I. INTRODUCTION

1.1 Background of the Study

Over a quarter (37%) of deposit-taking microfinance (DTM) banks in Kenya are exposed to liquidity risk (CBK, 2023). Nearly one in five (19 %) DTM banks report less liquidity than their costs and debt repayments for a single month or less (Fred, 2023).The operational changes that many DTM banks have probably made to cut expenses will help alleviate the strain on cash reserves. Nevertheless, a portion of Kenya's DTM banks have alarmingly low cash holdings, so the situation is worth monitoring closely.If financiers fail to

refinance DTM banks' debt, then one in two of them may encounter liquidity risk. Compared to typical levels, two-thirds of the DTM banks have cut lending by more than half. Meanwhile, 69 percent are imposing repayment moratoria; however, if these were to last longer than the first few months, it would effectively push the liquidity crunch onto the low-income communities they are supposed to serve and put their sustainability of into question.

The nature of banks activities brings about liquidity crisis (Acharya & Mora, 2015).The profitability of a bank can be impacted by its liquidity position. Banks are concerned about liquidity risk due to the growing competition for deposits, the wide range of products available, and technological advancements. Chu and Chu (2020) state that holding too much liquidity can negatively affect profitability, while holding fewer liquidity holdings can create liquidity risk and hurt the bank's growth in the long run.Chen (2018) asserts that even a bank with strong assets, strong profits, and sufficient shareholder capital may collapse if it lacks sufficient liquidity. The performance of banks can be significantly impacted by liquidity risk, which can vary in intensity depending on capital adequacy and bank size. This is why liquidity risk management is one of the main banks' success factors.

Capital adequacy which is the minimum amount of capital a micro finance bank must retain as a proportion of its risk-weighted assets(Bialas & Solek, 2023). Its a critical bank-specific factor that influences liquidity creation. It functions as a buffer against adverse situations and potential losses (Sopan & Dutta, 2018). Two conflicting hypotheses demonstrate the linkage that exists between capital adequacy and the creation of liquidity Proponents of financial fragility-crowding out assert that banks with large capital areimpeded in their liquidity creation activity. The additional equity capital, makes its more challenging to commit and monitor applicants before granting credit, exposing the banks to liquidity risk (Berger & Bouwman, 2009).

Liquidity is the potential for an entity's liquid assets and liabilities to be out of balance, making it impossible for it to satisfy its financial obligations(Kurniawan& Mulyani 2023). Liquidity risk exposure remains an empirical question because deposit-taking microfinance banks in Kenya recently lost their deposits to private investment vehicles. Customer deposits fell by 7.8% in 2022 (Central Bank of Kenya [CBK], 2023). For deposit-taking microfinance institutions, which primarily rely on deposits and borrowings—which account for 66% and 13% of the banks' overall funding (CBK, 2023), loss of customer deposits foreshadows liquidity risk problems. Therefore, we have selected DTM banks because deposits may be an increasingly important source of liquidity risk for them, unlike non-deposit-taking microfinance institutions that are not allowed to mobilize public funds. They can only lend their own funds or borrowed funds. Liquidity risk needs to be managed for the DTM banks to continue as a going concern. Thus, regulators are emphasizing that a DTM bank capacity to identify and manage factors influencing liquidity risk is the greatest long-term viability strategy (Hsieh & Lee, 2020)

In Vietnam, Le (2019) established a positive bidirectional association between capital and liquidity risk, supporting the financial fragility-crowding out hypothesis, which holds that capital impedes the creation of liquidity.

The ability of banking institutions to overcame liquidity constraints varies throughout West African nations, even though their overall liquidity gaps are still limited. With run-off rates of up to 40% for large deposits and haircuts of 30% on public securities in the event of a major crisis, 58 of 91 banks in West Africa would not be able to handle deposit withdrawals (International Monetary Fund, 2022). All things considered; system-wide liquidity shortfalls seem to be manageable, totaling CFAF 2.2 trillion spread over three months.

In addition, 30 banks in West Africa are highly dependent on debt refinancing (exceeding 20%) from the Central Bank of West Africa States (BCEAO) with four banks exceeding the 30% refinancing limit (IMF, 2022).These banks are in a precarious liquidity situation because of the requirement to provide collateral before refinancing capital.This is because their liquid assets are primarily pledged to the BCEAO (IMF, 2022).

Ideal level of capital is needed to offer a buffer against shocks and liquidity risk without adversely affecting liquidity creation, a vital channel through which banks support the economy(Kinini, Ocharo, and Kariuki, 2023) . This is because there is a trade-off between capital adequacy and liquidity creation. Debt had no effect on the liquidity because most firms could still pay their short-term liabilities with their short-term assets (Aziidah, 2017). while non-performing loans had a positive and significant influence on the liquidity risk faced by commercial banks(Ratemo,2021).

The size of a bank is an important factor since it connects to financial markets to make access to capital easier. The amount of assets a bank possesses increases with its size. According to Ahmet (2018), bank size matters because it strongly correlates with access to capital, which represents the banks desire and ownership in avoiding managing risk or insolvency.

The study was anchored by the trade-off theory, capital buffer theory and the anticipated income theory. Trade-off theory explained how leverage influenced liquidity risks due to the high cost of financial distress. Capital buffer theory explained the alternative forgone concept as the minimum capital held could be used to advance credit to customers at a profit, increasing non-performing and influencing liquidity risk.

In Kenya, most MFBs have limited growth prospects as they have been in the loss-making territory, raising concerns about their capacity to fulfill their intermediation function of providing micro credit and micro-savings in the economy. The viability of MFBs is called into question by the slow increase in loans and profitability (CBK, 2023). Concerns about liquidity risk are raised since the subsector's capacity to increase its assets is significantly impacted by a narrowing funding base (CBK, 2023). A 3.1 % decrease in advanced loans was the primary reason for the bank's overall assets, which is a gauge of its size, falling by 4.8 percent to Ksh 70.4 billion ($472.48 million) (CBK, 2023).

Microfinance institutions can be broadly classified as either deposit-taking or non-deposit-taking. Deposit-taking microfinance institutions (DTMs) are able to mobilize and intermediate (or lend) public deposits since they hold a license and are subject to CBK regulations, they are also not permitted to engage in wholesale or retail trading, underwrite securities, or invest in venture capital (CBK, 2023). On the other hand, the Ministry of Finance regulates non-deposit-taking microfinance that don't accumulate deposits. CBK (2023) report indicates the existence of (14) licensed microfinance banks with (3) banks licensed as community banks and (11) as countrywide banks (CBK, 2023).

In 2022, the primary funding sources for deposit taking microfinance banks were customer savings (66%) and borrowings (13%) (CBK, 2023). The majority of their assets are financed by short-term deposits, which can be called at any time, creating an imbalance between short-term liabilities and assets. Customer deposits at DTM banks decreased by 8% between 2021 and 2022, from Kes 50,400 million to Kes 46,000 billion (CBK, 2023). As a result of depositors shifting their money to government bonds because of the bonds' high interest rates, DTM banks were exposed to greater liquidity risks.

