



# Liquidity Architecture and Regulatory Resilience under Basel III: A Comparative Panel Analysis of Moroccan and South Korean Banks (2004–2022)

EL HADDAOUI Tarik <sup>1</sup> and KHRIBECH Salim <sup>\*1</sup>

<sup>1</sup>Moulay Ismail university, FSJES, ETSA Laboratory, Meknès, Morocco  
khribechsa@gmail.com

## Abstract.

This paper conducts a comparative panel analysis of bank liquidity structures in Morocco and South Korea over the Basel III implementation period 2004–2022. Using three structural indicators—liquid assets to total assets (L1), loans to deposits (L2), and liquid assets to deposits (L3)—the study evaluates how regulatory maturity, funding models, and market depth shape banks' liquidity resilience. The empirical results reveal that South Korean banks maintain consistently higher and more stable liquidity buffers (L1) and more disciplined maturity transformation (L2), supported by diversified and stable funding structures. Moroccan banks, while progressing toward Basel III alignment, display thinner and more volatile liquidity cushions, higher reliance on short-term funding for certain institutions, and greater dispersion in risk profiles. The findings highlight how similar regulatory standards can produce heterogeneous liquidity outcomes depending on institutional environments and financial market development. Policy implications stress the importance of reinforcing liquidity governance, funding diversification, and supervisory capacity to enhance systemic resilience in bank-dominated emerging markets.

**Keywords:** Bank liquidity; Basel III; L1–L2–L3 liquidity structure; Comparative panel analysis; Morocco–South Korea banking systems.

## 1. Introduction

Bank liquidity again has become a central issue in the regulatory environment created after the global financial crisis, due to the fact that it facilitates the transmission of shocks originating at an individual institution, to the rest of the economy. Classic bank-run models illustrate how demandable deposits with backing of illiquid assets represent socially useful forms of liquidity insurance, however they are inherently vulnerable if confidence in the bank collapses[1]. Extensions of general equilibrium models have demonstrated how correlations among shocks and incompleteness of markets lead to liquidity shortages being transmitted throughout institutions and markets, converting individual funding difficulties into systemic strain[2].

© The Author(s) 2026

C. Jerry et al. (eds.), *Proceedings of the Conference Morocco-Korea Cooperation: A Lever for Afro-Asian Development (MKC 2025)*, Atlantis Highlights in Social Sciences, Education and Humanities 50,  
[https://doi.org/10.2991/978-94-6239-680-7\\_16](https://doi.org/10.2991/978-94-6239-680-7_16)

Furthermore, interactions between funding liquidity (ability to obtain cash or funding) and market liquidity (ability to sell securities without incurring significant price dislocation) may create self-reinforcing loops, where increased constraints on funding availability decrease the ability of firms to act as market makers and increase the magnitude of price dislocations [3].

With the above theoretical framework in mind, banks are viewed as liquidity creators that convert illiquid, long-lived assets to liquid claims against depositors and other short-term creditors. The intermediation theory of bank functions emphasizes that liquidity creation is the primary source of value added by commercial banking, yet it creates vulnerabilities due to the potential for excessive maturity transformation creating vulnerability to runs and refinancing risk[4, 5]. Therefore, there is a need to move away from a broad view of bank performance to a more detailed view of liquidity characteristics. Ratios such as liquid assets to total assets (L1), loans to deposits (L2), and liquid assets to deposits (L3) measure, respectively, banks' prudential liquidity buffers, the degree of maturity transformation funded by deposits, and the degree to which liquid assets cover potentially unstable funding sources. The collective behavior of these ratios offers a condensed, but theoretically valid, depiction of liquidity creation and the related risks.

The global financial crisis led to a comprehensive revision of prudential liquidity regulation. Under Basel III, the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) constitute two quantitative pillars intended to control short-term run risk and long-term structural funding instability. In parallel to this, supervisory practices are relying more frequently on internal processes for assessing the consistency and credibility of banks' risk appetite, funding structures, stress testing models, and contingency planning[6]. For the developed world, evidence indicates that enhanced liquidity requirements cause banks to rebalance on both sides of their balance sheets, increasing the amount of high-quality liquid assets held, relying more heavily on stable funding, and reducing the rate of loan growth and the level of liquidity created[7, 8].

Further empirical research demonstrates that liquidity structures are determined by factors including regulation, bank-specific characteristics, and macroeconomic conditions. Research on MENA and other emerging banking systems indicates that increased liquidity and credit risks, poor macro-economic conditions, and politically or externally induced shocks are typically linked to more prudent liquidity profiles, characterized by higher values of L1 and L3[9]. Analysis of European banks illustrates cyclical tendencies, with L1 and L3 typically decreasing and L2 increasing during expansions, followed by reversals of trends during crises as institutions rebuild buffers[10]. Emerging markets evidence supports that Basel III-style reforms cause banks to strengthen their reliance on deposit funding and extend their terms of lending, though limited capital market development restricts adjustment through long-term instruments[11]. Nevertheless, relatively few studies compare in detail how international standards are translated into concrete L1-L2-L3 configurations across particular pairs of banking systems that are significantly different in terms of the stage of regulatory development, market depth and funding models.

Accordingly, this study addresses the following research question: How do Basel III implementation timing, funding structures, and market depth shape the liquidity configuration (L1–L2–L3) and resilience of banks in Morocco and South Korea?

The comparison between Morocco and South Korea is especially interesting. South Korea has implemented Basel III early and with considerable stringency, possesses well-developed and diversified capital markets and possesses a strong supervisory regime, all of which facilitate disciplined management of buffers and diverse funding structures. Morocco, on the other hand, has a bank dominated system based primarily on deposit funding, with a more gradual implementation of Basel III and relatively underdeveloped domestic capital markets, leading to a likelihood of liquidity adjustments occurring primarily through expansion of core deposits and additions to buffers of liquid assets rather than substantial increases in reliance on long-term market funding. This study fills the gap by conducting a comparative panel analysis of the liquidity structures of banks in Morocco and South Korea over the 2004-2022 period, which corresponds to the introduction and solidification of Basel III liquidity standards in both countries. Theoretical models emphasize the trade-off between liquidity creation and stability[1, 2, 4] and this study measures liquidity using the structural ratios L1, L2 and L3 and assesses how the timing of the implementation of regulations, the nature of supervisory regimes and market structures affect their configuration.

This study makes three contributions. Conceptually, it ties theories of financial intermediation and liquidity risk to the actual design of Basel III liquidity regulations and illustrates that banks operating within similar business models will produce different liquidity profiles depending on their institutional context[5, 6]. Empirically, the comparative panel data establish how the configuration of L1-L2-L3 differs systematically between two structurally different banking systems and demonstrate the extent of differences in the strength of buffers, the level of maturity transformation and the reliance upon short-term funding. From a policy perspective, the results provide guidance for regulators in emerging markets seeking to transition beyond strict compliance with liquidity ratios to a configuration-oriented approach to liquidity supervision, utilizing directionally applicable lessons from the South Korean example while considering the structural features present in Morocco.

## **2. Literature Review**

### **2.1. Conceptual Foundations of Bank Liquidity**

The ability of banks to make good on all the promises they've made, without going bankrupt, is known as bank liquidity. Bank liquidity refers to the amount of money available to banks at any time to pay off creditors. Funding liquidity relates to an institution's access to sufficient funds to cover short-term commitments while maintaining the ability to operate and avoid insolvency. Market liquidity pertains to an institution's ability to quickly sell assets without causing significant declines in asset prices. Understanding both funding and market liquidity is important because

the lack of one can undermine the other; i.e., if an institution lacks sufficient funding liquidity, it will have difficulty making markets and the subsequent loss of market liquidity could cause large price changes, which would increase overall systemic risk [3].

