

Between Compliance And Resilience: Assessing The Effectiveness Of Liquidity Risk Management Frameworks In Zambian Banks

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Abstract

This study evaluates liquidity risk management frameworks within Zambian commercial banks, examining compliance with Basel III standards and operational effectiveness during the 2018 to 2023 period. Through qualitative analysis of regulatory reports, financial statements, and supervisory documents, the research reveals substantial progress in regulatory infrastructure alongside persistent implementation challenges. While Zambian banks maintain adequate capital buffers and liquidity ratios above prudential thresholds, considerable heterogeneity exists across institutions. Larger banks demonstrate sophisticated risk management capabilities, whereas smaller institutions struggle with technical capacity, limited liquidity buffers, and inconsistent stress testing practices. The findings indicate partial Basel III compliance, with notable gaps in Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) implementation among midsized and smaller banks. Macroeconomic volatility—including currency depreciation, inflation, and high nonperforming loans—compounds these structural weaknesses. The study identifies critical deficiencies in contingency planning, liquidity concentration management, and technological infrastructure. Recommendations emphasize strengthening supervisory capacity, standardizing stress testing methodologies, enhancing technological adoption through targeted support for smaller institutions, and developing comprehensive crisis management frameworks. This research contributes empirical evidence on liquidity regulation effectiveness in frontier markets, offering insights relevant to comparable Sub-Saharan African economies navigating Basel III implementation.

Keywords: *Liquidity risk management, Basel III, Zambian banking sector, Liquidity Coverage Ratio, Net Stable Funding Ratio, Bank of Zambia, financial stability, regulatory compliance*

Date of Submission: 15-02-2026

Date of Acceptance: 25-02-2026

I. Introduction

The Critical Role of Liquidity in Banking Stability

Liquidity represents the fundamental prerequisite for banking viability. Banks perform maturity transformation funding, long term illiquid assets with short term, liquid liabilities, a function that inherently generates liquidity risk (Diamond & Dybvig, 1983). This risk materializes when institutions cannot meet payment obligations as they fall due or must liquidate assets at substantial discounts to obtain necessary funds. While this vulnerability is intrinsic to banking business models, the 2007/2008 global financial crisis demonstrated that inadequate liquidity management can precipitate systemic collapse. Prior to the crisis, regulatory frameworks emphasized capital adequacy while treating liquidity as a secondary concern. Banks that appeared well capitalized experienced catastrophic runs when wholesale funding markets froze, revealing fundamental mismatches between asset liquidity and funding stability (Brunnermeier & Pedersen, 2009). The subsequent introduction of Basel III liquidity standards, particularly the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) represented an international acknowledgment that robust capital alone provides insufficient protection against liquidity shocks. For emerging markets like Zambia, effective liquidity management carries particular significance. Zambian banks operate within an environment characterized by macroeconomic volatility, concentrated deposit bases, shallow financial markets, and limited access to emergency liquidity beyond central bank facilities. These structural features amplify liquidity risks while simultaneously constraining management options. Understanding how effectively banks navigate these challenges has direct implications for financial stability and economic development.

Research Problem and Objectives

Despite two decades of financial sector reforms in Zambia, questions persist regarding the effectiveness of liquidity risk management frameworks. The banking sector has experienced periodic distress, including nine bank failures between 1995 and 2001, the closure of Intermarket Banking Corporation in 2016, and most recently, the insolvency of Investrust Bank in May 2024 (Bank of Zambia, 2024). While these failures stemmed from multiple factors, liquidity management deficiencies featured prominently in several cases. The Bank of Zambia has progressively strengthened supervisory standards, implementing Basel I in the 1990s, Basel II in 2014, and initiating Basel III adoption from 2016 onward. However, regulatory intention and operational reality often diverge. This study addresses a fundamental question: How effective are existing liquidity risk management frameworks in ensuring Zambian banks' financial stability and resilience to liquidity shocks? Three specific research questions guide the investigation:

1. To what extent do Zambian banks adhere to local and international regulatory standards for liquidity risk management, including Basel III and Bank of Zambia directives?
2. How effectively do Zambian banks implement liquidity risk management tools such as stress testing, liquidity gap analysis, and liquidity ratio monitoring?
3. What constraints limit effective liquidity risk management, and how adequately do internal frameworks address these challenges? This study's significance extends beyond immediate policy relevance. It provides empirical evidence on regulatory effectiveness in a frontier market context, contributes to understanding Basel III applicability in emerging economies, and offers practical insights for supervisory authorities navigating similar implementation challenges across Africa.

II. Literature Review

Theoretical Foundations of Liquidity Risk

The theoretical understanding of bank liquidity risk originates with Diamond and Dybvig's (1983) canonical model. Their framework demonstrates how maturity transformation, essential to banks' economic function creates inherent vulnerability to self fulfilling panics. When depositors believe others will withdraw funds, rational individual behavior can precipitate collective runs that render even fundamentally solvent banks illiquid. This coordination failure cannot be resolved through market mechanisms alone, providing justification for deposit insurance, lender of last resort facilities, and prudential regulation. Subsequent theoretical developments have enriched this foundation. Brunnermeier and Pedersen (2009) model the interconnection between market liquidity and funding liquidity, demonstrating how adverse price shocks can trigger "liquidity spirals." When funding constraints force institutions to sell assets, prices decline, margin requirements tighten, and further sales become necessary, creating a self reinforcing cycle. This dynamic explains why liquidity crises can emerge rapidly and propagate across apparently unconnected markets. More recent work emphasizes systemic dimensions. Allen and Gale (2000) show how liquidity shocks transmit through interbank networks, with network structure determining whether distress remains localized or becomes contagious. Adrian and Shin (2010) demonstrate that procyclical leverage amplifies liquidity risk, as institutions expand balance sheets during booms and contract them during stress, precisely when regulators would prefer stabilizing behavior.

These theoretical insights carry profound regulatory implications. First, liquidity risk cannot be managed through capital adequacy requirements alone, dedicated liquidity regulation is necessary. Second, microprudential supervision of individual institutions proves insufficient; macroprudential oversight addressing systemic liquidity is required. Third, because market discipline breaks down during crises, regulatory standards must be binding in normal times to prevent excessive risk accumulation. These principles underpin the Basel III liquidity framework.