1.2 Statement of the Problem

Ideally, deposit-taking microfinance banks (DTMs) are expected to maintain robust liquidity levels and sufficient capital buffers to meet short-term obligations, protect depositor funds, and ensure the overall resilience of the financial system. The Basel III Accord underscores the necessity of adequate capital adequacy and liquidity coverage ratios to enhance institutional shock absorption and mitigate systemic risks (BIS, 2011). In Kenya, the Central Bank of Kenya (CBK) requires DTMs to uphold a minimum liquidity ratio of 20% and a core capital of at least KES 60 million (CBK, 2023). Global empirical literature affirms that institutions with higher capital adequacy and larger asset bases tend to be more effective in managing liquidity risk, owing to improved market credibility, operational flexibility, and better access to funding (Barua & Dhar, 2021; Al-Khouri, 2012). A sound capital and liquidity position is also essential for promoting depositor confidence and supporting inclusive financial development.

In reality, however, DTMs in Kenya have been grappling with structural and operational challenges that have led to deteriorating liquidity conditions. The CBK (2023) reports that 9 out of the 14 licensed DTMs did not meet the statutory liquidity threshold, with some reporting liquidity ratios as low as 12%. Meanwhile, fluctuations in capital adequacy have raised further concern. While aggregate capital adequacy ratios were above the regulatory limit of 12% in 2018 (18%), 2019 (18%), and 2020 (13%), a steep decline occurred in 2021 to 3%, significantly below the then-required 16%. Though there was a partial recovery to 11.79% in 2022, this figure still fell short of the regulatory benchmark (CBK, 2020–2023). The volatility and insufficiency in capital buffers compromise the DTMs' ability to absorb losses and meet liquidity needs, particularly for smaller institutions that lack economies of scale and access to interbank liquidity facilities (FSD Kenya, 2022). These liquidity shortfalls have, in some cases, culminated in institutional failures, such as the closure of Century Microfinance Bank in 2022.

This divergence between the regulatory ideals and the practical realities reflects a systemic gap in the stability and sustainability of DTMs in Kenya. While the regulatory framework stipulates minimum capital and liquidity requirements, many DTMs continue to operate at levels dangerously close to non-compliance. The inability to build and maintain adequate capital buffers heightens exposure to liquidity risk, especially during financial stress. Furthermore, small bank size limits access to diverse funding sources, making liquidity management more challenging. Without sufficient buffers and scalability, DTMs remain vulnerable to liquidity mismatches, posing a threat to deposit safety and undermining the sector's role in financial inclusion.

To mitigate this persistent liquidity risk, policy and strategic interventions should focus on strengthening capital adequacy and enhancing institutional scale. Recapitalization initiatives, tailored capital adequacy requirements based on risk-weighted assets, and regulatory support for consolidation could foster more resilient financial structures. Encouraging mergers or partnerships among smaller DTMs may improve their access to liquidity and operational efficiency. Since capital adequacy directly influences an institution's capacity to manage liquidity stress, understanding its interaction with bank size is vital for shaping risk mitigation strategies. Ultimately, robust capital frameworks and effective internal risk management will help safeguard the liquidity position of DTMs, enhancing their contribution to Kenya's financial stability and inclusion agenda.

1.3 General Objective of the Study

The main objective was to examine the influence of capital adequacy, bank size and liquidity risk of deposit taking microfinance banks in Kenya.

1.3.1 Specific Objectives of the Study

To achieve the main objective, the study sought to.

i. Establish influence of capital adequacy on liquidity risk in deposit taking microfinance banks in Kenya
ii. Determine the moderating effect of bank size on the relationship between capital adequacy and the liquidity risk of deposit taking microfinance banks in Kenya.

1.4 Research Hypotheses

The study tested the following null hypotheses:

H_{0i}Capital Adequacy has no statistically significant influence on liquidity risk of deposit taking microfinance banks in Kenya.

H_{0ii} Bank size has no statistically significant moderating influence on the relationship between capital adequacy and the liquidity risk of deposit taking microfinance banks in Kenya.

1.5 Significance of the Study

The significance of the study lies in the valuable insights it provided to various stakeholders within the financial sector. Management benefited by gaining a deeper understanding of how to address the challenge of determining the optimal level of capital adequacy necessary to mitigate liquidity risk. Bank executives were able to identify the key elements that most significantly influence their liquidity risk exposure, enabling them to adopt value-enhancing strategies that promote effective liquidity risk management across the industry. Additionally, policymakers such as the Central Bank of Kenya (CBK), responsible for overseeing the operations of deposit-taking microfinance banks (MFBs), may find the study's findings instrumental in formulating prudent capital and liquidity regulations that not only ensure the sound operation of MFBs but also support their growth and safeguard against insolvency. Furthermore, the study served as a foundational reference for subsequent academic research by scholars and students, particularly in exploring liquidity risk theories such as the trade-off theory and capital buffer theory. By contributing empirical evidence that can either support or challenge these theoretical frameworks, the study enhanced their theoretical relevance and applicability in the context of liquidity risk management.

2.1THEORETICAL REVIEW

2.1.1 Trade-Off Theory

The trade-off theory formulated by Myers (1984), posited that by including market imperfections, firms seem to get an optimal, value-maximizing debt-equity ratio by trading off the advantages of debt against the disadvantages. So, firms will set a target debt ratio and gradually will move towards achieving it.According to Myers (1984) financial managers often think of the firm's debt-equity decision as a trade-off between interest tax shields and the costs of financial distress. Companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing. If there were no costs of adjusting capital structure, then each firm should always be at its target debt ratio (Brealey & Myers, 2003).

The trade-off theory supposes that microfinance banks with increased debt funding opportunities, might face higher costs of financial distress and hence prefer equity financing. While employing more debt increases the benefits of tax shields that a bank could enjoy, it also increases the likelihood of the bank facing liquidity risks and going bankrupt, which may cause future funding opportunities to fall (Brealey & Myers, 2003). Thus, microfinance banks are more unwilling to utilize debt in order not to get their future funding opportunities reduced. According to Myers (1984), expected agency and bankruptcy costs are higher for firms with high growth opportunities. So, banks may be hesitant to employ high extent of debt in order not to surge their possibility of liquidity risks and bankruptcy. Therefore, debt financing may not be the first option for companies with more debt funding opportunities, suggesting a positive relationship between debt and liquidity risk.

Fischer, Heinkel and Zechner (1989), advanced the trade-off theory by explicitly accounting for the adjustment behavior of the leverage ratio where adjustments take place when the cost of deviation from the target exceeds the cost of adjustment towards that target. One advantage of the dynamic feature is that since the adjustment towards the target is a characteristic of trade-off theory, it can be used to validate the trade-off theory against other theories of capital structure that do not presume the existence of target leverage.

Myers (2001) critiqued the trade-off model assumption that high profits mean low debt, and vice versa. He argued that if managers can exploit valuable interest tax shields, as the tradeoff theory predicts, we should

observe exactly the opposite relationship. High profitability means that the firm has more taxable income to shield, and that the firm can service more debt without risking financial distress

The theory was useful in explaining how a higher debt level amongst microfinance banks could support a lower liquidity risk as a result of the more exceptional ability to meet short-term obligations. Further, the theory also assisted in supporting the argument that high leverage could result in liquidity risks due to the high cost of financial distress; Heavy borrowing decreasing the capacity of future debt and increasing the microfinance bank's cost and liquidity risk. The theory predicts a positive association between debt and liquidity risk.