Classical theories of financial intermediation view banks as creating liquidity by converting illiquid, long-lived assets into liquid, short-lived claims held by depositors. This liquidity creation benefits depositors, but it also makes banks inherently fragile because illiquid assets back claims that can be withdrawn quickly. When depositors lose confidence in a bank due to a decline in the quality of its assets, they may withdraw their funds, potentially triggering a bank run [1].

In a more complete model of banking, researchers use general equilibrium models to study the impact of incomplete markets and correlated shocks on liquidity. Incomplete markets refer to the inability of some borrowers to obtain financing through traditional channels. Correlated shocks refer to events that occur simultaneously in multiple parts of the financial system. General equilibrium models allow researchers to study how liquidity shortages can be transmitted from one bank to another and how one shock can cause a cascade of failures throughout the financial system [2].

A key aspect of banking is the inherent conflict between the need for banks to be resilient and the desire for them to be efficient. To achieve resilience, banks must maintain substantial amounts of high-quality liquid assets, stable funding sources, and (where relevant) contingency funding arrangements. While these buffers increase the capacity to absorb shocks, they impose costs through forgone earnings and constraints on lending and investment activities. Conversely, insufficient buffers can temporarily raise profitability but increase reliance on favorable refinancing conditions, asset sales at depressed values, and exposure to contagion. Therefore, effective liquidity management requires finding the optimal liquidity buffer that balances maximizing profitability and minimizing risk [2].

This study adopts a liquidity configuration perspective in which bank resilience depends not only on liquidity levels but on the structural interaction between liquidity buffers, maturity transformation, and funding stability. In doing so, we develop a configuration approach to liquidity that differentiates Basel III compliance (meeting regulatory ratios) from the underlying liquidity architecture (the balance-sheet structure and interactions that shape resilience under stress).

These theoretical foundations require a detailed examination of banks' liquidity structures. Such studies must distinguish among funding, market, and transformation mechanisms to understand how banks' regulatory requirements (e.g. Basel III) influence their vulnerability to financial shocks and the stability of the broader financial system.

## **2.2. Liquidity Structure Measures (L1, L2, L3)**

A comparative study of bank liquidity based on detailed data from the balance sheet of the bank helps understand which aspects of the bank's resilience (the ability to

recover quickly), how intense the banking business is (the degree of lending and deposits), and how vulnerable to sudden funding problems the bank is.

The three components of this study are L1 (liquid assets / total assets), L2 (loans / deposits) and L3 (liquid assets / deposits). These three elements form a consistent model of a bank's liquidity profile and provide an overview of its individual elements and their relationship to one another, going beyond the general performance indicators.

L1 (liquid assets / total assets) determines the portion of cash and other liquid assets available at all times for sale, held by the bank (and thus usable to satisfy any immediate or rapid liquidity needs of the bank) relative to the total amount of money in circulation for the bank. As such, L1 is considered as a surrogate of the buffer of liquidity of the bank and of its ability to absorb unexpected outflow of funds or shocks to the value of the bank's assets without selling assets too quickly. Generally, empirical studies of bank stability and liquidity risk interpret L1 values above average as a sign of lower liquidity risk and of the bank's better capacity to absorb shocks, and therefore, as a result of the regulatory focus after the crisis on strong holdings of liquid assets [9, 12, 13].

As such, L1 is consistent with the principles of the Liquidity Coverage Ratio in the Basel III framework, while being sufficiently simple to allow cross-country comparisons over time using a panel of countries.

L2 (Loans / Deposits) represents the level of maturity mismatch resulting from the bank financing its illiquid loan portfolio through deposits. When L2 is high it means that a large volume of illiquid loans are financed by deposits. Therefore, there is a higher risk that when deposits are withdrawn, or cannot be rolled-over, the bank will face a liquidity problem. This is particularly relevant when comparing financial systems that rely heavily on wholesale funding versus those that rely more heavily on retail deposits. This dimension of liquidity risk is closely related to theoretical arguments regarding liquidity creation and vulnerability under incomplete markets.

L3 (liquid assets / deposits) provides an indication of the protection offered to the bank against short-term funding shocks, representing the percentage of potentially unstable deposits covered by liquid assets that can be sold quickly. The higher the L3, the lower the probability that a withdrawal of deposits results in a sale of assets at low price and/or a need for the bank to borrow in an emergency situation. Conceptually, L3 completes the concept of L1 by conditioning the buffer of liquidity of the bank on the primary funding source which may trigger a run on the bank, and is consistent with the structural liquidity requirements (such as the Net Stable Funding Ratio) introduced by regulators.

Therefore, the combination of L1, L2 and L3 constitutes a coherent set of liquidity structure indicators: L1 measures the strength of the buffer, L2 measures the level of maturity transformation and associated risks, and L3 measures the link between the buffer and potential fragile funding. Therefore, examining them simultaneously enables a thorough evaluation of the impact of regulatory changes and market structures on banks' liquidity profiles in different jurisdictions.

### 2.3 Basel III Liquidity Standards and Supervisory Frameworks

Basel III introduced a number of quantitative and qualitative standards for liquidity that are intended to limit banks' ability to engage in excessive maturity transformation and to limit systemic vulnerabilities associated with liquidity. The Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) represent two of the key quantitative standards that underpin these requirements. The LCR will require banks to have a sufficient stock of High Quality Liquid Assets (HQLAs) to meet the net cash outflow needs over a thirty day stress period. A minimum ratio of 100 percent must be maintained by all banks at all times. These requirements provide banks with an incentive to develop larger and more robust liquidity buffers and to improve their cash flow forecasting and modelling capabilities (Basel Committee on Banking Supervision, 2013). The NSFR is designed to complement the LCR by providing additional discipline on banks' ability to fund themselves through stable means over a one year time horizon. Banks must ensure that the amount of stable funding they have available is at least equal to the amount of stable funding they require to avoid developing structural imbalances in their funding bases and to encourage banks to shift from relying upon short term wholesale funding towards utilizing more stable funding sources such as term funding, stable deposits and more aligned funding and asset maturities.

In addition to serving as prudential constraints on banks, these standards are intended to serve as behavioral drivers of banks' portfolio choices, funding profiles and risk management practices. To achieve these objectives, the standards will tie compliance to specific aspects of banks' balance sheet compositions. For example, by making the holding of HQLAs more attractive than engaging in long term illiquid lending or trading activities, banks can be encouraged to build up their reserves of HQLAs. Studies have shown that strengthening liquidity requirements results in reduced measured liquidity risk and reallocation effects (e.g., an increase in the holdings of safe assets, a possible decrease in lending and a transfer of risk to less regulated sectors) which highlight the importance of proper calibration and ongoing supervision[13]. In addition to providing discipline based upon the quantity of liquidity held by banks, the public disclosure of banks' LCR and NSFR scores will introduce market discipline based upon banks' liquidity profiles.