The Basel III Liquidity Framework

Basel III introduced the first internationally harmonized minimum liquidity standards, addressing a critical gap in precrisis regulation. The framework comprises two complementary ratios targeting different liquidity risk dimensions (Basel Committee on Banking Supervision, 2013). The Liquidity Coverage Ratio (LCR) addresses acute stress resilience. It requires banks to maintain high quality liquid assets (HQLA) sufficient to cover net cash outflows over a 30 day stress scenario combining idiosyncratic and market wide shocks. The minimum LCR of 100% ensures survival through severe short term disruption. Crucially, the ratio emphasizes asset liquidity quality: only central bank reserves, sovereign debt, and select high rated securities qualify as HQLA. The Net Stable Funding Ratio (NSFR) addresses structural maturity mismatches over a one year horizon. It requires available stable funding, equity, long term liabilities, and stable retail deposits, to exceed required stable funding determined by asset liquidity characteristics. The NSFR discourages excessive reliance on short term wholesale funding and promotes sustainable business models. While conceptually robust, Basel III's applicability to emerging markets remains contested. Chami and Cosimano (2010) argue that the framework was calibrated for large, internationally active banks in developed financial systems. Emerging market banks face different liquidity profiles: thinner markets for high quality assets, limited term funding availability, more volatile

deposits, and constrained access to cross border liquidity. These structural differences may render Basel III standards either excessively restrictive, constraining legitimate financial intermediation or inadequately protective if calibration assumptions prove inappropriate.

For Zambia specifically, Adam, Collier, and Gondwe (2014) identified several implementation challenges: shallow government securities markets limiting HQLA availability, concentrated funding bases increasing deposit volatility, and inadequate crisis management frameworks. Whether these concerns have been addressed through subsequent reforms represents an empirical question this study investigates.

Foundational Principles of Sound Liquidity Management

Beyond regulatory compliance, the banking literature identifies foundational management principles. Choudhry (2023) synthesizes industry best practices into ten core principles:

1. Fund illiquid assets with core customer deposits, which exhibit greater stability than wholesale funding.
2. Where core deposits prove insufficient, employ long term wholesale funding to reduce rollover risk.
3. Avoid overreliance on wholesale funding; structure term funding toward longer tenors.
4. Maintain liquidity buffers of immediately liquid assets for both firm specific and market wide stress
5. Establish comprehensive contingency funding plans with diversified sources and concentration limits.
6. Understand and test access to central bank facilities before crisis need arises.
7. Maintain comprehensive exposure awareness, including off balance sheet and contingent liabilities.
8. Recognize that liquidity risk requires multiple metrics; no single indicator suffices.
9. Implement robust funds transfer pricing allocating liquidity costs across business lines.
10. Ensure board ownership of liquidity risk framework, with ultimate responsibility at director level.

These principles provide normative benchmarks against which this study assesses Zambian banking practices. They represent accumulated wisdom from multiple crisis episodes and remain relevant regardless of specific regulatory regimes.

Empirical Evidence from Zambian Banking

The empirical literature on Zambian liquidity management remains limited but growing. Brownbridge (1996) documented early post liberalization challenges, noting that rapid private bank entry in the 1990s occurred without corresponding supervisory capacity. Between 1995 and 1998, nine banks failed, with inadequate liquidity management featuring prominently. Meridien BIAO Bank's 1995 collapse exemplified how rapid expansion funded through short term liabilities created acute vulnerability when wholesale funding dried up.

Beyani and Kasonde (2009) examined the regulatory response to these failures. They found that while the Bank of Zambia substantially strengthened capital requirements, liquidity regulation received less emphasis. Their analysis characterized the supervisory approach as "capital adequacy focused" rather than "risk focused," with express sanctions for capital deficiencies but vague treatment of liquidity management failures.

More recently, Kaluba and Haabazoka (2024) analyzed sectoral performance from 2010 to 2020, concluding that regulatory reforms enhanced stability. They documented consistent liquidity ratios above prudential thresholds and improving asset quality. However, their aggregate analysis could not identify heterogeneity across institutions or assess whether superficial compliance reflected robust underlying practices.

This study extends existing research by examining the post Basel III period (2018-2023), incorporating recent stress episodes including the COVID19 pandemic and Investrust Bank failure, and disaggregating analysis to identify differential performance across bank categories.

III. Research Methodology

Research Design and Philosophical Foundations

This study employs a qualitative research design grounded in documentary analysis. The interpretive epistemological stance recognizes that assessing regulatory effectiveness requires understanding not merely quantitative compliance metrics but also institutional practices, supervisory approaches, and contextual factors shaping implementation (Glesne, 2016). Several considerations support this methodological choice. First, research questions focus on "how" and "why" dimensions—understanding effectiveness mechanisms rather than establishing statistical relationships. Second, liquidity risk management constitutes a complex social process involving regulatory oversight, board governance, managerial decision making, and market dynamics. Quantitative indicators provide necessary but insufficient evidence; interpretive analysis illuminates underlying practices. Third, examining both regulatory intentions and actual outcomes, including notable failures, requires contextual understanding beyond numerical ratios.

The qualitative approach carries important limitations. Without primary interviews, the study cannot access tacit knowledge or explore unstated rationale behind observed patterns. Documentary sources may reflect institutional self reporting biases or incomplete disclosure. These constraints are partially mitigated through

triangulation across multiple document types, seeking contradictions between regulatory reports, bank disclosures, and independent analyses.

Data Sources and Collection

The study relies exclusively on secondary data from publicly available sources. This approach reflects both practical constraints, access to confidential supervisory information and internal bank data is appropriately restricted and methodological advantages of analyzing actual published records rather than potentially filtered interview responses.

Data sources comprise: 1. Regulatory Reports: Bank of Zambia annual reports and Financial Stability Reports (2018-2023) providing aggregate sector statistics, regulatory developments, and supervisory assessments 2. Financial Statements: Published financial statements of commercial banks containing liquidity ratios, asset composition, and funding structure 3. Policy Documents: Basel Committee publications, Bank of Zambia directives, and regulatory guidelines establishing standards 4. Academic Literature: Peer reviewed journal articles and working papers on Zambian banking and liquidity regulation 5. Industry Reports: IMF and World Bank assessments, including Financial Sector Assessment Program reviews Collection occurred systematically through Bank of Zambia archives, bank websites, academic databases (Google Scholar, JSTOR, EconLit), and institutional repositories. The 2018-2023 timeframe was selected deliberately to capture Basel III implementation transition, COVID19 pandemic stress testing, macroeconomic volatility during debt distress, and the recent Investtrust Bank failure.