2.1.2 Capital Buffer Theory

The capital buffer theory was formulated by Dewatripont and Tirole in (1994). The buffer theory predicts that banks will maintain a level of capital above the required minimum (a buffer of capital). The costs of falling below the minimum required level of capital are both explicit and implicit. Buser et al. (1981) argued that implicit costs of regulation may arise from regulatory interference designed to control excess demand for insurance (e.g. expanding risk taking). Explicit costs relate to penalties and/or restrictions imposed by the supervisor triggered by a breach of the regulation, possibly even leading to bank closure.

The theorists argued that an increased bank capital buffer has a positive effect on bank risk-taking, implyingthat banks increase their liquidity risk-taking when increasing their capital buffer.

This is because greatercapital buffer enables banks to deal with possible temporary losses, increases the possibilitiesto invest in different projects and opens up for opportunities to invest in riskier, and then alsomore profitable assets (Dewatripont & Tirole, 1994).

However, the effect varies depending on whetherthe bank is a low capital bank or a high capital bank, with a positive effect for a high capitalbank and a negative effect for a low capital bank(Dewatripont & Tirole, 1994).Ayuso et al. (2004) argued that a capital buffer is a tool for banks to mitigate excessive risk, which means when a bank maintains a greater amount of capital buffer against an increase in their risk, it remains able to survive in a difficult period.

Mirrlees (1999) critiqued the capital buffer theory. He argued that banks no longer hold the minimum allowable amount of capital, rather, they have their own preferred (target) level of capitalization. If this level is exceeded by regulatory requirements, then there is no longer a relationship between capital and risk taking

The theory was relevant to the study especially in explaining capital adequacy cost implications for deposit taking microfinance banksas it can have implications on efficiency, liquidity risk level, profitability and pricing of the institutions.It was also used to explain the alternative forgone considerations as the minimum capital held by these banks could be used as a credit to customers at a profit, increasing non-performing and ultimately influencing liquidity risk.

2.2 Empirical Literature Review

2.2.1 Capital Adequacy and Liquidity Risk

Setiawan and Muchtar (2021) conducted a study on Indonesian commercial banks listed on the Indonesia Stock Exchange (IDX) from 2015 to 2019. The objective was to examine internal bank-specific factors influencing the Capital Adequacy Ratio (CAR), a critical indicator of a bank's capacity to absorb financial shocks. The researchers employed a quantitative panel study using secondary financial data. CAR was the dependent variable, while the independent variables included bank size, loan loss reserves, return on equity (ROE), liquidity ratio, and loan ratio. Data were sourced from annual financial reports submitted to IDX and the Financial Services Authority (OJK).The target population comprised all commercial banks listed on IDX during the study period. A sample of 42 banks was selected using purposive sampling, ensuring inclusion of institutions with complete data across all five years. Panel data regression methods, including Fixed Effects and Random Effects models, were applied to analyze relationships while controlling for time-invariant differences among banks. Software such as EViews or SPSS was likely used for analysis. Key findings showed that bank size and ROE had a positive and statistically significant impact on CAR, indicating that larger, more profitable banks tend to maintain stronger capital buffers. Conversely, the loan ratio negatively and significantly influenced CAR, suggesting that higher reliance on loans could weaken capital adequacy. Loan loss reserves and liquidity ratio had no significant effects. Based on these findings, the study recommended that banks increase total assets to strengthen capital bases, enhance profitability to support CAR, and manage loan ratios to reduce credit risk. Since liquidity and loan-loss reserves showed no significant impact, the authors suggested focusing on asset growth and profitability strategies to improve capital adequacy.

Leykun (2017) conducted a study on the Ethiopian commercial banking sector, focusing on the period from 2005 to 2014. The study aimed to assess whether capital adequacy and other internal, bank-specific factors significantly influence liquidity risk, which is a critical concern in banking operations. To address this objective, Leykun adopted a quantitative panel study design. Specifically, the study employed an unbalanced fixed-effects

regression model to examine the effects of selected financial indicators on liquidity risk. The conceptual framework positioned liquidity risk as the dependent variable, while the independent variables included the Capital Adequacy Ratio (CAR), total loans to total assets, and total deposits to total assets. This framework allowed the researcher to analyze how each factor either positively or negatively impacted liquidity risk. Data for the study were collected from secondary sources, primarily audited financial reports of Ethiopian banks for the 2005–2014 period. These reports provided consistent and credible data necessary for calculating the variables under investigation. The methodology encompassed a clearly defined target population, which included all commercial banks operating in Ethiopia during the study period. From this population, an unbalanced panel of banks with complete and accessible annual data was selected. Purposive sampling was used to include only banks with reliable reporting across the timeframe. Fixed-effects panel regression analysis was then applied to evaluate the relationships between the variables, accounting for unobserved time-invariant characteristics among banks. The analysis adhered to classical linear regression assumptions to ensure statistical robustness. The study's findings revealed that the Capital Adequacy Ratio had a negative and highly statistically significant effect on liquidity risk ($p < 0.01$), supporting the crowding-out-of-deposit hypothesis. Similarly, both the loan-to-asset and deposit-to-asset ratios showed significant negative relationships with liquidity risk. Based on these findings, Leykun recommended that bank management should closely monitor asset–liability mismatches to mitigate liquidity risk. Furthermore, he advised banks to diversify their funding sources, such as by issuing commercial paper, rather than relying heavily on customer deposits, aligning with global best practices.

Kiio, Wamugo, and Omagwa (2023) investigated the impact of capital adequacy on liquidity risk within Kenyan microfinance banks (MFBs), drawing on data from 2012–2018. Situated in the Kenyan microfinance sector, their study aimed to determine how holding capital buffers above the minimum requirement affects operational liquidity. The authors adopted an explanatory quantitative research design. They utilized secondary financial data extracted from published financial statements and Central Bank of Kenya (CBK) regulatory reports for all 13 MFBs operating during the specified period. The conceptual framework treated liquidity risk as the dependent variable, while capital adequacy was the primary independent variable, further informed by capital buffer theory and liquidity preference theory .Under methodology, the target population included the entire universe of Kenyan MFBs active from 2012 to 2018, and a census approach was employed covering all 13 institutions .The researchers analyzed the panel data using regression techniques through Stata, applying descriptive and panel regression analyses to test hypotheses at the 5% significance level. Their findings revealed a significant negative relationship between capital adequacy and liquidity risk, indicating that holding excess capital above the regulatory minimum reduced liquidity ($p < 0.05$). This supported the crowding-out hypothesis, where high capital buffers restrict the bank's ability to maintain sufficient liquid assets. Based on these results, the authors recommended that MFB managers strive to balance capital reserves with liquidity needs—ensuring capital buffers do not impair liquidity operations. They emphasized careful calibration of capital requirements to align with liquidity management goals.