In addition to the use of ratios, regulatory agencies are increasingly using internal process-based assessments of the credibility and robustness of banks' liquidity strategies. The Internal Liquidity Adequacy Assessment Process (ILAAP) provides a framework for banks to formally assess whether their liquidity risk management practices, funding structures, risk appetite and contingency planning tools are consistent with their business models and stress scenarios. The Supervisory Review and Evaluation Process (SREP) is used to review the quality of ILAAP, the adequacy of banks' governance arrangements, data and methodologies and the regulatory agency may also establish institution specific liquidity guidelines or add-on requirements if it identifies deficiencies. Stress testing and contingency funding plans are additional elements of this framework and require banks to model the impact of severe but plausible shock events (e.g., wholesale funding dries up, credit spreads spike, etc.) and to identify reasonable backup plans (e.g., collateral mobilization, access to central bank facilities, etc.).

It is anticipated that the implementation of these standards will systematically alter the liquidity structure indicators L1, L2 and L3. More stringent LCR requirements and credible ILAAP frameworks will lead to a higher proportion of liquid assets in banks' total assets which will result in higher levels of L1 and greater flexibility in the way banks manage their balance sheets. NSFR-related incentives will discourage excessive growth in loan portfolios relative to deposits, and therefore will help moderate upward pressures on L2 in cases where funding does not stabilize accordingly. Ultimately, the combination of an increase in the level of HQLA and a more stable funding profile should contribute to an increase in L3 by creating a deeper pool of liquid assets to protect against short-term funding stresses. As such, the liquidity standards and supervisory processes established under Basel III are not simply static thresholds; rather they will influence banks' strategic decisions regarding the composition of their portfolios, their funding structures and the design of their risk management systems, and therefore will affect the observed configuration of L1-L2-L3 across jurisdictions.

## **2.4 Empirical Evidence on Liquidity Structures**

Studies concerning the empirical analysis of bank liquidity structures have established various influences of regulation, bank characteristics, market power, and macro-financial factors upon bank balance-sheet liquidity ratios as well as various combinations thereof, including liquid assets to total assets (L1), loans to deposits (L2), and liquid assets to deposits (L3). The convergence of research findings from developed and developing countries has established a number of empirically-supported, stylized facts that provide a basis for assessing the comparative performance of Moroccan and South Korean banks subject to Basel III-oriented regimes.

Regulatory-induced changes in liquidity requirements have been shown to be positively correlated with increases in banks' liquidity buffers and the stability of their funding sources. Cross-national evidence from the Organization for Economic Cooperation and Development (OECD) has demonstrated that binding or prospective liquidity regulations encourage banks to expand their holdings of liquid assets and utilize stable funding mechanisms, thus increasing L1 and L3[14]. Additionally, post-liquidity coverage ratio (LCR) analyses of data collected from the U.K. and other developed economies demonstrate that there exists an ongoing realignment of the two sides of the balance sheet — substitution towards higher quality liquid assets and more stable deposits — at the expense of decreased loan growth and liquidity creation which translates into upward pressure on L1 and L3 and reduced capacity to grow L2 unless funded stably[7, 8]. Similar patterns were also identified in emerging markets where the implementation of Basel III induced banks to strengthen their use of deposit funding and the term structure of their funding, however, limited development of the long-term funding mechanism limits the ability of these banks to adjust[11].

Bank-specific characteristics including bank size, capitalization, and market power determine the structure of liquidity in ways that vary by bank. Larger and systemically significant banks typically generate more liquidity and engage in more extensive maturity transformation than smaller banks and frequently operate with

lower shares of liquid assets relative to total assets and higher L2 values, due to their diverse funding base and reliance on government support[4]. Capitalized banks in general have greater flexibility to retain liquidity buffers without jeopardizing future loan growth and empirical evidence demonstrates a complementary relationship between strong capital positions and prudent liquidity management practices among banks in the United States and Europe[8]. Increased market power in deposit markets typically corresponds with more stable, less costly core funding which enables dominant banks to fund themselves using less liquid funds (i.e., lower L1, L3); conversely, less capitalized banks facing increased competitive pressures or less robust franchise bases are more likely to hold larger amounts of liquidity to mitigate potential risks.

Macroeconomic variables have been found to produce a pronounced cyclic effect. Research on European and Central/Eastern European banks has indicated that liquidity ratios decrease during periods of economic expansion as the demand for credit increases and banks convert more deposits into loans (increasing L2 and decreasing L1 and L3); conversely, during times of crisis, liquidity ratios increase as banks rebuild their liquidity buffers and reduce their leverage[10, 15]. Similarly, evidence from MENA banks indicates that heightened liquidity and credit risk, weak macroeconomic conditions, and external or political shocks correspond with conservative liquidity structures, and therefore reinforce the stabilizing role of higher L1 and L3 in promoting bank resiliency[9].

The comparative study of advanced economies (United States, European Union, South Korea) with emerging economy banking systems (MENA, Sub-Saharan Africa, some parts of Asia) highlights that the transmission of Basel III-style standards is influenced by differences in market depth and funding mechanisms. Wholesale-dependent, market-based systems exhibit more significant regulatory effects on L1–L3 through changes in their security portfolios and term funding; conversely, deposit-reliant, bank-based systems respond primarily to core deposits and additional liquid asset buffers. These differences justify a structured comparative analysis of liquidity configurations (L1, L2, L3) of Moroccan and South Korean banks to understand how institutional, regulatory, and macro factors jointly affect the liquidity resilience of these banks.

## **2.5 Positioning and Hypotheses / Propositions**

The comparison between Moroccan and South Korean banking systems is based on the different implementations of Basel III liquidity reform; timeframes for its implementation; how strictly each was implemented; and the differences in their funding models and market development. It can be assumed that earlier and stricter implementation of the Liquidity Coverage Ratio (LCR), Net Stable Funding Ratio (NSFR), and supervisory procedures related to liquidity will lead to more systematic optimization of liquid asset portfolios by the risk profile of South Korean banks compared to Morocco's progressive and bank-based approach to implementing these reforms, which would likely result in a more gradual build up of the banks' liquidity buffers.

Hypothesis H1 suggests that there is a greater degree of calibration in South Korean banks' Liquid Asset to Total Assets (L1) ratio compared to Moroccan banks; this reflects a greater degree of alignment with regulatory standards and internal risk appetite assessments of banks, along with the disciplinary influence of market forces resulting from the more advanced Basel III regulations adopted by South Korea[7]. Hypothesis H1 also suggests that the L1 ratio for South Korean banks will be less dispersed and cluster closer to regulatory compliant target ranges than those found among Moroccan banks.

Hypothesis H2 asserts that Loan-to-Deposit (L2) ratios are more constrained and diversified in South Korea, while they remain largely deposit driven in Morocco. The expectation is that the availability of more extensive capital markets in South Korea and greater access to long-term funding vehicles will reduce South Korean banks' reliance on short-term maturity transformation through deposits and provide more balanced liability structures than their counterparts in Morocco. It is further anticipated that the structurally deposit reliant nature of the Moroccan financial system will increase the sensitivity of L2 to domestic savings rates and competitive pressure in Morocco.

Hypothesis H3 presents the argument that the Liquid Asset to Deposits (L3) configurations employed by the two sets of banks represent fundamentally different liquidity transformation and depositor protection strategies. South Korean banks are anticipated to achieve higher or more actively managed L3 ratios, as an integral component of their formalized liquidity risk management frameworks, than are the banks of Morocco. Conversely, it is anticipated that the banks of Morocco will employ more conservative forms of intermediation practices; rely upon implicit expectations of government support to protect depositors; and utilize central bank facilities to instill confidence in depositors regarding the safety of their deposits.