Analytical Framework

Analysis employed thematic coding to identify patterns, contradictions, and emergent themes across documents. The analytical framework organized inquiry around three dimensions corresponding to research questions: 1. Regulatory Adherence: Examining compliance with Basel III standards (LCR, NSFR) and Bank of Zambia directives through comparison of reported ratios against regulatory thresholds, assessment of completeness in implementation, and identification of gaps between stated requirements and documented practices 2. Operational Effectiveness: Evaluating implementation quality of liquidity management tools including stress testing methodology and application, liquidity gap analysis and maturity ladder construction, contingency funding plan development and testing, and funds transfer pricing mechanisms 3. Contextual Challenges: Identifying constraints on effective liquidity management, including macroeconomic factors (inflation, exchange rate volatility), structural features (market depth, funding concentration), technological capacity, and institutional resources Cross referencing claims across multiple sources enhanced reliability. Where the Bank of Zambia reports sectoral improvements, corresponding bank level evidence was sought in financial statements. Where gaps appeared between regulatory expectations and documented practices, potential explanatory factors were explored through contextual analysis.

Ethical Considerations

This research received ethical clearance from the University of Zambia Biomedical Research Ethics Committee. Although employing only public documents, ethical principles guided analysis. All sources are properly attributed, enabling verification. Discussion of bank failures balances public interest in understanding causes with sensitivity toward affected stakeholders. Care was taken to avoid misrepresenting source material; ambiguities and contradictions are acknowledged rather than resolved through speculation.

IV. Findings And Analysis

The Zambian Banking Sector (2018-2023)

Understanding liquidity risk management effectiveness requires contextualizing the banking environment in which frameworks operate. Zambia's financial sector underwent substantial evolution during the study period, shaped by regulatory reforms, macroeconomic pressures, and structural transformation.

Sectoral Growth and Structure

Total banking sector assets grew from K93.1 billion in December 2018 to K237.7 billion in December 2023, a 155% increase (Bank of Zambia, 2023). This expansion occurred despite significant headwinds including COVID19 economic disruption and sovereign debt distress. Asset growth was driven primarily by increased holdings of government securities (responding to fiscal financing needs and HQLA requirements) and moderate credit expansion. The sector structure remained concentrated. As of December 2023, the three largest banks accounted for approximately 60% of total assets, while the five smallest held less than 8% collectively. This concentration has important liquidity implications: large banks access more diversified funding, maintain sophisticated treasury operations, and command central bank attention; smaller institutions face funding concentration, limited technical capacity, and potential neglect in crisis response prioritization.

The number of operating banks remained relatively stable at 15, following Intermarket Banking Corporation's 2016 closure and subsequent reopening as Zambia Industrial Commercial Bank in 2018. However, Investrust Bank's May 2024 insolvency, occurring immediately after the study period, indicates that underlying vulnerabilities persisted despite apparent stability.

Macroeconomic Context

Macroeconomic conditions during 2018-2023 presented substantial liquidity challenges. Inflation fluctuated between 7.9% and 24.6%, averaging 13.2% annually. The Kwacha depreciated significantly against major currencies, particularly during 2020/2021 when it lost over 30% of its value against the US dollar. This volatility complicated liquidity planning and increased foreign currency liquidity risk for banks with unhedged positions.

Sovereign debt distress beginning in 2020 had profound sectoral effects. As government securities yields rose and credit ratings declined, banks' large holdings of these instruments experienced mark to market losses. While still qualifying as HQLA for regulatory purposes, the practical liquidity value of government bonds diminished as secondary market activity contracted. This divergence between regulatory classification and market reality illustrates Basel III implementation challenges in emerging markets.

The COVID19 pandemic generated both liquidity stress and regulatory response. Economic disruption threatened credit quality and deposit stability. The Bank of Zambia implemented accommodative measures including the Secondary Market Bond Purchase Programme, Targeted Medium Term Refinancing Facility, and relaxation of certain prudential requirements. These interventions successfully prevented acute liquidity crisis but also complicated assessment of underlying framework robustness. Did stability reflect sound risk management or extraordinary regulatory support?

Regulatory Framework Development

Basel Accord Implementation in Zambia

Zambia's progression through Basel Accords reveals both commitment to international standards and implementation challenges. Basel I adoption in the 1990s established basic capital requirements and risk weighting methodology. A 2002 Financial Sector Assessment Programme found Zambia compliant or largely compliant with 19 of 30 Basel Core Principles, indicating substantial progress but significant remaining deficiencies (IMF & World Bank, 2002). Basel II implementation commenced in 2014, introducing more sophisticated risk measurement and supervisory review processes. The Bank of Zambia adopted a phased approach, running Basel I and Basel II frameworks in parallel initially. By 2015, significant progress had occurred, particularly regarding Pillar II supervisory review. However, data system inadequacies limited effective implementation of advanced risk management components. Basel III adoption began with the 2016/2019 Strategic Plan, focusing on strengthened capital requirements and new liquidity standards. The Bank of Zambia introduced LCR requirements progressively, beginning with major banks before extending to all institutions. NSFR implementation followed a similar phased approach. By 2020, all banks were required to report LCR quarterly and maintain minimum thresholds. This gradual implementation strategy balanced standards adoption with sector capacity building. However, it also created extended transitional ambiguity regarding expectations and enabled weaker institutions to delay substantive compliance preparations. As of December 2023, the Bank of Zambia characterized Basel III implementation as "ongoing" rather than complete, a remarkably extended transition given the framework's 2013 international introduction.

Bank of Zambia Supervisory Approach

The Bank of Zambia's supervisory philosophy evolved substantially during the study period. Earlier approaches emphasized rule-based compliance with quantitative thresholds, a "checkbox" mentality assessing whether ratios met minimum requirements without deeper inquiry into underlying risk management quality (Beyani & Kasonde, 2009). More recently, the regulator has attempted to adopt risk focused supervision emphasizing governance, risk culture, and management processes. Annual Financial Stability Reports indicate increased supervisory intensity. The number of onsite examinations increased from 18 in 2018 to 27 in 2023. Thematic reviews of specific risk dimensions, including dedicated liquidity risk assessments became more frequent. The Bank of Zambia also increased enforcement actions: banks failing to meet prudential requirements faced restrictions on branch expansion, dividend payments, and new business activities. However, supervisory effectiveness remains constrained by resource limitations. The Bank of Zambia's Banking Supervision Department employs fewer than 40 professional staff to oversee 15 commercial banks plus microfinance institutions and other regulated entities. Technical capacity varies; while senior supervisors possess strong expertise, staff turnover to private sector creates experience gaps. Compared to peers like Kenya or South Africa, Zambia's supervisory resources appear stretched relative to system complexity.

