

BASEL III LIQUIDITY COVERAGE RATIO AND BANKS' DEPOSIT FUNDING STRUCTURE: EVIDENCE FROM EMERGING MARKET ECONOMIES

<https://doi.org/10.5281/zenodo.18865400>

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1. Introduction

The global financial crisis of 2007–2009 exposed fundamental vulnerabilities in banks' liquidity risk management practices. A defining characteristic of pre-crisis banking models was the excessive reliance on short-term wholesale funding instruments, including repurchase agreements and asset-backed commercial paper. While these instruments enabled rapid balance sheet expansion during periods of financial exuberance, they proved highly unstable under conditions of systemic stress. As market confidence deteriorated, wholesale funding markets contracted abruptly, triggering severe liquidity pressures across banking systems worldwide.

In response to these vulnerabilities, the Basel Committee on Banking Supervision introduced a comprehensive set of liquidity reforms under the Basel III framework. Central among these reforms is the Liquidity Coverage Ratio (LCR), formally adopted in December 2010 and fully phased in by 2019. The LCR requires banks to maintain a sufficient stock of high-quality liquid assets (HQLA) to withstand projected net cash outflows under a standardized 30-day stress scenario. By imposing calibrated runoff rates on different liability categories, the LCR alters the regulatory cost structure associated with various funding sources.

Although the LCR is designed primarily to enhance short-term liquidity resilience, its behavioral implications for banks' liability management remain an active area of academic inquiry. In particular, the regulation embeds differentiated runoff assumptions that treat retail deposits more favorably than short-term wholesale funding instruments. This calibration creates implicit incentives for banks to rebalance their funding structures toward more stable retail deposit sources. Whether banks have responded to these incentives in practice, however, remains an empirical question.

The issue is particularly salient in emerging market economies. Banking systems in emerging markets are structurally distinct from those in advanced economies, often characterized by higher reliance on deposit funding and less developed wholesale funding markets. As a result, the marginal impact of liquidity regulation may differ substantially across institutional contexts. While advanced

economy banks may face significant structural adjustment in response to liquidity standards, emerging market banks may already operate with deposit-heavy liability structures. Whether regulatory pressure under the LCR induces further reallocation toward retail deposits in such environments is therefore unclear.

This study investigates whether the Basel III Liquidity Coverage Ratio requirement has materially influenced banks' retail deposit funding behavior in emerging market economies. Specifically, we examine whether banks operating below the regulatory LCR threshold increased their reliance on retail deposits at a significantly higher rate than compliant institutions.

To address this question, we construct a bank-level panel dataset comprising commercial banks operating in emerging market jurisdictions that had formally implemented the LCR standard by the end of 2016. Employing a dynamic panel estimation framework based on the two-step System Generalized Method of Moments (System GMM) estimator, we evaluate whether regulatory liquidity pressure is associated with statistically and economically significant changes in deposit funding ratios.

Our empirical findings indicate that banks operating below the LCR minimum threshold increased their retail deposit funding ratios by approximately 9.5 percentage points more than banks already meeting the regulatory requirement. This effect is both statistically significant and economically meaningful, suggesting that the LCR has exerted a measurable influence on banks' funding structures. In addition, we document persistence in deposit funding behavior, consistent with gradual adjustment toward implicit target liability compositions.

This paper contributes to the literature in several ways.

First, while prior research has examined the macroeconomic and lending implications of liquidity regulation, relatively limited empirical evidence exists on how the LCR affects banks' liability composition in emerging market contexts. By focusing specifically on funding structure adjustments, this study isolates a key behavioral channel through which liquidity regulation may influence financial stability.

Second, we construct a bank-level measure of regulatory pressure that captures whether institutions operate below the Basel minimum liquidity threshold. This approach allows us to distinguish between compliant and non-compliant banks and to evaluate heterogeneous behavioral responses to regulatory constraints.