### **3. Methodology**

#### **3.1. Research Design**

A comparative quantitative design using bank level panel data from Morocco and South Korea for the period 2004-2022 will be used to examine how banks' liquidity levels changed during the implementation of the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR), which were rolled out as part of the Basel III liquidity requirements. Since this time frame corresponds with the full rollout of the LCR and NSFR as well as the gradual phase-in of these regulations, it will enable the evaluation of the degree to which regulators and other structural aspects of banks' operations impact the observed changes in L1, L2 and L3 for banks in Morocco and South Korea. This study relies on descriptive and comparative panel evidence rather than causal econometric estimation. The objective is to identify structural liquidity configurations rather than estimate causal determinants.

Using a balanced or quasi-balanced panel of all listed and systemically important banks in each country will allow for an appropriate degree of comparability among

the sample observations in terms of reporting quality, accounting standards, and supervisory reporting. As a result of focusing on only the largest and listed banks in each country, there should also be less measurement error due to the fact that these banks are required to report financial information on a regular basis using standardized formats, which have been audited by third parties, and are available for public scrutiny. This type of design is particularly useful when comparing banks across countries, as variations in transparency and regulatory oversight may otherwise lead to biased estimates regarding the behavior of banks' liquidity levels.

The use of a panel design allows for the examination of both within-bank and between-banks variation in the liquidity levels of banks in Morocco and South Korea. It is therefore possible to account for individual bank-specific factors and common factors affecting the liquidity levels of all banks in both countries through the use of bank fixed effects and time effects in the model specification. The methodologies considered in this study are conventional techniques for analysing relationships in panel data and are well suited to documenting the association between the determinants of liquidity and the liquidity levels themselves, even in the presence of heterogeneity and limited dynamics in the data [16, 17].

### 3.2. Data and Sample Selection

The empirical analysis is based on a purposive sample of banks from Morocco and South Korea designed to ensure cross-country comparability, transparency, and consistency over the 2004–2022 period. Cross-country comparability is ensured through reliance on audited IFRS-based financial statements. Inclusion is restricted to commercial banks that (i) are listed or systemically important, (ii) publish complete audited annual reports with sufficient disclosure to construct L1, L2, and L3, and (iii) operate under the respective national Basel III implementation frameworks throughout most of the sample window. Institutions with highly specialised business models (e.g., pure development banks, policy banks, or narrowly focused investment entities) are excluded where their balance-sheet structure is not comparable to universal or commercial banks. Entities undergoing major restructuring, mergers, or resolution are treated with appropriate adjustments or excluded if continuity of series cannot be guaranteed. The final dataset covers 11 banks (6 Moroccan and 5 South Korean), yielding 169 bank-year observations in the panel.

Reliance on listed and major banks is primarily motivated by data reliability. These institutions are subject to stricter reporting, external auditing, and market discipline, which enhances the accuracy of liquidity ratios and reduces biases arising from opaque or incomplete disclosures. Focusing on this segment also aligns with the systemic relevance of liquidity structures, as these banks represent a substantial share of total assets and play a central role in the transmission of Basel III liquidity standards.

In this regard, the study retains the five major Korean commercial banks—KB Kookmin, Shinhan, Hana, Woori, and NH NongHyup—because they are listed and systemically important institutions that publish complete, audited annual reports with sufficient disclosure to construct L1, L2, and L3 under the national Basel III

implementation framework. This purposive restriction enhances cross-country comparability, transparency, and consistency over time, while excluding specialized institutions whose balance-sheet structures are not comparable to universal/commercial banking models. Moreover, these banks represent the core of Korea's banking sector and are documented individually in the dataset used for the comparative tables and figures in this study.

### 3.3. Variables and Measurements

The study operationalizes bank liquidity through three complementary ratios (L1, L2, and L3) capturing distinct yet interrelated dimensions of liquidity structure and risk exposure. Because LCR and NSFR data are not consistently available for the full sample period and across banks, structural ratios provide a comparable and theoretically grounded proxy.

- L1 (Liquid Assets / Total Assets) measures the proportion of high-quality liquid assets relative to total assets, representing the prudential liquidity buffer and balance-sheet flexibility. It reflects the capacity to absorb liquidity shocks without fire sales or external assistance. Consistent with the liquidity coverage logic of Basel III, higher L1 values indicate stronger short-term resilience and asset-side preparedness [12].
- L2 (Loans / Deposits) captures the degree of intermediation intensity and maturity transformation funded by the deposit base. A higher L2 suggests greater conversion of deposits into illiquid loans, implying elevated liquidity risk exposure if funding sources are volatile or concentrated. Lower values denote conservative lending and enhanced liquidity coverage, aligning with stable funding principles under the Net Stable Funding Ratio [8].
- L3 (Liquid Assets / Deposits) measures the extent to which the deposit base is covered by liquid assets. This ratio combines funding-side exposure with asset-side buffers, serving as a key indicator of short-term liquidity stress resistance [9].

All three ratios are computed annually using data from audited financial statements and expressed as percentages for comparability across banks and jurisdictions.

## 4. Results

### 4.1 Descriptive Analysis of Liquidity Structures

#### 4.1.1 Dispersion, interbank heterogeneity

To complement level comparisons, the descriptive analysis reports dispersion metrics for each liquidity structure ratio (L1–L3) using the full panel. Specifically, we compute the standard deviation and the coefficient of variation over bank-year observations, and interbank dispersion, measured as the cross-sectional standard deviation across banks within each year and then averaged over time (for South Korea, interbank dispersion is computed over years with at least two banks observed).

**Table 1.** Dispersion indicators (panel-based)

Country	Ratio	Mean	Std.	CV	AvginterbankSD	Years with $\geq 2$
---------	-------	------	------	----	----------------	---------------------

		(%)	dev. (%)		(%)	banks (for interbank SD)
Morocco	L1	18.60	10.61	0.57	10.61	19
Morocco	L2	95.22	28.72	0.30	25.00	19
Morocco	L3	27.97	35.57	1.27	24.95	19
South Korea	L1	20.99	2.75	0.13	2.89	14
South Korea	L2	102.26	6.68	0.07	4.19	14
South Korea	L3	29.00	4.81	0.17	4.58	14

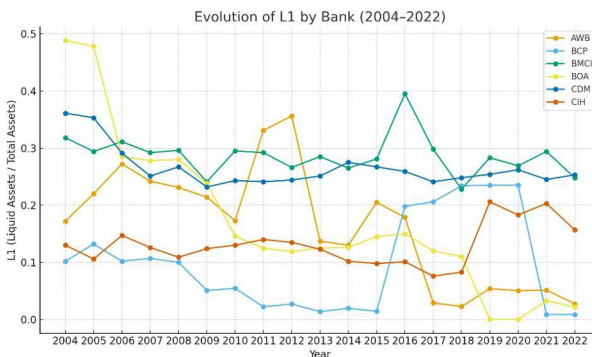
Source. Author's computation

The dispersion indicators reveal marked cross-country differences in the heterogeneity of liquidity structures. In Morocco, dispersion is substantial, particularly for L3, which exhibits the highest variability (SD = 35.57; CV = 1.27) and a high average interbank dispersion (24.95), suggesting strong heterogeneity in how liquid-asset buffers cover the deposit base. L2 also shows sizable dispersion (SD = 28.72; interbank SD = 25.00), indicating meaningful differences across banks in maturity transformation and reliance on deposits to fund lending. By contrast, South Korean banks display comparatively low dispersion across all ratios (CV between 0.07 and 0.17 and interbank SD below 4.6), pointing to a more homogeneous liquidity architecture among major banks. Finally, interbank dispersion for South Korea is computed over 14 years with at least two banks observed, whereas Morocco provides coverage for the full 19-year window.