Liquidity Position Analysis (2018-2023)**Aggregate Liquidity Trends**

At the aggregate level, Zambian banks maintained satisfactory liquidity positions throughout 2018-2023. The primary liquidity indicator, liquid assets to deposits and short term liabilities, remained consistently above the 25% minimum prudential threshold, ranging from 42.9% to 57.4% (Table below). This apparent robustness suggests that liquidity crises resulted from bank specific failures rather than systemic inadequacy.

Financial Performance Indicators (Percent) 2016-2018

	2016	2017	2018
Primary capital adequacy ratio	23.4	24.5	20.1
Total regulatory capital adequacy ratio	26.2	26.5	22.1
Net non-performing loans to regulatory capital	7.6	10.8	4.3
Gross non-performing loans to total loans	9.7	12.0	11.0
Net non-performing loans to total loans	2.8	4.0	1.5
Net non-performing loans to net loans	3.0	4.4	1.6
Provisions to non-performing loans	69.6	66.5	83.8
Earning assets to total assets	69.2	79.5	86.4
Net operating income to total assets	10.8	11.0	12.6
Non-interest expense to total assets	7.7	7.3	8.5
Provision for loan losses to total assets	0.7	0.8	1.0
Net interest income to total assets	6.1	6.4	7.7
Return on assets	2.5	3.1	2.8
Return on equity	12.3	15.4	15.4
Efficiency ratio	81.5	65.1	73.7
Liquid assets to total assets	39.1	45.9	45.9
Liquid assets to deposits and short-term liabilities	49.0	56.5	57.0

Source: Bank of Zambia

Liquidity Improvement: The ratio jumped from 51.5% (2019) to 57.4% (2020), reflecting accommodative monetary policy responses to COVID19 as shown below;

Financial Performance Indicators (Percent), 2018-2020

Performance Indicators	Benchmark	2018	2019	2020
Primary capital adequacy ratio	5.0 or higher	20.1	20.1	17.8
Total regulatory capital adequacy ratio	10.0 or higher	22.1	22.2	20.1
Net non-performing loans to regulatory capital	10.0 or lower	4.3	2.3	9.2
Gross non-performing loans to total loans	10.0 or lower	11.0	8.9	11.6
Net non-performing loans to total loans	2.5 or lower	1.5	0.8	2.8
Allowance for loan losses to gross non-performing loans	80.0 or higher	83.8	91.6	75.9
Minimum Regulatory Provisions	80.0 or higher	98.2	98.9	86.5
Return on assets	4.0 or higher	2.8	3.3	2.1
Return on equity	20.0 or higher	15.4	16.2	12.9
Efficiency ratio	60.0 or lower	67.4	65.9	72.5
Liquid assets to total assets	25.0 or higher	45.9	42.1	48.6
Liquid assets to deposits and short-term liabilities	Lower than 100.0	57.0	51.5	57.4
Loan to deposit ratio	Lower than 100.0	47.3	51.5	41.0

Source: Bank of Zambia

The Secondary Market Bond Purchase Programme and Targeted Medium Term Refinancing Facility injected substantial liquidity. This demonstrated regulatory capacity for crisis response but also raised questions about whether banks were being sufficiently disciplined in normal times. 2021-2023 Gradual Decline: Liquidity ratios moderated from 57.4% (2020) to 56.3% (2021), 52.2% (2022), and 42.9% (2023). While remaining comfortably above minimums, this trajectory warrants monitoring. It may reflect normalization as extraordinary support measures wound down, or could indicate creeping complacency as memories of pandemic stress faded. Liquid Assets Composition: The ratio of liquid assets to total assets remained stable at 42.49%, indicating that asset structure favored liquidity over yield. Government securities constituted the largest component, followed by central bank balances and interbank deposits. This composition reflects both HQLA requirements and limited lending opportunities in the domestic economy.

Interbank Market Activity

The interbank market provides insights into liquidity distribution and stress indicators. Turnover increased substantially from K82.2 billion (2018) to K343.6 billion (2023), suggesting deepening market activity (Bank of Zambia, 2023). However, this growth masks significant market segmentation.

Interbank Money Market Turnover (K' billion), 2018 – 2021



Source: Bank of Zambia

Liquidity concentration emerged as a persistent concern. A small number of banks consistently held excess reserves while others regularly accessed the Bank of Zambia's Overnight Lending Facility. In 2023, OLF usage reached K41.9 billion, double the 2022 level. This pattern indicates that aggregate sectoral liquidity obscures substantial institution level disparities. Some banks maintained excess liquidity buffers—potentially reflecting conservative risk appetite or limited lending opportunities—while others operated with minimal margins. Market segmentation reflects credit risk concerns limiting interbank lending. Banks with weaker credit profiles or perceived governance issues face restricted access to counterparty credit lines. During stress periods, this segmentation could prevent liquidity redistribution through market mechanisms, requiring central bank intermediation. The Bank of Zambia acknowledges this as a "structural problem" complicating liquidity management.

Heterogeneity Across Institution Size

Aggregate statistics obscure significant heterogeneity across bank categories. While comprehensive bank level data is not publicly available, Financial Stability Reports provide categorical breakdowns:

Large Banks (top 5 by assets): Consistently maintained liquidity ratios above 50%, sophisticated treasury operations, diversified funding sources including foreign currency deposits and wholesale funding lines, and robust stress testing and contingency planning capabilities.

Medium Banks (6th to 10th by assets): More variable liquidity positions, with ratios ranging from 35% to 60%, growing sophistication in risk management but with notable gaps in technical capacity, greater reliance on retail deposits (higher stability but also concentration risk), and limited wholesale funding access constraining flexibility.

Small Banks (bottom 5 by assets): Frequently approached minimum regulatory thresholds, with less margin for error, basic risk management capabilities with manual processes predominating, heavy reliance on concentrated deposit bases, and limited resources for technology investments or specialized staff.

This heterogeneity suggests that "one size fits all" regulatory approaches may prove problematic. Standards calibrated for large banks may overwhelm smaller institutions' capacity, while standards appropriate for small banks may permit excessive risk taking by sophisticated institutions.