Njeri (2017) examined whether the Capital Adequacy Ratio (CAR) influenced liquidity risk within Kenyan deposit-taking SACCOs, focusing on institutions in Nairobi from 2013 to 2017. The study aimed to determine how liquidity and risk measures impacted two definitions of capital adequacy core capital to total assets and core capital to total deposits. To investigate these relationships, the research adopted a causal quantitative design, utilizing secondary data collected from audited financial statements of all licensed deposit-taking SACCOs under the SACCO Societies Regulatory Authority (SASRA) in Nairobi County. The dependent variables were the two CAR measures, while the independent variables comprised liquidity indicators cash position, reserve ratio, capacity ratio, and total deposits—and a risk measure .Under its methodology, the target population encompassed the entire set of 35 deposit-taking SACCOs operating in Nairobi and regulated by SASRA during the study period. Employing a census sampling technique, all 35 SACCOs were included because they provided the full dataset required. The data analysis made use of descriptive statistics, correlation analysis, and multiple regression in SPSS and Excel to examine how liquidity and risk influenced capital adequacy .The findings revealed that cash position and reserve ratio were positively associated with the core-capital-to-assets CAR, while capacity ratio and total deposits exhibited negative relationships. When CAR was measured relative to deposits, cash position, capacity ratio, and total deposits were negatively associated except for reserve ratio, which remained positive. Liquidity measures were generally significant predictors of CAR (at the 95% confidence level), and risk also showed a positive, significant relationship with both CAR measures. Based on these results, Njeri recommended that SACCO managers maintain adequate reserves to meet withdrawal demands while ensuring compliance with SASRA's CAR guidelines. She also suggested that deposit-taking SACCOs should uphold sufficient capital to absorb loan losses, maintain a minimum CAR of 10%, establish a central depository to manage seasonal liquidity shortages, and expand savings mobilization to enhance liquidity and capital strength.

Nyaundi (2015) examined the effect of capital adequacy on the liquidity of Kenyan commercial banks over the period 2010–2014. Focusing on all 43 licensed banks, the study sought to understand how regulatory capital buffers influenced liquidity ratios within the Kenyan banking sector .Adopting a descriptive research design, Nyaundi relied on secondary data sourced from Central Bank of Kenya (CBK) financial reports, covering the full population of 43 commercial banks. This comprehensive approach enabled a thorough analysis of liquidity behavior and capital adequacy across the sector .Under the methodology, the target population consisted of all commercial banks operating in Kenya during the study period, namely 2010–2014. Because the data covered every bank, no sampling was required—the entire population was analyzed. The analysis employed descriptive statistics alongside regression and correlation techniques using SPSS v21, allowing for rigorous examination of relationships between liquidity and capital adequacy .Nyaundi's findings revealed a strong correlation between capital adequacy and liquidity ratios, with capital adequacy exerting a significant positive influence on liquidity. Bank size and national GDP growth were also found to significantly affect liquidity, with bank size having the greatest impact, followed by capital adequacy and GDP growth.Based on these results, Nyaundi recommended that commercial banks should focus on reducing their cash conversion cycles to improve liquidity, thereby freeing up excess cash for reinvestment. Additionally, policymakers and bank management should continue to enforce adequate capital buffers that support liquidity without constraining operations.

2.2.2Moderating Effect of Bank Size on Capital Adequacy

Hermuningsih and Rahmawati (2023) investigated the moderating effect of bank size on the relationship between liquidity and profitability in Indonesia's conventional commercial banking sector, covering the period from 2012 to 2021.To explore this theme, they employed a quantitative explanatory design grounded in structural equation modeling using SmartPLS (PLS-SEM). Their conceptual framework considered financial performance as the dependent variable, while fintech adoption and liquidity functioned as independent variables; bank size was posited as a moderating factor in both relationships. Data were sourced from secondary financial statements and OJK reports for conventional commercial banks registered with the Financial Services Authority (OJK) between 2012 and 2021. These reports provided liquidity ratios, fintech usage indicators, financial performance metrics (e.g., ROA), and bank size proxies. Under methodology, the target population encompassed all commercial banks registered with OJK during the period, and purposive sampling was employed to select those actively using fintech. The resulting sample consisted of 20 banks yielding 200 firm-year observations . SmartPLS was utilized to model the direct effects of fintech and liquidity on performance, and to test the moderating influence of bank size.The study found that both fintech adoption and liquidity had significant positive effects on bank financial performance. Moreover, bank size significantly strengthened (moderated) these relationships, suggesting that larger banks benefit more from fintech and liquidity in driving profitability. Based on these findings, the authors recommend that Indonesian banks, particularly larger ones, should deepen fintech integration and manage liquidity strategically to maximize financial performance. They also advise regulators to develop size-sensitive policies that recognize the amplifed benefits of liquidity and fintech in larger institutions.

Hassan, Sabo, Tijjani, & Aliyu. (2023) investigated whether bank size moderates the relationship between liquidity risk and profitability within Nigeria's commercial banking sector. The study focused on 12 commercial banks listed on the Nigerian Stock Exchange (NSE), covering a ten-year period from 2011 to 2020. To address this objective, the researchers adopted an ex-post-facto quantitative design and relied on secondary data obtained from the audited annual financial statements of the sampled banks, complemented by macroeconomic indicators sourced from the World Development Indicators (WDI) database. Their conceptual framework was anchored on profitability, measured using return on equity (ROE) as the dependent variable, while the independent variables included liquidity risk proxied by the loan-to-deposit ratio—and interest rate indicators, specifically deposit and lending rates. Importantly, bank size was introduced as a moderating variable to examine its influence on the relationship between these predictors and profitability. Methodologically, the target population comprised all commercial banks listed on the NSE during the study period, from which a purposive sample of 12 banks with complete and consistent data was selected. The authors employed panel regression analysis using Stata 14.2, enabling them to estimate both the direct effects of the independent variables and the moderating role of bank size. Diagnostic tests were conducted to ensure the validity and robustness of the results. The study's findings indicated that the deposit rate had a significant negative effect on profitability, while both the lending rate and loan-to-deposit ratio had positive and statistically significant relationships with profitability. Moreover, bank size was found to positively moderate the relationship between deposit rate and profitability, thereby intensifying the adverse effect of higher deposit rates. In contrast, it negatively moderated the link between loan-to-deposit ratio and profitability, reducing its positive impact. Based on these insights, the authors recommended that commercial banks in Nigeria should strategically expand their asset base to benefit from economies of scale and improve cost efficiency. They further advised that large banks

are better positioned to manage the complex interplay between interest rates, liquidity, and profitability, while smaller banks should adopt tailored approaches to enhance profitability amidst liquidity challenges.

Amira, B Alala, and Maniagi (2023) investigated liquidity risk determinants and their influence on financial performance in Kenya's commercial banking sector, focusing on 32 banks over the period 2010–2019. Situated within liquidity management theory specifically the shiftability paradigm the study aimed to assess how liquidity management affected profitability, as measured by return on equity (ROE) and return on assets (ROA). To explore this relationship, they applied a positivist philosophy and adopted a longitudinal, explanatory research design that relied on secondary data drawn from audited annual financial statements. This data encompassed both time-series and cross-sectional information covering a full decade of bank performance. Under methodology, the target population comprised the 32 commercial banks operating in Kenya during the study period. Using panel data analysis with EViews, the researchers employed descriptive and inferential statistics to examine how liquidity risk management was related to financial outcomes . Diagnostic measures were implemented to ensure robustness and validity in the regression models. The findings demonstrated an insignificant negative relationship between liquidity risk management and both ROE ($F = 0.5839$, $p < 0.05$) and ROA ($F = 2.7704$, $p < 0.05$). Despite this negative association, the weakness and lack of statistical strength suggested that liquidity risk management did not substantially influence profitability in a meaningful way over the examined period .Based on the results, the authors recommended that Kenyan commercial banks should minimize excessive liquidity buffers so as not to impair financial performance. They advised maintaining liquidity risk parameters at optimal levels to avoid loss-making scenarios, aligning liquidity management with operational efficiency and profitability objectives.