#### 4.1.2. evolution of L1 ratio in Moroccan banks and south Korean banks

As illustrated in Figure 1, the liquidity structure of Moroccan banks has undergone a gradual and heterogeneous decline in liquid asset buffers over the period 2004–2022. Overall, L1 ratios show a downward trend, reflecting increased liquidity transformation as banks shifted toward more credit-intensive business models. This reduction is particularly pronounced after 2010, coinciding with a period of strong credit expansion and the progressive alignment of the sector with Basel III liquidity regulation.

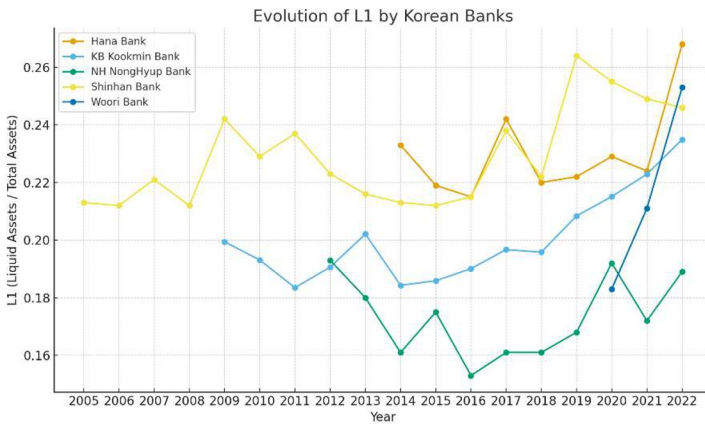
Figure 1. Evolution of L1 in Moroccan banks



**Sources.** Author’s calculation based on publicly disclosed audited financial statements of Moroccan banks

A cross-institutional comparison reveals important differences in liquidity strategies. CDM and BMCI maintain comparatively higher L1 values throughout the observed period, suggesting stronger liquidity coverage and more conservative asset allocation. Conversely, BCP and CIH display persistently lower liquid asset ratios, revealing greater dependency on less liquid asset structures. BOA and AWB, while initially exhibiting moderate liquidity levels, demonstrate a marked decline after 2015, with BOA reaching near-zero liquidity buffers during 2019–2020, indicating a high exposure to short-term refinancing pressures during that period.

**Figure 2.** Evolution of L1 for Major South Korean Banks (2005–2022)



**Source.** Author’s computation based on publicly disclosed audited financial statements of South Korean banks

The liquidity ratios (L1 ratios) of Major South Korean Banks remain generally consistent from 2005 through 2022 (as can be seen in figure 2), and continue to exceed International Regulatory Minima throughout this time frame. The L1 Ratio for most South Korean banks fluctuates moderately within a very narrow range (0.20-0.25) due to global and local economic cycles; the overall consistency of these ratios indicate that there is a substantial stock of High Quality Liquid Assets (HQLA) compared to total bank assets and that each bank appears to maintain adequate liquidity reserves. The consistency of the ratios also reflects the fact that many South Korean banks were among the first to adapt to Basel III Liquidity Requirements (which were part of the financial reform agenda established following the financial crisis of 2008).

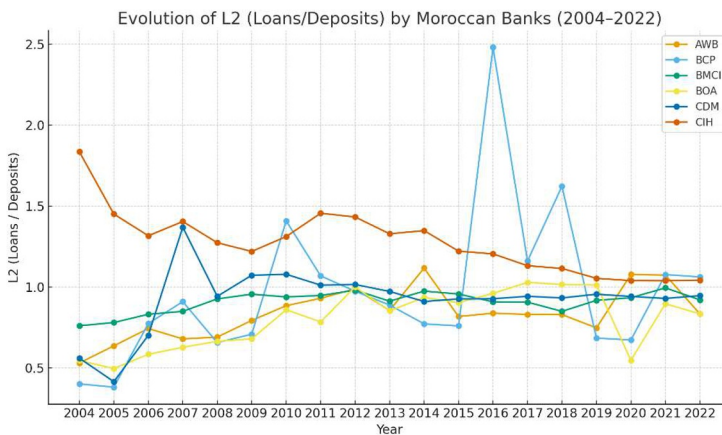
There are some differences between individual banks in South Korea, however, they do not necessarily represent structural differences. Specifically, Shinhan Bank and Hana Bank have consistently displayed the largest L1 Ratios and therefore may have the most conservative asset/liability mixes. Conversely, KB Kookmin Bank's L1

Ratio improved gradually beginning in 2017, which coincided with an increase in its funding strategies and an enhancement of its liquidity coverage. NH NongHyup Bank and Woori Bank have had lower L1 Ratios historically, however, both banks' L1 Ratios have trended upwards since the end of 2019, suggesting that both banks have reinforced their liquidity positions in response to COVID-19 related stress in markets. Comparing the two countries in Figures 1 & 2 highlights a significant divergence in the approaches taken by Moroccan and South Korean banks to manage their liquidity. In particular, the L1 Ratios of Moroccan banks have declined progressively from 2004 through 2022 (see Figure 1); specifically, the L1 Ratios for several of the large banks in Morocco (BOA, AWB, BCP) have fallen significantly after 2010. This decline in L1 Ratios reflects an increasingly expansionary growth strategy for the balance sheet of each of these banks, combined with an increasing reliance on liquidity transformation to meet the needs of those growing assets, thus leaving the banks potentially more exposed to shocks in times of stress. On the other hand, the L1 Ratios of South Korean banks have been consistently higher and more stable than those of Moroccan banks, with a relatively small amount of variation between the L1 Ratios of the different banks in South Korea. Additionally, the L1 Ratios for both KB Kookmin Bank and Woori Bank have continued to improve since the end of 2018.

#### 4.1.3. evolution of L2 ratio in Moroccan banks and south Korean banks

As presented in Figure 3, Moroccan banks display heterogeneous patterns in their loans-to-deposits ratio (L2), reflecting varying degrees of liquidity transformation and funding behaviors. Overall, most institutions maintain L2 values close to or slightly above unity ( $L2 \approx 1$ ), which suggests that lending activity is largely funded by deposits. However, several banks exhibit significant deviations from this equilibrium. For instance, CIH maintains structurally high L2 levels, especially before 2015, indicating a stronger maturity transformation profile and a higher dependency on external and wholesale financing. Conversely, BOA, CDM, and BNCI generally operate within a more moderate L2 range, reflecting comparatively conservative lending activity or broader access to stable deposit bases.