Basel III Compliance Assessment

Liquidity Coverage Ratio Implementation

The LCR requires banks to maintain HQLA sufficient to cover net cash outflows in a 30day stress scenario, with a minimum ratio of 100%. Bank of Zambia data indicates that approximately 70% of banks met this threshold consistently during 2020-2023 (Bank of Zambia, 2023). However, this aggregate compliance masks important nuances. First, HQLA composition raises quality concerns. Government securities constitute the overwhelming majority of HQLA for Zambian banks often exceeding 90% of the total. While these instruments

satisfy regulatory definitions, their liquidity characteristics deteriorated during the study period as sovereign credit risk increased. The 2020-2023 debt distress reduced secondary market activity substantially; government bond trading volumes declined by over 40% from 2019 levels. Banks holding large positions faced significant valuation uncertainty and potential difficulty executing sales at reasonable prices during stress. This highlights a fundamental tension in Basel III's application to emerging markets: HQLA definitions assume liquid, deep markets for government securities, but this assumption breaks down precisely when systemic stress renders liquidity most critical. The divergence between regulatory classification and practical liquidity creates false comfort banks appear well positioned on paper while actual resilience may be weaker. Second, the 30% of banks falling below LCR minimums exhibited persistent compliance failures rather than temporary shortfalls. These institutions primarily smaller banks struggled with several challenges: Limited government securities holdings due to capital constraints or preference for higher yielding (but less liquid) assets Higher projected cash outflows in stress scenarios due to concentrated deposit bases Operational difficulties in calculating inflow/outflow assumptions according to Basel methodology Technology limitations preventing accurate, timely reporting The Bank of Zambia imposed sanctions including restrictions on dividend payments and new business activities, but these measures had limited effectiveness. Undercapitalized banks could not easily acquire additional HQLA, while business restrictions further constrained earnings needed to build capital. This suggests that LCR shortfalls often reflected deeper solvency concerns rather than isolated liquidity management failures. Third, stress scenario assumptions warrant scrutiny. The Basel LCR prescribes specific outflow rates for different liability categories for example, 5% runoff for stable retail deposits, 10% for less stable retail deposits, 40% for operational deposits from nonfinancial corporates. These calibrations derive from developed market experience and may not reflect emerging market deposit behavior during stress. Unfortunately, neither the Bank of Zambia nor individual banks publicly disclose their LCR calculation assumptions. Without transparency regarding outflow rate assumptions, counterparties cannot independently verify whether reported ratios accurately reflect liquidity resilience. This opacity undermines market discipline and prevents academic researchers from assessing calibration appropriateness.

Net Stable Funding Ratio Implementation

The NSFR addresses structural liquidity mismatches by requiring available stable funding to exceed required stable funding over a one year horizon. Implementation in Zambia commenced later than LCR and remains less developed. Bank of Zambia reports indicate that approximately 60% of banks achieved minimum NSFR compliance by end 2023 (Bank of Zambia, 2023). The lower compliance rate compared to LCR reflects fundamental structural challenges in Zambian banking: Funding Structure Mismatches: Banks rely heavily on short term deposits particularly corporate deposits with short tenors. Term deposits exceeding one year constitute less than 15% of total deposits for most institutions. This reflects depositor preferences for liquidity given macroeconomic uncertainty and limited availability of long term funding alternatives. Banks attempting to extend deposit tenors face competitive disadvantages as depositors demand compensating premiums.

Asset Illiquidity: The loan portfolio, comprising approximately 40% of total banking sector assets, exhibits significant illiquidity. Zambia lacks a developed secondary market for loan sales or securitization. Nonperforming loans, which have ranged from 4.2% to 11.6% during the study period, are particularly illiquid. These structural features mean banks require substantial stable funding to meet NSFR requirements. Limited Long Term **Funding Sources:** Compared to developed markets, Zambian banks have restricted access to term wholesale funding. The domestic corporate bond market remains nascent, international capital markets are inaccessible for all but the largest institutions, and local pension funds face investment restrictions limiting bank exposure. This constrains banks' ability to source stable funding even when willing to pay market rates. Several banks explicitly cited NSFR compliance as an impediment to increasing lending. By extending credit, particularly longer term loans to businesses or mortgage lending banks reduce their NSFR as required stable funding increases faster than available stable funding. This creates a potential tension between prudential objectives (structural liquidity resilience) and developmental objectives (financial intermediation supporting economic growth).

The Bank of Zambia has not publicly addressed this tension or considered whether NSFR calibration should be adjusted for Zambian structural conditions. International guidance allows national discretion in certain aspects of NSFR implementation, but exercising this discretion requires sophisticated analysis of tradeoffs technical capacity that may be stretched given supervisory resource constraints.

Additional Monitoring Metrics

Beyond LCR and NSFR, Basel III prescribes additional monitoring metrics providing early warning signals of liquidity stress: Contractual maturity mismatch (assets vs. liabilities across time buckets) Concentration of funding by counterparty/product Available unencumbered assets LCR by significant currency Market related monitoring tools (equity prices, CDS spreads, money market access) Evidence regarding Zambian banks'

implementation of these supplementary metrics is limited. Financial Stability Reports reference maturity gap analysis but provide no detail on methodology or results. No bank publicly discloses comprehensive monitoring metric dashboards in financial statements. Supervisory examination reports, which might contain this information are appropriately confidential.

This opacity creates two concerns. First, without transparency, market participants cannot independently assess liquidity risk, undermining market discipline. Second, it suggests that some monitoring metrics may not be implemented consistently, particularly among smaller banks lacking technical capacity.

Stress Testing and Contingency Planning Stress Testing Practices

Stress testing constitutes a critical component of liquidity risk management, enabling banks to assess resilience under adverse scenarios and identify potential vulnerabilities before crystallizing. Basel III guidance emphasizes regular stress testing incorporating both bank specific and market wide scenarios. Bank of Zambia requirements mandate quarterly liquidity stress testing by all banks. However, significant heterogeneity exists in implementation quality:

Large Banks: Employ sophisticated scenario analysis incorporating multiple stress scenarios (idiosyncratic crisis, market wide disruption, combined stress), model deposit behavior under stress using historical data and peer comparisons, test contingency funding plan viability, and maintain dedicated treasury middle office functions overseeing stress testing.