2.4 Research Gap

The extant literature reviewed has revealed numerous gaps. Objective 1 on capital adequacy provides evidence of mixed empirical findings. While some set of studies established a positive relationship, others concluded a negative or no relationship between capital adequacy and liquidity risk. Njeri (2019) found that CAR influences liquidity risks negatively as Kiio et al., (2023) and Nyaundi (2019) find evidence that CAR positively influences the liquidity risk of Saccos and commercial banks. Setiwan and Muchtar (2021) find no association between capital adequacy and liquidity risk.

The objective on bank size as the moderating variable, resulted in the identification of methodological gaps. Chibole (2022) found bank size as an insignificant moderator and Hassan et al. (2023) established bank size as a significant moderator for firm level internal factors and liquidity risk.

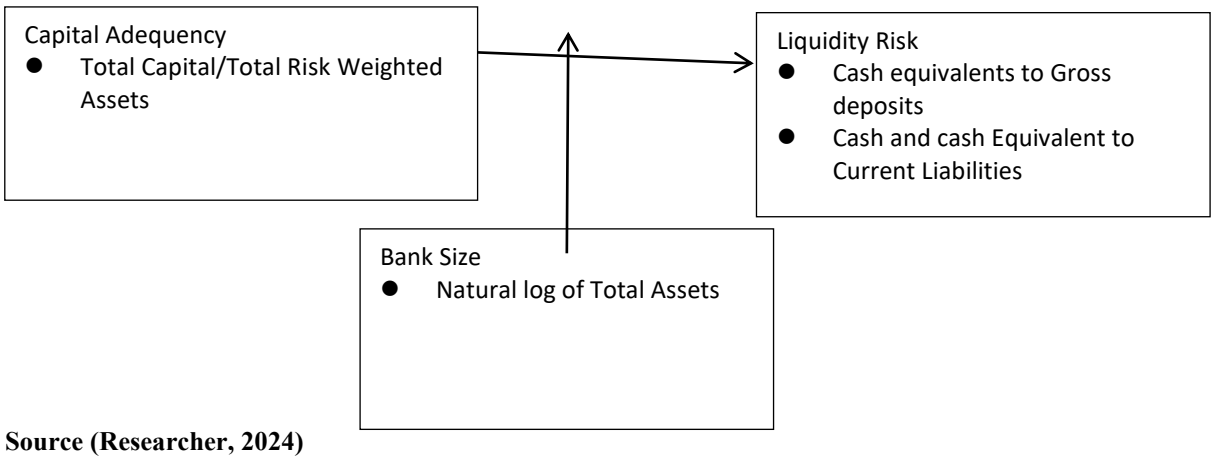
In addition, Amira et al. (2023) adopted bank size as the main variable (independent variable). This study adopted bank size as the moderating variable.

2.5 Conceptual Framework

For this study, the independent variable was capital adequacy that was measured using total capital to total assets or natural log of total capital. Bank size the moderating variable was measured using

operationalized using gross loans to deposits or cash and cash equivalent to current liabilities (See Fig. 2.1 for the framework).

Figure 2.1 Conceptual Framework



Source (Researcher, 2024)

2.5.1 Liquidity Risk

A bank's liquidity is a measurement of its capacity to quickly locate the funds it might require to satisfy requests made by its clients. Direct cash holdings or on deposit with central banks are two sources of liquidity. It usually results from owning securities that can quickly be sold with a minimal loss (Sopan & Dutta, 2018). Short-term, extremely safe securities also frequently trade in liquid markets, which allows for large volumes to be sold without significantly moving prices and with minimal transaction costs.

A bank's liquidity status impacts other factors apart from cash reserve and highly liquid securities, especially during a crisis. It is also important to consider the maturity date of its illiquid assets because they might mature before a crisis elapses, offering additional finances (Sopan & Dutta, 2018).

2.5.2 Capital Adequacy

Capital adequacy is the bare minimum capital reserves required by law for banks and other financial institutions to operate (Sopan & Dutta, 2018). A banks ability to absorb future losses increases with capital. Thus, capital cushions the bank against potential losses. The bank's ability to withstand further losses, however, decreases as the cushion gets smaller, and deposits become much more susceptible. Lower capital levels result in increased deposit exposure, and as exposure increases, so does the likelihood of bankruptcy.

To reduce their cost of capital, many banks frequently hold the bare minimum of regulatory standards. In addition, managers favor greater levels of leverage over capital adequacy since they are held accountable for their financial success. Managers think that increasing leverage boost financial results and make the banks less vulnerable to market discipline. Another moral hazard reason for having lower capital adequacy standards is the added protection that banks receive from their regulators (Sopan & Dutta, 2018).

2.5.3 Bank Size

The size of a bank is an important factor since it connects to financial markets to make access to capital easier. The amount of assets a bank possesses increases with its size. According to (Ahmet, 2018), the size of the bank matters because it strongly correlates with access to capital, which represents the bank's desire and ownership in avoiding managing risk or insolvency. Greater capital adequacy is attained by larger banks, while smaller banks have less capital adequacy since they are unable to expand the number of their depositors and so cannot increase their capital.

III. RESEARCH METHODOLOGY

The chapter examines methods useful for attaining the goals of the study. It explains the research design, population, the data collection methods, and the procedure for processing the acquired data.

3.1 Research Design

This study employed the longitudinal research design which was useful in evaluating the relationship between leverage, capital adequacy and non-performing loans, and the outcome - liquidity risk, over multiple time periods (2018 to 2023). Furthermore, the longitudinal research design was ideal since data was gathered for specific banks (microfinance banks) inside a predefined group (microfinance banks that accept deposits), allowing statistical testing to examine changes over time for the group. The longitudinal research design was also ideal for this study because it provided information on the influence of time on the variables measured, thus generally more valid for examining cause-and-effect relationships.Similarly, Kiio, Wamugo, and Omagwa (2023) explored the impact of capital adequacy on the liquidity risk of Kenyan microfinance banks using the longitudinal research design.

3.2 Target Population of the Study

The target population was 13 deposit taking microfinance banks regulated by the CBK. The population is as shown in Appendix III. The researcher obtained financial data for the period 2018-2023, to account for the risk-based supervision framework, continued enhancement of capital adequacy, introduction and the subsequent removal of the interest rate capping and the coming into law of the Finance Act 2023, which reduced the disposable income of many income earners due to the revision of the PAYE upwards as well as the introduction of 1.5% contributions towards the housing development fund.

3.3 Data and Data Collection Method

The study employed secondary data from the 13 MFBs published audited reports. The data collected included total non-performing loans, debt, equity, cash equivalents, capital, gross loans, deposits, current liabilities, liquid assets, and total assets. The researcher gathered separate yearly data on all the variables for all the MFBs in one excel sheet. Thereafter, the researcher determined the different ratios for the study variables. The researcher collected panel secondary data with the help of a template, attached as Appendix II. Panel data

has more variability and less collinearity among the variables than crosssectional or time series data. It also controls heterogeneity and can identify and estimate effects that are not easily detectable in pure cross-section and pure time series data, in particular, therefore, panel data sets are better able to study complex issues of dynamic behavior (Gujarati, 2012).