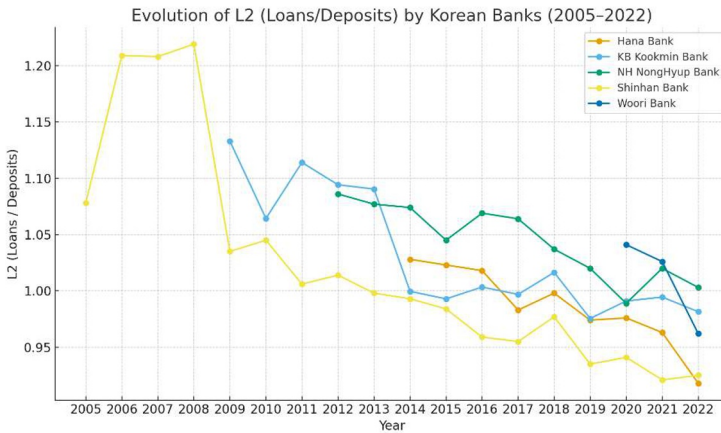
**Figure 3.** Evolution of L2 in Moroccan banks



**Source.** Author’s calculation based on publicly disclosed audited financial statements of Moroccan banks

The evolution of the sector suggests that post-2014 regulatory reforms influenced by Basel III have contributed to a progressive convergence toward more balanced L2 ratios. The patterns in Figure 3 therefore highlight the persistent challenge of balancing credit growth and funding stability within the Moroccan banking system.

**Figure 4.** Evolution of L2 for Major South Korean Banks (2005–2022)



**Source.** Author’s computation based on publicly disclosed audited financial statements of South Korean banks

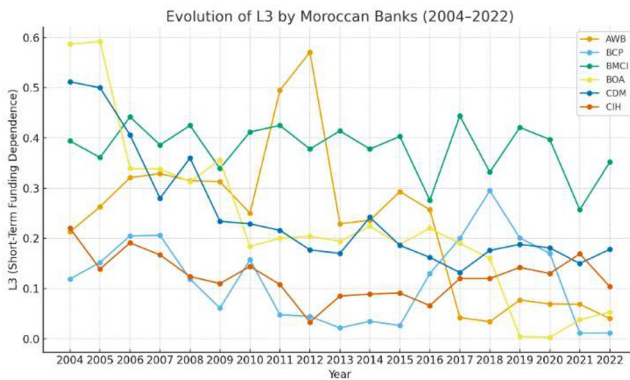
Based on Figure 4, Major South Korean banks show a very consistent and stable loan-to-deposit ratio (L2) through the years of 2005-2022 and at all times were near or at the regulatory limit of 1. These statistics indicate that these banks primarily rely on deposits to fund their lending and do not rely significantly on either wholesale and/or short-term market funds. As illustrated in Figure 4, there was an initial high level of L2 prior to Basel III, but then it declined progressively after 2010. The progressive decline in L2 after 2010 is reflective of both the early adoption and the stringent enforcement of the Basel III liquidity regulations in South Korea; specifically the Net Stable Funding Ratio (NSFR). The NSFR has been instrumental in providing incentives to reduce structural maturity mismatches. Following the Global Financial Crisis, Korean banks have employed a much more conservative funding strategy than in the past and, by 2022, have converged towards a low and homogeneous L2 ratio. Therefore, based upon the information provided in Figure 4, we can conclude that South Korea's liquidity transformation model indicates a more stable liquidity configuration and suggests stronger structural resilience to potential funding disruptions when compared to the more variable patterns observed in Morocco. When comparing Figures 3 & 4, we see a vastly different liquidity transformation profile exists in Moroccan vs. South Korean banks. In contrast to the highly variable

loan-to-deposit ratio (L2) values seen in the Moroccan banks, which often exceed the equilibrium threshold (i.e.,  $L2 > 1$ ) as evidenced by the CIH & BCP Banks, indicative of instances where loan growth exceeds deposit gathering, the South Korean banks demonstrate stable loan-to-deposit ratio (L2) values, with L2 ratios remaining consistently aligned with unity, and as such, are consistent with earlier adoption and stricter implementation of Basel III NSFR requirements.

#### 4.1.4. evolution of L3 ratio in Moroccan banks and south Korean banks

The evolution of Morocco's deposit liquidity coverage ratio (L3) is shown in Figure 5 and reveals a gradual decline for most banks over the 2004–2022 period. In the early years of the sample, several institutions held relatively comfortable liquidity cushions, with L3 values above 0.40 for banks such as BOA and BMCI, signalling a substantial stock of liquid assets available to absorb unexpected deposit outflows. In subsequent years, however, most banks in the sample recorded lower L3 ratios as they rebalanced their portfolios toward higher-yielding but less liquid assets. While current levels remain broadly consistent with Basel III, this downward adjustment implies a thinner liquidity buffer and a greater reliance on the stability of the funding base and on access to market and central bank backstops. At the same time, the persistent dispersion in L3 values across institutions points to marked heterogeneity in liquidity strategies. BMCI and BCP, for example, exhibit intermittent spikes in L3, which likely reflect precautionary episodes of liquidity hoarding or targeted adjustments in response to market or regulatory signals. By contrast, CIH and CDM display relatively stable but comparatively low L3 ratios indicating a more intensive transformation of deposits into illiquid assets and, therefore, a thinner immediate cushion against large withdrawals. Overall, the downward trend suggests that Moroccan banks have reduced their liquidity cushions over time, with the degree of resilience varying significantly from one institution to another.

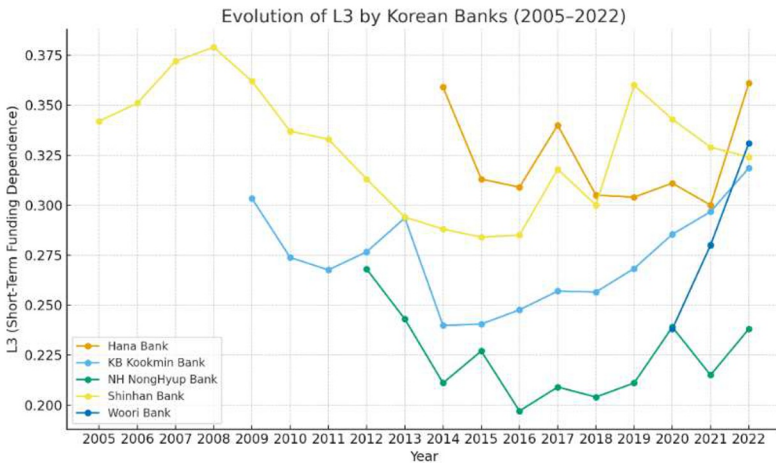
**Figure 5.** Evolution of L3 in Moroccan banks



**Source.** Author's calculation based on publicly disclosed audited financial statements of Moroccan banks

As illustrated in Figure 6, the deposit liquidity coverage ratio (L3) of the large South Korean banks follows a predominantly steady and moderate trajectory over the 2005–2022 period. L3 values for the sampleremainwithin a relativelynarrow band of approximately 0.25 to 0.35, reflecting a broadlybalancedapproach to managingliquidity buffers againstdepositoutflows. Withinthis range, NH NongHyup Bank tends to operate at the lower end, with L3 ratios frequentlyapproaching or fallingsslightlybelow 0.25, which signals a comparatively thinner liquidity cushion and a greater sensitivity to severe funding shocks. Hana Bank, by contrast, maintains somewhat higher L3 levels than NH NongHyup Bank, implying more comfortable coverage of deposits by liquid assets while remaining within typical prudential thresholds. Notably, short-lived spikes in L3 observed during episodes of global financial stress (notably 2008–2009 and 2020–2021) are consistent with a countercyclical liquidity management stance: South Korean banks temporarily reinforced their liquidity buffers in order to absorb external market shocks and preserve confidence in their funding structures.