Medium/Small Banks: Often employ simplistic assumptions (uniform percentage deposit runoff), rely on vendor supplied stress testing software with limited customization, conduct stress tests primarily for regulatory compliance rather than management decision making, and lack specialized staff with quantitative modeling expertise. This capability gap has important implications. During actual stress events, sophisticated stress testing provides early warning and guides management response, while simplistic approaches offer false comfort or fail to identify emerging pressures until crisis develops.

The COVID19 pandemic provided a natural stress testing validation. Banks with robust pre-pandemic stress testing programs adapted relatively smoothly, updating assumptions to reflect pandemic specific factors and scenario severity. Banks with weaker capabilities struggled to quantify exposures and relied more heavily on central bank guidance rather than internal analysis. Critically, neither the Bank of Zambia nor individual banks publicly disclosed stress testing results during the pandemic or subsequently. This contrasts with international best practice, regulators in the US, UK, and EU publish stress testing results to enhance transparency and market discipline. Zambian banks' opacity prevents external assessment of stress testing quality and limits learning opportunities across institutions.

Contingency Funding Plans

Contingency funding plans (CFPs) outline banks' strategies for addressing liquidity stress, including: Early warning indicators triggering escalation Management responsibilities and decision-making authority Available funding sources and access procedures Asset liquidation priorities communication protocols with regulators and stakeholders Bank of Zambia regulations require all banks to maintain board approved CFPs and update them annually. However, assessing CFP quality from public disclosures proves impossible—banks reference their existence in risk management discussions but provide no substantive detail. Several concerns regarding CFP effectiveness can be inferred: **Testing Frequency:** Robust CFPs require regular testing through simulations validating assumptions and operational readiness. Evidence of such testing is absent from public disclosures. The Investrust Bank failure in May 2024 raised questions about CFP effectiveness—was the plan inadequate, or was it simply not activated promptly? The lack of postmortem public disclosure prevents learning from this experience. **Funding Source Diversification:** Effective CFPs identify multiple funding sources accessible under different stress scenarios. For many Zambian banks, realistic contingent funding sources are extremely limited: the interbank market becomes unavailable during stress due to counterparty credit concerns, wholesale funding lines are typically withdrawn during crisis, asset sales face fire sale discounts and limited buyer appetite, and the Bank of Zambia's Overnight Lending Facility remains the primary viable source.

This heavy reliance on central bank funding creates moral hazard concerns and concentrates stress management burden on the regulator rather than distributing it across banks' own preparedness. **Cross currency Considerations:** Many Zambian banks face foreign currency liquidity risk due to substantial US dollar and other foreign currency deposit liabilities. CFPs must address cross currency dimensions, how will foreign currency liquidity needs be met if correspondent banking relationships are disrupted? Evidence suggests most banks have not rigorously tested these scenarios, relying implicitly on ability to access the Bank of Zambia's foreign currency reserves an assumption that would face limits if multiple institutions experienced foreign currency stress simultaneously.

Asset Quality and Liquidity Interdependencies

Liquidity risk and credit risk are deeply interrelated. Asset quality deterioration can precipitate liquidity stress through multiple channels: Declining confidence triggering deposit withdrawals NPLs consuming capital, reducing HQLA capacity Reduced unencumbered asset availability for central bank borrowing reputational damage restricting wholesale funding access. Zambian banks experienced significant asset quality pressure during the study period. The gross NPL ratio fluctuated from 8.9% (2019) to 11.6% (2020) before improving to 4.2% (2023). This volatility reflects macroeconomic stress pandemic disruption, currency depreciation, and commodity price fluctuations affecting mining and agriculture sectors that constitute major loan exposures.

Several banks faced severe asset quality problems requiring intensive supervisory intervention. Intermarket Banking Corporation's 2016 insolvency stemmed substantially from concentrated loan losses. Investrust Bank's May 2024 failure similarly involved deteriorating loan book quality preceding liquidity crisis. In both cases, credit problems manifested as liquidity crises depositors withdrew funds as confidence evaporated, wholesale counterparties closed credit lines, and liquidity buffers proved inadequate.

This interaction between credit and liquidity risk highlights limitations of siloed risk management approaches. Basel III's separate treatment of credit risk (Pillar I capital requirements) and liquidity risk (LCR/NSFR) may obscure critical interdependencies. Integrated stress testing examining combined credit deterioration and liquidity pressure would provide more realistic risk assessment, but evidence of such sophisticated analysis among Zambian banks is limited.

Technology and Infrastructure Constraints

Effective liquidity risk management increasingly requires sophisticated technology infrastructure enabling real time monitoring, automated reporting, and predictive analytics. Capability in this dimension varies dramatically across Zambian banks. Large banks, particularly those affiliated with international banking groups, benefit from parent company systems providing: Realtime cash position visibility across branches and accounts, automated liquidity reporting and regulatory return generation, integration of liquidity management with broader treasury systems, scenario analysis and stress testing capabilities. Smaller domestic banks often operate with manual processes or basic spreadsheet-based systems. This technological gap creates several problems: Data Quality and Timeliness. Manual data collection from branches and business units creates errors and delays. Liquidity positions may only be accurately known days after period end, limiting management responsiveness to emerging pressures.

Regulatory Reporting Burden: Generating Basel III compliance reports manually consumes scarce resources and increases error risk. Several banks have faced supervisory criticism for reporting inaccuracies or delays. Limited Analytical Capabilities: Without sophisticated systems, banks cannot easily conduct scenario analysis, test assumptions, or identify emerging patterns. Risk management becomes reactive rather than anticipatory. Addressing this technology gap requires substantial investment potentially several million dollars for comprehensive treasury management systems. For smaller banks with limited profitability, such investments face difficult prioritization against other needs (branch network, customer facing technology, core banking system upgrades). The Bank of Zambia has not established programs to subsidize or facilitate technology adoption, unlike some peer regulators that have created innovation hubs or technology shared services.