3.4 Data Collection Instrument

A secondary tally data collecting sheet, a tool for collecting and organizing data, was utilized in this study. This worksheet aided in collecting, processing, and making sense of data derived from the balance sheet and the income statement.In quantitative research, data collecting sheets are highly helpful as they facilitate the collection, documentation, and arrangement of various numerical values derived from the research variables (Forrest& Forrest, 2013).

3.5 Validity and Reliability of the Instrument

Validity refers to measuring what is meant to be measured (Field, 2005). Reliability is the degree to which a measurement of a phenomenon yields consistent and reliable results(Cohen, Manion& Morrison 2017). Repeatability is another aspect of reliability. Validity and reliability were ensured throughother information sources such as analysts' forecasts. In addition, non-financial information might be relevant. Further, validity was ensured by consulting an independent professional experienced in finance who compared the collected data against the expected forecasts. By doing this, one could identify any red flags, errors, or manipulations in the financial report and gain a broader context and perspective to evaluate the performance and position of the bank.

3.6 Diagnostic Tests

Diagnostic tests were conducted to ensure the validity of panel regression analysis by checking for assumption violations that may distort results. The **normality test** used the Shapiro-Wilks method to check error distribution, suggesting remedies like data transformation if violated. **Multicollinearity** was assessed using the Variance Inflation Factor (VIF), with values above 10 (or even 4) indicating a problem; remedies include standardization or ridge regression. **Autocorrelation**, which can bias results over time, was checked using the Durbin-Watson statistic, where values between 1.5 and 2.5 are ideal. The **stationarity test** used the Augmented Dickey–Fuller test to ensure time series stability; non-stationary data were transformed. **Homoscedasticity** was tested using the Breusch-Pagan/Cook-Weisberg test, with heteroscedasticity corrected via robust regression methods. Finally, the **Hausman test** determined the appropriate model (fixed or random effects), with the fixed effects model preferred if the p-value is less than 0.05.

3.7 Data Analysis and Presentation

This consists of cleaning and preparing the data, analysis, report discussion, and interpretation. The researcher analyzed data using STATA statistical software version 16. The data was presented using tables, means, and standard deviations.The causality between variables was determined using inferential statistics. The analysis results was shown as, percentages, means, and standard deviations.

The study adopted the panel data regression model. Data Panel Regression is a combination of cross section data and time series, where the same unit cross section is measured at different times. So in other words, panel data is data from the same deposit taking microfinance banks observed in a certain period of time (2018 to 2023).

The panel data model was selected, amongst other reasons, due to its computational advantage. It allowed the researcher to control for unobservable individual time-invariant heterogeneity, that is, systematic differences across cross-sectional units (e.g., various deposit taking microfinance banks). The model also increased the degrees of freedom, removed the influence of the individual of the independent variables, thus making the estimates of model coefficients more realistic.

3.7.1 General Panel Data Regression Model

$Y_{it} = \beta_0 + \beta_1 X_{1it} + \varepsilon$ …….....Equation 3.1

Where:

Y = Liquidity Risk measured using gross loans to gross deposits or cash and cash equivalent to current liabilities.

β_0 = Constant term

β = Regression coefficient to be estimated

X_1= Capital adequacy measured using total capital to total assets or natural log of total capital

i = Microfinance banks (Cross - section dimension) ranging from 1 to 13

t = Time index: ((Years (time - series dimension) ranging from 2018 to 2023

ε = Error Term

3.7.2 Analytical Regression Equation with Moderating Variable

$Y_{it} = \beta_0 + Z^* (\beta_1 X_{1it}) + \varepsilon$ ……..... Equation 3.2

β_0 = Constant term

β = regression coefficient to be estimated

Z= Moderating variable, bank size

IV. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 4.1 below reports the mean, standard deviation, maximum, minimum, and observation of the data. Descriptive statistics are presented after preparing the data for analysis. The data contains 13 deposit taking microfinance banks in Kenya for the years (2018 – 2023).

Table 4.1: Summary of Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Liquidity risk	78	0.5326	0.1140	0.3133	0.7530
Capital adequacy	78	0.0881	0.0102	0.0647	0.1022
Bank size	78	7.1935	1.8002	3.8067	10.3292

Source: Analyzed Data from the CBK Annual Bank Supervisory Reports

Liquidity risk is the actual or future risk resulting from the failure of an entity to fulfill its liabilities/obligations when they are due without incurring unreasonable losses. In Table 4.1, liquidity risk depicts a mean of 0.5326, with the min and max values ranging from 0.3133 to 0.7530. Microfinance banks are likely to face liquidity problems as they increase their funding from deposits. The standard deviation of 0.1140 is smaller than the mean, implying that the variation in liquidity risk ratio either between MFBs or within each MFBs over time is relatively small.

DTM banks have economies of scope when they take deposits.

The capital adequacy ratio depicts a mean of 8.81%, with minimum and maximum values of -0.0647 and 0.1022 respectively. The mean CAR value of 8.81 % is below the 19.05% CAR strong performance ratings (CBK, 2023). A mean Capital Adequacy Ratio of 8.81%, which is significantly below the 19.05% strong performance rating, implies that DTM banks in Kenya are undercapitalized and potentially at risk, indicating reduced ability to absorb losses and possibly requiring regulatory intervention or capital injections to ensure stability. The standard deviation of 0.0102 is rather lower compared to the mean, an indication of low volatility in CAR values for the MFBs over time.

Finally, we capture bank size based on the natural log of total assets. In our sample total assets range from 3.8067 to 10.3292 with an average value of 7.1935.

The mean revealed that the MFBs customer deposits constituted a large proportion of their total assets. The SD of 1.8002 is significantly lower than the mean, revealing a small difference in the total assets owed by the MFBs over time.

4.2 Diagnostic Tests

These tests included normality, multicollinearity, autocorrelation, stationarity and heteroscedasticity were conducted and the findings presented herein.

4.2.1 Normality Test

Shapiro Wilk test was used to determine whether the data were normally distributed. The results of the normality test are displayed in Table 4.2.

Table 4.2: Normality Test

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adjchi2(2)	Prob>chi2
Liquidity risk	78	0.9034	0.8822	0.04	0.9818
CAR	78	0.1999	0.9486	1.70	0.4275
Bank size	78	0.5173	0.0354	4.83	0.0894

Source: Analyzed Data from the CBK Annual Bank Supervisory Reports

Based on Table 4.2 above, the p values for all the variables were greater than the significance p value of 0.05: Liquidity risk ($p = 0.9818 > 0.05$), capital adequacy ($p= 0.4275 > 0.05$) and bank size ($p = 0.0894 > 0.05$) thus the variables were normally distributed.

4.2.2 Test for Multicollinearity

Multicollinearity is when two or more of the explanatory variables in a model exhibit strong correlations, or linear relationships. The statistical conclusions drawn from the data may not be trustworthy due to the occurrence of multicollinearity (Gujarati et al., 2017).

Gujarati and Porter (2009) stated that the variance inflation factor should be equal to 4 or less than 4. Any value above 4 indicates multicollinearity. The findings in Table 4.3 indicate the mean VIF value as 1.53 with all the values for the respective variables being below 4. Thus, our findings provide an indication that there was no multicollinearity in the dataset that was used in the current research and hence it was suitable to support regression analysis.