**Figure 6.** Evolution of L3 for Major South Korean Banks (2005–2022)



**Source.** Author’s computation based on publicly disclosed audited financial statements of South Korean banks

Comparing Morocco and South Korea in terms of their deposit liquidity coverage ratio (L3), as illustrated in Figures 5 and 6, highlights significant structural differences in the liquidity profiles of the two banking systems. Historically, Moroccan banks have displayed higher volatility in L3 and, on average, somewhat thinner and more cyclical liquidity buffers than their South Korean counterparts. There were periods, especially in the mid-2000s and around episodes of stress, when the L3 ratios of several Moroccan banks rose into the 0.30–0.40 range, signalling precautionary buildups of liquid assets to protect against potential funding tensions. However, these peaks have been intermittent, and the more recent downward drift of L3 for many institutions suggests a stronger transformation of deposits into illiquid

assets and, hence, a greater sensitivity to severe deposit withdrawals or market disruptions.

By contrast, South Korean banks have maintained L3 values at a more stable and moderately elevated level, generally within a narrow band of 0.25–0.35 over most of the 2005–2022 period. This pattern indicates the presence of relatively stable and consistently managed liquidity buffers that complement a diversified and stable funding base, in line with the spirit of Basel III's focus on resilient liquidity coverage and stable funding structures. While the most recent years point to a slow convergence, with Moroccan banks progressively aligning their liquidity coverage closer to the South Korean benchmark, the evidence still suggests stronger structural resilience of Korean banks to refinancing and withdrawal risks.

#### 4.2 Comparative Patterns: Morocco vs South Korea

The data presented in Table 1 illustrates a comparative analysis of indicators of liquidity structure for major South Korean and Moroccan banks during the period evaluated; the analysis allows for an understanding of how both banking systems manage the liquidity buffers, credit intermediation functions, and funding stability in different environments of finance and regulation. These differences reflect structural and institutional factors rather than strictly regulatory compliance.

As it pertains to L1, which represents the percentage of liquid assets within a bank's balance sheet, South Korean banks demonstrate a higher average level of liquidity buffer (0.2115) compared to those found in Moroccan banks (0.1860). The implication is that Korean banks possess a larger reserve of liquid and readily convertible assets allowing for a better capability to absorb short term liquidity shocks. In terms of heterogeneity in Morocco, the banks BMCI and CDM have demonstrated L1 levels that exceed the average for all banks in the country; however, BCP and CIH are characterized by significantly lower levels of liquidity cushion, thus, increasing their vulnerability during periods of stress. Such disparities in L1 may be attributed to structural disparities in the funding base, in asset allocation strategies, and/or in the degree of regulatory compliance.

**Table 2.** Comparative Liquidity Structure Indicators (L1, L2, L3) for Major South Korean and Moroccan Banks

	Banks	L1	L2	L3
			1,032	
	KB Kookmin Bank	0,200		0,273
		0,233		
	Shinhan Bank		0,979	0,319
South Korea	Hana Bank	0,230	0,986	0,322
	Woori Bank	0,221	0,998	0,305
	NH NongHyup Bank	0,173	1,044	0,224
	Mean	0,212	1,008	0,289
Morocco	BOA	0,172	0,801	0,231
	AWB	0,163	0,836	0,232

BCP	0,0985	0,971	0,464
BMCI	0,287	0,907	0,381
CDM	0,265	0,923	0,246
CIH	0,130	1,274	0,124
Mean	0,186	0,952	0,260

**Source.** Author's computation based on publicly disclosed audited financial statements of Moroccan and South Korean banks.

In reference to L2, which represents the intensity of credit intermediation functions through the ratio of total loans to total deposits, South Korean banks display higher equilibrium levels (mean 1.0078) and, therefore, transform deposits into loans at an optimal rate. This finding is consistent with a well-developed and functioning financial market providing an effective mechanism for the allocation of credit while also maintaining liquidity stability. In contrast, Moroccan banks display slightly lower funding conversion (0.9522 on average); this finding suggests that there are limitations to the amount of lending that can occur through a given pool of deposits and/or that these banks are employing a more cautious approach to risk management. Additionally, CIH demonstrates an elevated L2 value; this indicates that the bank has aggressively pursued lending growth in order to expand its presence in real estate financing. An excessively high L2 value can lead to an excessive draw-down of liquidity reserves if not complemented by stable long-term funding.

Finally, L3, as depicted in Table 1, demonstrates substantial contrasts between the two systems. On average, the L3 ratios for Moroccan banks show a slightly lower mean value (0.2797) and greater dispersion across institutions than those of South Korean banks. This pattern suggests that, on average, Moroccan banks operate with thinner and more heterogeneous liquidity buffers, which may leave some institutions more exposed to severe deposit withdrawals or market disruptions than others.

By contrast, South Korean banks exhibit a marginally higher mean L3 ratio (0.2887) and a much tighter dispersion among institutions, indicating more uniformly robust coverage of deposits by liquid assets. This configuration is consistent with more stable funding bases, supported by deeper capital markets and earlier, stricter adherence to Basel III.

The results illustrated in Table 2 demonstrate that South Korea's liquidity structure suggests stronger structural resilience through relatively higher liquid asset buffers and more homogeneous funding patterns, while Morocco shows a more heterogeneous configuration in which some banks maintain substantial buffers and others appear more exposed to liquidity pressures. Overall, the cross-country differences observed in L1–L3 are consistent with differences in market depth, funding mechanisms, and institutional settings, rather than being attributable solely to Basel III compliance.

## 5. Discussion

### 5.1 Implications for Theory

The comparative evidence on Moroccan and South Korean banks offers several contributions to theories of financial intermediation and liquidity risk management. Classical intermediation theory portrays banks as liquidity transformers that accept short-term deposits and extend longer-term loans, with liquidity risk arising when this transformation becomes excessive [5]. Our results refine this view by showing that similar business models can generate very different liquidity profiles depending on how banks configure the mix of liquid assets (L1), loan–deposit transformation (L2) and deposit coverage by liquid assets (L3). South Korean banks combine relatively high and stable L1 with L2 ratios close to unity and moderate L3, illustrating a “disciplined” maturity transformation consistent with effective internal liquidity risk management. Moroccan banks, in contrast, exhibit thinner and more volatile liquidity buffers, higher dispersion in L2 and structurally higher L3 for some institutions, indicating that intermediation can be more fragile even when average liquidity levels appear acceptable. The findings support a shift from ratio compliance toward liquidity architecture supervision.

The findings also speak to liquidity risk management theory by underscoring that institutional and regulatory environments shape not only the level but the configuration of liquidity [6]. Basel III is often theorized as imposing uniform constraints through the LCR and NSFR [18]. Yet the evidence suggests that in a context of deep, diversified capital markets and strong supervisory capacity (South Korea), these standards are internalized as a coherent liquidity architecture. In a bank-dominated system with shallow markets and more gradual implementation (Morocco), the same global rules translate into partial adjustments: some banks improve L3, others compress L1 or L2, resulting in heterogeneous and sometimes fragile configurations.

### 5.2 Policy Implications

For Morocco, the evidence suggests that liquidity policy should focus less on simple ratio compliance and more on configuration and resilience. The combination of thin L1 buffers, volatile L2 and elevated L3 for some banks calls for more risk-sensitive calibration of liquidity buffers: institutions with aggressive loan growth or higher wholesale funding should be required to hold larger stocks of high-quality liquid assets and operate within tighter L2 limits. At the same time, policy should encourage funding diversification, reducing dependence on short-term or concentrated deposits. This implies incentives for longer-term instruments (bonds, covered bonds, well-regulated securitizations), stronger retail deposit franchises, and the development of domestic institutional investors. These measures are closely linked to deepening capital markets which can provide alternative, more stable refinancing channels.