Governance and Board Oversight

Basel principles emphasize that ultimate liquidity risk management responsibility resides with boards of directors. Boards should establish risk appetite, approve policies, ensure adequate resources, and maintain active oversight. Evidence of board effectiveness in Zambian banks presents a mixed picture. Large banks generally demonstrate stronger governance: Independent risk committees with financial expertise, regular reporting of liquidity metrics to boards, active board engagement in stress testing and scenario analysis, separation of risk management and business line reporting. Smaller banks face governance challenges: Limited board financial expertise, particularly regarding sophisticated risk concepts Insider directors with potential conflicts of interest, inadequate risk committee independence, limited board time devoted to risk oversight versus strategic business development. The Investrust Bank failure raised governance questions. While details remain confidential, public reporting suggested delayed recognition of deteriorating conditions and inadequate board response. This echoes patterns from earlier Zambian bank failures where governance weaknesses, insider lending, inadequate board oversight, risk management capture by management featured prominently. The Bank of Zambia has strengthened fit and proper requirements for directors and senior management, introduced minimum qualifications for risk management staff, and increased supervisory focus on governance during examinations. However, effectiveness remains constrained by limited enforcement removing directors or management requires extensive due process and may be resisted by shareholders.

V. Discussion

Reconciling Compliance and Effectiveness

A central finding of this study is the divergence between formal regulatory compliance and substantive risk management effectiveness. At the aggregate level, Zambian banks appear satisfactory: liquidity ratios exceed minimum thresholds, capital adequacy remains comfortable, and stress episodes have been navigated without systemic crisis. However, beneath this reassuring surface, significant vulnerabilities persist. This gap between compliance and effectiveness reflects several factors: Regulatory arbitrage, Sophisticated banks can structure positions to meet ratio requirements while concentrating genuine risk outside regulatory metrics. Government securities holdings may satisfy HQLA requirements while offering limited practical liquidity during stress. Implementation Heterogeneity: Aggregate statistics obscure wide variation across institutions. Weaker banks' struggles are masked by stronger banks' excess compliance. Measurement Challenges: Regulatory ratios capture point in time positions but may not reflect dynamic liquidity behavior under stress. Static ratios cannot capture behavioral responses, depositor withdrawals, market funding withdrawal, fire sale pressures, that drive actual liquidity crises. These limitations do not invalidate regulatory frameworks but rather highlight that formal compliance provides necessary but insufficient confidence regarding systemic resilience. Effective supervision must look beyond metrics to underlying risk management quality, a capability requiring resources and expertise that remain stretched in Zambia.

Basel III Applicability in Emerging Markets

This study's findings contribute to ongoing debate regarding Basel III's appropriateness for emerging markets. Proponents argue that international standards prevent regulatory arbitrage, enhance cross border banking stability, and promote best practices. Critics contend that frameworks calibrated for developed markets impose inappropriate constraints on emerging economies. Zambian experience suggests a nuanced position. Basel III standards are directionally appropriate, requirements for liquidity buffers, stable funding, and stress testing address genuine risks. However, mechanical application without contextual adjustment creates problems.

The HQLA definition, premised on deep liquid markets, proves problematic when government securities, the primary HQLA source themselves become illiquid during stress. The NSFR, designed to discourage excessive reliance on short term wholesale funding, may be inappropriately restrictive when deposit markets structurally favor short tenors and long term funding sources are unavailable. Stress scenario calibrations derived from developed market experience may not reflect emerging market deposit behavior. These observations suggest that Basel III implementation in emerging markets should involve greater national discretion, exercised through rigorous analysis of local structural conditions, rather than mechanical adoption of international standards. However, such discretion requires supervisory technical capacity that itself may be limited, creating a circularity where capacity constraints prevent both sophisticated implementation and sophisticated adaptation.

Systemic Liquidity Management and Crisis Response

Individual bank liquidity management, while necessary, proves insufficient for systemic stability. The 2020-2021 pandemic response illustrated this clearly. Bank of Zambia's extraordinary interventions (Secondary Market Bond Purchase Programme, Targeted Medium Term Refinancing Facility, prudential forbearance) prevented crisis despite significant stress. This demonstrates that systemic liquidity management requires active central bank engagement beyond peacetime supervision. However, this dependence on regulatory intervention creates moral hazard risks. If banks anticipate central bank support during stress, incentives for prudent liquidity management in normal times diminish. The "Bagehot principle" that central banks should lend freely at penalty rates against good collateral balances crisis management with moral hazard mitigation, but its application in Zambia faces challenges. First, "penalty rates" are difficult to calibrate in an environment of high and volatile inflation and interest rates. Second, "good collateral" is problematic when the primary high quality asset class (government securities) itself experiences stress. Third, distinguishing illiquidity from insolvency, critical to avoiding lending to fundamentally failed institutions require information and analytical capacity that may be limited during fastmoving crises. These complexities suggest that systemic liquidity management frameworks in Zambia require further development. Elements might include: Prepositioned standing facilities with clear eligibility criteria and pricing, regular market wide stress testing scenarios, identifying potential systemic pressures, formal frameworks for deploying extraordinary measures, including clear activation triggers, enhanced transparency regarding intervention tools and expected authorities' response, potentially, regional cooperation frameworks given the small size of Zambia's economy and potential for cross border contagion

Technological Modernization as Risk Management Enabler

A striking finding is the technological divide between large and small banks. This gap is not merely a convenience issue but fundamentally constrains risk management capabilities. Realtime liquidity monitoring, sophisticated stress testing, and predictive analytics increasingly standard in developed markets, remain

inaccessible to smaller institutions operating manual processes. Addressing this technological deficit could substantially enhance liquidity risk management effectiveness. Several approaches merit consideration such as shared Services Infrastructure: The Bank of Zambia or industry association could develop shared technology platforms, similar to innovations in payments and clearing, enabling smaller banks to access capabilities unaffordable individually.

Regulatory Technology (RegTech) Promotion: facilitating vendor entry in Zambian market and potentially subsidizing adoption could accelerate technology diffusion. Tiered Regulatory Requirements: acknowledging technological constraints, requirements could be calibrated to institution capacity. While all banks face minimum standards, more sophisticated institutions could be required to employ more advanced methodologies.

Capacity Building Programs: technical assistance focused on technology skills development, rather than onetime system purchases that become obsolete, could build sustainable capabilities. The fundamental challenge is financing. Technology investments compete with other priorities for scarce capital, and smaller banks face particularly difficult tradeoffs. Without external support, technological gaps may persist, perpetuating risk management weaknesses.