Table 4.3: Multicollinearity Test

Variable	VIF	1/VIF
CAR	1.02	0.9829
Bank size	2.04	0.4908
Mean VIF	1.53	

Source: Analyzed Data from the SPSS

4.2.3 Autocorrelation Test

Deficit of independence between the residual components of observations is referred to as autocorrelation (Field, 2000). The residual terms between any two observations made during distinct time periods should not be auto correlated for data to have a good prediction power (Maddala, 2001). The Durbin Watson Statistic helped in determining the presence of autocorrelation, and its results are shown in Table 4.4.

Table 4.4: Durbin-Watson Statistic

Durbin-Watson d-statistic (Original) (5, 78) = 1.320869

Source: Analyzed Data from the CBK Annual Bank Supervisory Reports

Autocorrelation is present in the study dataset, as indicated by the Durbin Watson Statistic value of 1.320869 in Table 4.4. In order to address autocorrelation, the researcher used the difference transformation technique to estimate the residuals of the dependent variable, liquidity risk. The findings are displayed in table 4.5 below.

Table 4.5: Transformed Durbin Watson Statistic

Durbin-Watson d-statistic (Transformed) (5, 78) = 2.5293

Dependent Variable: Predicted Residuals

After transforming the dependent variable, Table 4.5 results show a D-W static value of 2.52,which falls between 1.5 and 2.5suggesting that autocorrelation has been eliminated from the data set. Normal D-W test scores fall between 1.5 and 2.5 (Turner, 2020).

4.2.4 Stationarity Test

The premise that the time series are roughly stationary is the foundation of the majority of statistical forecasting techniques. Given that panel data frequently contains a time series component, its crucial to determine stationarity when performing panel regression analysis (Beenstock & Felsenstein, 2019). The study opted for the Augmented Dickey–Fuller Test (ADF) test for determining stationarity.

Table 4.6: Augmented Dickey–Fuller Test

Dickey-Fuller test for unit root Number of obs = 78

---------- Interpolated Dickey-Fuller ---------

	Test Statistic	1% Critical Value	5% Critical Value	10%Critic Value
Z(t)	-11.017	-3.544	-2.909	-2.590

MacKinnon approximate p-value for Z(t) = 0.0000

Source: Analyzed Data from the CBK Annual Bank Supervisory Reports

The result in table 4.6 shows that the ADFtest statistic value of 0.000 is less than the critical value at 0.05 significance level. Thus, the study rejects the null hypothesis of a unit root, concluding the series is stationary.

4.2.5 Heteroscedasticity Test

Homoscedasticity assumes that the errors in a linear regression model are spread uniformly across all the independent variables when applying the model to make inferences, if this is violated that heteroscedasticity exists. The Breusch-Pagan test was applied in determining heteroscedasticity. The results are shown in Table 4.7.

Table 4.7: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: Debt, NPLs, CAR, Bank Size
chi2(4) = 5.46
Prob > chi2 = 0.2429

Source: Analyzed Data from the CBK Annual Bank Supervisory Report

Table 4.7 shows a probability chi-square of 5.46 with p-value of 0.2429. We therefore accept the null hypothesis of constant variance, since the p value 0.2429 > 0.05, thus justifying the absence of heteroskedasticity.

4.2.6 Hausman Specification Test Results

The study used the Hausman test in selecting the most ideal model Using the Chi-square test statistic, the FE model would be adopted where probability < 0.05 but rejected for the RE model where p > 0.05.

Table 4.8: Hausmann Specification Results

Model Choice	Chi-Square	Probability>Chi-Square	Model Type
Hausman Test	2.22	0.5280	Random effect preferred

Source: Analyzed Data from the CBK Annual Bank Supervisory Reports

Table 4.6 reveals a Chi-Square of 2.22 with probability of Chi-Square being 0.5280 which exceeds the conventional threshold set at 0.05. This result indicates that the null hypothesis, which posits that the RE model is preferable, cannot be rejected. Consequently, the RE model was deemed more appropriate for the analysis conducted in this study.

4.3 Inferential Results Analysis

This section present and discusses the result of inferential statistics presented inform of Pair wise Pearson correlation and panel regression model. Pearson assessed the relationship and static panel regression assessed the effect.

The discussion and analysis are supported by interpretation of the results and collaboration with existing empirical and theoretical findings.

4.3.1 Correlation Matrix

Pearson correlation coefficients was used to determine the nature of the relationships between the variables. Table 4.9 depicts the correlation matrix, which shows the strength and direction of the correlations between the study variables.

In Table 4.9, correlation analysis findings are presented, it shows that capital adequacy and liquidity risk are positively but weakly correlated (r = 0.0238, p = 0.8360). The finding contradicts the results of Setiawan and Muchtar (2021) who found that CAR and liquidity risk had a positive and strong correlation, it also doesn't support the findings by Leykun (2017) from the commercial banks context where the relationship was also positive but significant. However, in the commercial banks' context, Nyaundi (2018) established that the increased risk to the banks' liquidity was associated with higher capital adequacy but insignificantly. This was further supported by Kiio et al., (2023) in the context of microfinance banks.

The findings agree withAhamed (2021) results in Bangladesh that pointed to a positive and insignificant association between leverage and liquidity risk. Akin to that Jepkorir et al., (2019) established that financial leverage had no influence on financial distress in Saccos in Kenya.

Table 4.9: Correlation Results

		LR	LV	NPLs	CAR	BS
Liquidity Risk	Pearson Correlation	1				
	Sig. (2-tailed)					
Capital Adequacy	Pearson Correlation	.0238	.0920	-.0374	1	
	Sig. (2-tailed)	.8360	.4231	.7448		
Bank Size	Pearson Correlation	.0804	-.7059	.1599	.0047	1

Sig. (2-tailed)	.4841	.5220	.1620	.9672

*. Correlation is significant at the 0.05 level (2-tailed).

However, the findings contradict,Mugenyah (2017) results that established leverage to have a positive but strong correlation with liquidity risk in the commercial bank context. The correlation results also showed that non-performing had a positive and weak correlation with liquidity risk (r = 0.1832, p = 0.1084). The findings contradict Aloys et al., (2019) and Muriithi (2019) who found a strong and positive correlation in the context of Saccos and commercial banks in Kenya. Lastly, the correlation findings pointed to a positive and weak correlation between bank size and liquidity risk (r = 0.0804, p = 0.4841).

4.3.2 Random Effects Panel Regression

The Random Effects Model (RE) was employed to assess firm level internal factors on liquidity risk. The analysis explores the impact of leverage, non-performing loans and capital adequacy on liquidity risk. The results are presented in Table 4.10.

The RE model regression results in table 4.9 indicate that the joint effect of leverage, capital adequacy and non-performing loans had an insignificant effect on liquidity risk as indicted by Wald Chi-Square 3.38, Probability > F 0.0000. This means the overall model was robust and statistically appropriate in testing firm level internal factors influence on liquidity risk. In addition, the overall R-Squared is 0.0437 implying that about 4.37 percent of the changes in the liquidity risk are determined by the firm level internal factors that the study did consider and 95.63 percent of the changes are determined by other factors that were beyond the scope of this study.