For South Korean banks, the paper’s evidence points to resilience built into day-to-day balance-sheet choices rather than superficial ratio compliance. First, L1 buffers are both higher and remarkably stable, most banks keep L1 in a narrow 0.20–0.25 band over 2005–2022, signaling disciplined accumulation of high-quality liquid assets and early alignment with Basel III, with Shinhan and Hana persistently at the upper end and KB Kookmin improving after 2017. Second, L2 (loans/deposits) is kept near

unity and declines after 2010, indicating tighter maturity transformation and a funding mix anchored in deposits consistent with NSFR discipline. Third, L3 (liquid assets/deposits) is stable in a moderate 0.25–0.35 range, with brief countercyclical spikes during stress (2008–09; 2020–21), and with NH NongHyup typically at the lower end. Finally, Korean banks internalize liquidity costs and constraints into portfolio and funding choices, so that resilience emerges endogenously from business models, not just from meeting regulatory floors.

For other emerging market economies, South Korea's experience offers directional lessons rather than a template. Its relatively robust liquidity configuration reflects not only early Basel III adoption but also careful sequencing: improvements in supervisory capacity, data infrastructure and market depth accompanied tighter standards. EMEs should therefore adapt LCR/NSFR requirements to local conditions, ensuring that supervisory authorities have sufficient analytical resources and that market infrastructure can support shifts toward more stable funding. Liquidity regulation is thus most effective when embedded in a broader institutional strategy that aligns banks' business models with sustainable levels of liquid assets, stable funding and prudent maturity transformation.

### 5.3 Limitations

This study has several limitations that should be acknowledged when interpreting the results. First, the analysis is restricted to a subset of listed or major banks in each country. While these institutions account for a large share of banking assets, they may not fully represent the behavior of smaller, specialized or non-listed banks, which could display different liquidity patterns and risk profiles.

Second, the study relies on ratio-based proxies (L1, L2, L3) constructed from publicly disclosed financial statements. These indicators inevitably compress complex balance-sheet structures into simplified measures and are sensitive to accounting conventions, aggregation choices and data availability. In addition, the study does not use bank-level LCR/NSFR series because such data are not consistently available across banks and for the full sample period. Alternative metrics, for example, maturity ladders, contractual cash-flow gaps or market-based liquidity indicators, could yield a more nuanced view of liquidity risk.

Third, the econometric specification does not explicitly incorporate institutional and structural variables such as the quality of supervision, the degree of state ownership, deposit insurance design, or the depth of money and capital markets. These factors are discussed qualitatively but not modelled directly, which may bias or attenuate estimated relationships. Moreover, the analysis does not explicitly control for macro-financial conditions (e.g., monetary policy stance, GDP growth, inflation, or financial stress), which may also shape liquidity structures over time.

Finally, the paper does not claim any causal identification. The analysis is based on descriptive statistics and comparative evidence for Moroccan and South Korean banks, which document robust patterns in liquidity structures across time and institutions. However, these patterns may still reflect unobserved factors and reverse causality that cannot be fully disentangled with the available data and design. The

results should therefore be interpreted as informative correlations and stylised facts rather than definitive causal effects.

Results are context-specific and should not be generalized without considering financial structure and regulatory capacity. Future research could extend the comparison to additional emerging economies, integrate institutional and macro-financial variables more explicitly, and examine dynamic adjustments in liquidity structures in the post-COVID period.

## References

1. Diamond, D.W., Dybvig, P.H.: Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy*. 91, 401–419 (1983). <https://doi.org/10.1086/261155>.
2. Allen, F., Gale, D.: Financial Intermediaries and Markets. *Econometrica*. 72, 1023–1061 (2004). <https://doi.org/10.1111/j.1468-0262.2004.00525.x>.
3. Brunnermeier, M.K., Pedersen, L.H.: Market Liquidity and Funding Liquidity. *Rev. Financ. Stud.* 22, 2201–2238 (2009). <https://doi.org/10.1093/rfs/hhn098>.
4. Berger, A.N., Bouwman, C.H.S.: Bank Liquidity Creation. *Rev. Financ. Stud.* 22, 3779–3837 (2009). <https://doi.org/10.1093/rfs/hhn104>.
5. Bhattacharya, S., Thakor, A.V.: Contemporary Banking Theory. *Journal of Financial Intermediation*. 3, 2–50 (1993). <https://doi.org/10.1006/jfin.1993.1001>.
6. Scannella, E.: Theory and regulation of liquidity risk management in banking. *IJRAM*. 19, 4 (2016). <https://doi.org/10.1504/IJRAM.2016.074433>.
7. Banerjee, R.N., Mio, H.: The impact of liquidity regulation on banks. *Journal of Financial Intermediation*. 35, 30–44 (2018). <https://doi.org/10.1016/j.jfi.2017.05.008>.
8. Distinguin, I., Roulet, C., Tarazi, A.: Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking & Finance*. 37, 3295–3317 (2013). <https://doi.org/10.1016/j.jbankfin.2013.04.027>.
9. Ghenimi, A., Chaibi, H., Omri, M.A.B.: The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. *Borsa Istanbul Review*. 17, 238–248 (2017). <https://doi.org/10.1016/j.bir.2017.05.002>.
10. Wójcik-Mazur, A., Szajt, M.: Determinants of liquidity risk in commercial banks in the European Union. *Argumenta Oeconomica*. 2, 25–47 (2015). <https://doi.org/10.15611/aoe.2015.2.02>.
11. Mashamba, T.: Liquidity regulations and bank behavior: An emerging markets perspective. *JGR*. 10, 194–211 (2021). <https://doi.org/10.22495/jgrv10i4siart1>.
12. DeYoung, R., Jang, K.Y.: Do banks actively manage their liquidity? *Journal of Banking & Finance*. 66, 143–161 (2016). <https://doi.org/10.1016/j.jbankfin.2015.11.013>.
13. Sundaresan, S., Xiao, K.: Liquidity regulation and banks: Theory and evidence. *Journal of Financial Economics*. 151, 103747 (2024). <https://doi.org/10.1016/j.jfineco.2023.103747>.

14. Bonner, C., Lelyveld, I.V., Zymek, R.: Banks' Liquidity Buffers and the Role of Liquidity Regulation. *J Financ Serv Res.* 48, 215–234 (2015). <https://doi.org/10.1007/s10693-014-0207-5>.
15. Vodová, P.: DETERMINANTS OF COMMERCIAL BANKS' LIQUIDITY IN HUNGARY. *AAK.* 13, 180–188 (2013). <https://doi.org/10.25142/aak.2013.016>.
16. Baltagi, B.H.: *Econometric analysis of panel data*. Wiley, Chichester (2012).
17. Hsiao, C.: *Analysis of Panel Data*. Cambridge University Press (2014). <https://doi.org/10.1017/CBO9781139839327>.
18. DeYoung, R., Jang, K.Y.: Do banks actively manage their liquidity? *Journal of Banking & Finance.* 66, 143–161 (2016). <https://doi.org/10.1016/j.jbankfin.2015.11.013>.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