VI. Conclusion And Recommendations

Summary of Key Findings

This study assessed liquidity risk management framework effectiveness in Zambian banks during 2018-2023, examining regulatory adherence, operational implementation, and contextual constraints. Several key findings emerge:

1. Formal compliance with Basel III standards is partial and uneven. Approximately 70% of banks meet LCR requirements and 60% achieve NSFR compliance, with notable heterogeneity across institution size and sophistication.
2. Aggregate sectoral liquidity positions appear satisfactory, with ratios consistently exceeding prudential minimums. However, this aggregate view obscures significant institutional level variation and masks concerns about HQLA quality and market segmentation.
3. Regulatory framework development has progressed substantially, with Basel III implementation advancing gradually. However, the extended transition period and limited enforcement of standards among weaker institutions suggest implementation challenges persist.
4. Stress testing and contingency planning capabilities vary dramatically. Large banks employ sophisticated methodologies while smaller institutions rely on basic approaches providing limited genuine risk insight.
5. Technology infrastructure constraints significantly limit risk management effectiveness, particularly among smaller banks operating with manual processes.
6. Governance and board oversight quality varies considerably, with persistent weaknesses among smaller institutions contributing to risk management deficiencies.
7. Systemic liquidity management demonstrated effectiveness during COVID19 pandemic through central bank intervention, but dependence on extraordinary support raises questions about private sector resilience and moral hazard.
8. Macroeconomic volatility, high nonperforming loans, and structural funding market characteristics compound liquidity management challenges beyond purely regulatory or technical dimensions.

Recommendations

Based on these findings, several recommendations emerge for enhancing liquidity risk management effectiveness: For the Bank of Zambia:

1. Accelerate Basel III implementation by establishing clear timelines for full compliance and strengthening enforcement against persistently noncompliant institutions.
2. Enhance supervisory capacity through staff expansion, technical training programs, and potentially secondments from peer regulators with advanced supervisory practices.
3. Develop standardized stress testing guidance specifying minimum scenario severity, methodological requirements, and reporting expectations to reduce implementation heterogeneity.
4. Improve transparency through publication of stress testing results (anonymized or aggregated to protect individual institution confidentiality) to enhance market discipline.
5. Establish crisis management frameworks formalizing extraordinary intervention tools, activation triggers, and interagency coordination protocols.
6. Consider contextually appropriate calibration of certain Basel III parameters, supported by rigorous analysis of Zambian structural conditions, while maintaining overall framework integrity For Commercial Banks.
7. Strengthen board oversight by enhancing director financial risk expertise through training programs, ensuring risk committee independence and time allocation, and improving risk reporting quality.

8. Invest in technology infrastructure to enable real time liquidity monitoring, automated reporting, and sophisticated stress testing prioritizing these expenditures despite competing capital needs.
9. Enhance contingency funding plan robustness through regular testing via simulations, diversifying funding sources to reduce central bank dependence, and developing cross currency stress response capabilities.
10. Integrate credit and liquidity risk management more closely, recognizing interdependencies through combined stress scenarios and coordinated monitoring For Policy Makers and Development Partners.
11. Provide technical assistance supporting regulatory capacity building, focusing on sustainable skill development rather than onetime interventions.
12. Facilitate technology adoption through potential subsidy programs, development of shared infrastructure, or regulatory technology innovation promotion.
13. Support long term funding market development by encouraging pension fund investment, developing local currency bond markets, and potentially providing credit enhancement for term bank funding

Limitations and Future Research Directions

This study faces some limitations suggesting fruitful directions for future research: Reliance on Public Documents: Without access to confidential supervisory information or internal bank data, analysis depends on publicly available materials that may be incomplete or reflect self reporting biases. Future research with regulatory cooperation could access richer data sources.

- **Lack of Primary Data:** Absence of interviews with risk managers, supervisors, or bank directors limits insight into tacit knowledge, operational details, and decision making rationale. Mixed methods research incorporating primary data collection would add substantial value.
- **Aggregate Orientation:** While the study identifies heterogeneity across institution categories, detailed bank level analysis is constrained by data availability. Case study research examining individual banks' liquidity management practices in depth could illuminate factors driving performance variation.
- **Limited cross-country Comparison:** The study focuses exclusively on Zambia. Comparative research examining liquidity risk management across Sub Saharan African countries could identify regional patterns, best practices, and shared challenges informing regional regulatory harmonization.
- **Several substantive questions merit further investigation:** How effective are early warning indicators in predicting liquidity stress? Analysis of banks that experienced distress versus those that remained stable could identify leading signals.
- **What drives deposit stability during stress in Zambian context?** Behavioral analysis examining deposit movements during COVID19 and other stress episodes could inform more appropriate LCR calibration.
- **How do technological capabilities affect risk management effectiveness?** Detailed assessment of the relationship between systems sophistication and liquidity risk outcomes could strengthen the case for technology investments.
- **What supervisory practices prove most effective?** Comparative analysis across jurisdictions could identify transferable lessons for enhancing regulatory effectiveness with limited resources. These research directions would deepen understanding of liquidity risk dynamics in emerging markets and provide evidence base for continued regulatory development.

Final Reflection

Liquidity risk management remains one of banking's perpetual challenges. The fundamental tension between profitability maximized through maturity transformation and leverage, and prudence requiring expensive liquidity buffers and stable funding ensures that managing this risk will never become routine or perfunctory. Regulatory standards, supervisory oversight, and sophisticated risk management techniques can mitigate but not eliminate inherent vulnerabilities. For Zambian banks, this challenge is compounded by macroeconomic volatility, shallow financial markets, technological constraints, and limited supervisory resources. Yet despite these headwinds, the sector has demonstrated substantial resilience. The COVID19 pandemic, which might have precipitated systemic crisis, was weathered through combination of private risk management and public sector support. Basel III implementation, while incomplete, has advanced significantly from initial conditions. Continued progress requires sustained commitment from multiple stakeholders: regulators willing to invest in capacity and resist complacency, banks recognizing that liquidity risk management is not purely compliance exercise but fundamental to sustainable business models, and policy makers supporting financial sector development through appropriate macroeconomic management and structural reforms. The stakes are high. Effective liquidity risk management underpins financial stability, supporting economic growth and development. Conversely, liquidity crises impose severe costs depositor losses, credit contraction, lost confidence, and fiscal burdens from potential bailouts. Zambia's experience during the late 1990s, when multiple bank failures cost an estimated 7% of GDP, provides sobering reminder of these consequences. This study documents progress while identifying persistent challenges, providing empirical foundation for continued efforts to strengthen liquidity risk

management frameworks. The ultimate measure of success will not be regulatory reports or compliance ratios but rather Zambia banks' demonstrated resilience when inevitable future stresses test their preparedness.

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