Analysis of Table 4.10: Static Random Effects Panel Regression Model

Table 4.10 presents a static random effects panel regression analyzing the influence of capital adequacy on the liquidity risk of deposit-taking microfinance banks (DTMs) in Kenya.The regression results indicate statistically insignificant relationship, as reflected by *p*-value exceeding 0.05. Capital adequacy displayed a positive but insignificant effect on liquidity risk (β = 0.2639, *p* = 0.851). This suggests that while higher capital may marginally increase liquidity risk, likely due to the shift of resources from liquid to less liquid assets, the effect is not strong. These results align with findings by Kiio et al. (2023) and Nyaundi (2018), who similarly reported a weak, non-significant relationship. However, they contradict studies by Setiawan & Muchtar (2021) and Leykun (2017), who found a significant negative association, positing that stronger capital buffers reduce liquidity risk. Overall, the model's low R-squared values (within = 0.0469, between = 0.1370, overall = 0.0443) and insignificant Wald Chi-square test (*p* = 0.3364) indicate weak explanatory power. These findings suggest that liquidity risk in DTMs may be influenced more by operational or external macroeconomic factors than by internal financial ratios like CAR.

4.3.3 Moderating Effect of Bank Size on capital adequacy and Liquidity Risk

The hypothesis was tested to ascertain the influence of moderator variable within the panel regression model. The results are summarized in Table 4.11.

This table presents the results of a regression model assessing the moderating effect of bank size (BS) on the relationship between capital adequacy ratio (CAR) and liquidity risk among deposit-taking microfinance banks in Kenya. The interaction term BS*CAR represents this moderation.

Table 4.11: Moderating Effect of Bank Size

Variable	Coefficient	Std. Error	z-value	p-value	Interpretation
CAR	-4.5788	5.2092	-0.88	0.379	Although negative, CAR's effect on liquidity risk is statistically insignificant ($p>0.05$), indicating that on its own, CAR does not significantly impact liquidity risk.
Bank Size (BS)	0.1016	0.1233	0.82	0.410	The direct effect of bank size on liquidity risk is also statistically insignificant.
Interaction Term (BS*CAR)	0.6680	0.8342	0.80	0.423	The moderating effect of bank size on the CAR–liquidity risk relationship is statistically insignificant, suggesting that bank size does **not** significantly alter the effect of capital adequacy on liquidity risk.
Constant	-1.0993	0.8173	-1.35	0.179	The baseline liquidity risk when all predictors are zero is also not significant.

Model Fit:

R-squared values:

Within = 0.119, *Between* = 0.1085 *Overall* = 0.0997. These low values indicate that only about 10–12% of the variation in liquidity risk is explained by the model, suggesting poor explanatory power.

Wald Chi-square (7) = 7.76, **Prob > Chi2 = 0.3546**

This overall test of model significance indicates the model is **not statistically significant** at the 5% level.

The analysis shows that neither capital adequacy, bank size, nor their interaction significantly explains variations in liquidity risk. This implies that bank size does not moderate the relationship between capital adequacy and liquidity risk among DTMs in Kenya. The findings are consistent with studies such as Kiio et al. (2023), which also found no moderating influence of size. Thus, whether a bank is large or small, its capital adequacy has a similarly weak effect on liquidity risk.

Table 4.12 Test of hypotheses results summary

Hypothesis	Results	Decision
H_{0i}:Capital adequacy has no significant effect on the liquidity risk of deposit taking microfinance banks in Kenya	Capital adequacy has a positive relationship with liquidity risk but it is not statistically significant determinant of liquidity risk DT-MFBs in Kenya ($p = 0.851 > 0.05$, $\beta = 0.2639$)	H_{0i}:is accepted
H_0ii:Bank size has no statistically significant moderating influence on the relationship between firm level internal factors and the liquidity risk of deposit taking microfinance banks in Kenya	Bank size (BS) has a positive relationship with liquidity risk but it is a statistically insignificant moderator of the firm level internal factors and liquidity risk of DT-MFBs in Kenya($p = 0.423 > 0.05$, $\beta = 0.6680$)	H0ii:is accepted

The interaction term (β_3) is statistically insignificant; therefore, we fail to reject H_{04}, stating that bank size has no statistically significant moderating influence on the relationship between firm level internal factors and the liquidity risk of deposit taking microfinance banks in Kenya.The results suggest that the size of a microfinance bank has no bearing on the extent to which its internal firm level factors impact its potential for liquidity risk issues.

V. DISCUSSION ,CONCLUSION AND RECOMMENDATIONS

5.1 Capital Adequacy and Liquidity Risk

The study's first objective was to assess how capital adequacy affects the liquidity risk of deposit-taking microfinance (DTM) banks in Kenya. Correlation and regression analyses showed a positive but weak and statistically insignificant relationship. This suggests that higher capital adequacy may reduce available liquidity as funds shift from liquid deposits to less liquid capital, although this has minimal overall effect especially in larger DTM banks.These findings align with Kiio et al. (2023), who found a similar insignificant relationship, arguing that increased capital may push banks away from an optimal structure, raising liquidity risk. Nyaundi (2018) also noted that highly capitalized banks create more liquidity and risk, but reduce it during crises, suggesting capital requirements may not significantly affect liquidity creation.However, this contradicts Njeri (2019), who found that well-capitalized banks face less liquidity risk, and Setiawan and Muchtar (2021), who observed that the impact of capital adequacy varies by capitalization level. Leykun (2017) also reported a significant positive link. These conflicting findings challenge the capital buffer theory, which suggests greater capital increases risk-taking. Overall, the study suggests that the impact of capital adequacy on liquidity risk is nuanced and may depend on bank size, capitalization level, and economic conditions.

5.2 Moderating Effect of Bank Size

The study sought to determine the moderating effect of bank size on effect of firm level internal factors on liquidity risk as the fourth objective. The study found the interaction terms between bank size and the other independent variables produced no significant results, implying that the moderating effect of bank size on the correlations between leverage, NPLs, CAR, and liquidity risk was insignificant in this sample. The lack of significant moderating effects of bank size on the linkages between internal characteristics and liquidity risk in Kenyan deposit-taking microfinance banks calls for additional investigation.Such uniformity may be attributed to regulatory standardization, homogeneous market conditions, or sector-specific characteristics that transcend size differences.

5.3 Conclusion

This study examined the effect of capital adequacy on liquidity risk in Kenya's deposit-taking microfinance banks, while also assessing the moderating role of bank size. Findings from correlation and regression analyses revealed a positive but statistically insignificant relationship between capital adequacy and liquidity risk. As such, the study concludes that capital adequacy does not significantly influence liquidity risk, likely due to a mismatch between long-term capital and short-term liquidity needs. Similarly, leverage showed a positive but insignificant association with liquidity risk. Moderation regression analysis also indicated that bank size does not significantly affect the relationship between capital adequacy and liquidity risk. This implies that whether a microfinance bank is large or small, its size does not alter how capital adequacy impacts its liquidity risk exposure. These findings contribute to both theoretical understanding and practical risk management by suggesting that size-based regulatory distinctions may not be necessary in managing liquidity risk.

5.4 Recommendations

The study recommends that Kenyan deposit-taking microfinance banks and regulators reassess capital adequacy's role in liquidity risk management. Given the weak statistical significance, a broader framework incorporating other risk indicators is advised. Risk management should expand beyond non-performing loans to include cash flow forecasting, asset-liability management, and early warning systems. The absence of a significant moderating effect of bank size suggests uniform regulatory approaches may suffice, though further research is needed to confirm this. Future studies should explore other factors influencing bank performance, use primary or mixed data, and examine external influences like inflation, interest rates, GDP growth, and exchange rates.

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