Third, the analysis integrates bank-specific characteristics and macro-financial determinants within a dynamic adjustment framework, thereby controlling for persistence and potential endogeneity concerns in deposit funding decisions.

The findings carry important policy implications. If liquidity regulation successfully encourages more stable funding structures without generating excessive distortions, it may strengthen systemic resilience. However, increased reliance on retail deposits may also intensify competition within deposit markets, potentially affecting funding costs, interest rate transmission, and credit intermediation dynamics. Understanding banks' funding responses to liquidity regulation is therefore essential for evaluating the broader effectiveness of macroprudential reforms.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and identifies the research gap addressed by this study. Section 3 provides an overview of the institutional design of the Liquidity Coverage Ratio. Section 4 describes the data and sample construction. Section 5 outlines the empirical methodology. Section 6 presents the empirical results. Section 7 discusses robustness considerations. Section 8 highlights policy implications and limitations. Section 9 concludes.

2. Literature Review

The introduction of liquidity regulation under the Basel III framework has generated a growing body of academic research examining its implications for bank behavior, financial stability, and macroeconomic outcomes. This literature can be broadly categorized into three strands: (i) theoretical foundations of bank liquidity and funding structure, (ii) empirical analyses of liquidity regulation and bank behavior, and (iii) emerging market banking dynamics and regulatory transmission.

2.1 Theoretical Foundations of Bank Liquidity and Funding Structure

The role of liquidity in banking has long occupied a central position in financial theory. Classic models emphasize the dual nature of banks as liquidity providers and liquidity transformers. Diamond and Rajan (1983) demonstrate that banks create liquidity by issuing demandable deposits while investing in illiquid assets, thereby exposing themselves to the risk of runs. Although individual deposit withdrawals are stochastic, depositor heterogeneity ensures aggregate statistical stability under normal conditions. This theoretical insight underpins the regulatory treatment of retail deposits as relatively stable funding sources.

Subsequent research highlights the fragility of wholesale funding markets during systemic stress. Brunnermeier (2009) argues that reliance on short-term wholesale instruments amplifies procyclical dynamics, particularly when funding is secured through collateralized markets vulnerable to sudden margin calls and liquidity spirals. Empirical evidence from the global financial crisis supports this view. Bologna (2011) and Vazquez and Federico (2012) document that banks more

heavily reliant on wholesale funding experienced greater funding instability and higher failure risk during crisis periods. Berger and Bouwman (2013) further show that liquidity creation dynamics differ significantly across funding structures, with deposit-funded banks demonstrating greater resilience.

The trade-off between stability and cost also features prominently in the literature. Retail deposits typically carry lower interest costs than wholesale funding instruments (Demirgüç-Kunt and Huizinga 1999), but aggressive competition for deposits may erode margins. From a corporate finance perspective, funding structure adjustments reflect dynamic optimization subject to adjustment costs and balance sheet frictions (Chang and Yang 2016). Consequently, banks are expected to adjust gradually toward implicit target liability compositions.

These theoretical considerations suggest that regulatory frameworks altering the relative attractiveness of funding sources may induce measurable shifts in banks' liability structures.

2.2 Liquidity Regulation and Bank Behavior

The introduction of Basel III liquidity standards marked a fundamental shift from microprudential capital regulation toward explicit liquidity risk governance. The Liquidity Coverage Ratio (LCR) standardizes stress assumptions by imposing differentiated runoff rates across liability categories, thereby embedding regulatory incentives directly into funding composition.

Empirical studies investigating the behavioral impact of liquidity regulation remain relatively limited compared to the extensive literature on capital regulation. Banerjee and Mio (2017) examine UK banks and find that liquidity requirements influence asset allocation and lending behavior. Kowalik (2013) analyzes liquidity buffers and regulatory interactions in the United States, documenting changes in liquidity management practices following regulatory tightening.

Lang (2016) provides evidence from Hungary that liquidity reforms increased competition for retail deposits, suggesting that regulatory constraints can alter liability structures. Similarly, Debelle (2012) and Robertson and Rush (2013) describe intensified deposit competition in Australia following liquidity reforms. However, much of the existing evidence focuses on advanced economies, where funding structures and capital market access differ substantially from those in emerging markets.

Research on regulatory pressure mechanisms provides a complementary perspective. Studies such as Van Roy (2008), Kleff and Weber (2008), Abreu and Gulamhussen (2013), and Ashraf, Arshad, and Hu (2016) demonstrate that banks operating below regulatory thresholds adjust behavior more aggressively than compliant institutions. This "regulatory pressure" channel is well established in

capital regulation literature but remains underexplored in the context of liquidity standards.

Despite these advances, limited empirical work isolates the direct impact of the LCR on funding structure composition, particularly within emerging market contexts.

2.3 Emerging Market Banking and Regulatory Transmission

Emerging market banking systems differ structurally from advanced economies in several respects. Deposit funding often constitutes a larger proportion of total liabilities, and wholesale capital markets are generally less developed. The Basel Consultative Group (2014) documents that deposit funding frequently exceeds 80 percent of liabilities in many emerging market jurisdictions.

Financial openness and capital flow volatility further complicate liquidity management in emerging economies. Hermann and Mihaljek (2013) and Reinhardt, Ricci, and Tressel (2013) highlight the sensitivity of banking systems to cross-border capital flows, which may substitute for or complement domestic deposit funding. Financial sector development levels also shape funding flexibility and liability diversification opportunities.

Given these structural characteristics, the marginal effect of LCR implementation in emerging markets is theoretically ambiguous. On one hand, banks already reliant on deposits may exhibit limited adjustment. On the other hand, regulatory runoff calibrations may further incentivize deposit expansion even within deposit-dominant systems.

Empirical evidence addressing this ambiguity remains sparse. While Asanovic (2018) and Vučinić (2016) examine broader financial stability dynamics in emerging markets, direct evidence on liquidity regulation-induced funding adjustments is limited.

2.4 Research Gap

The existing literature establishes that liquidity regulation can influence bank behavior and that funding structure plays a critical role in systemic resilience. However, three gaps remain.

First, empirical studies directly examining LCR-induced changes in liability composition are limited.

Second, evidence from emerging market economies is scarce, despite their structural differences from advanced economies.

Third, the regulatory pressure channel – distinguishing banks operating below versus above liquidity thresholds – has not been extensively applied to liquidity regulation analysis.

This study addresses these gaps by examining whether banks in emerging markets operating below the LCR minimum threshold adjust their retail deposit funding ratios more aggressively than compliant institutions. By focusing specifically on liability composition within a dynamic panel framework, the paper isolates a key behavioral mechanism through which liquidity regulation may influence financial stability.

3. Institutional Background: The Liquidity Coverage Ratio

3.1 Regulatory Motivation and Objectives

The Liquidity Coverage Ratio (LCR) constitutes a central pillar of the Basel III regulatory framework introduced in the aftermath of the global financial crisis. The crisis revealed that even well-capitalized banks were vulnerable to liquidity shocks when short-term funding markets contracted abruptly. The failure of major financial institutions highlighted the systemic risks associated with maturity transformation financed through unstable wholesale funding sources.

In response, the Basel Committee on Banking Supervision introduced the LCR in December 2010, with detailed guidance provided in 2013. The objective of the LCR is to strengthen banks' short-term liquidity resilience by ensuring that institutions maintain sufficient high-quality liquid assets (HQLA) to withstand a severe but plausible 30-day liquidity stress scenario.

Unlike internal liquidity stress-testing models previously used by banks, the LCR standardizes both the stress horizon and the runoff assumptions across institutions. This harmonization enhances comparability, reduces model discretion, and embeds regulatory incentives directly into balance sheet management.

3.2 Formal Structure of the LCR

Formally, the Liquidity Coverage Ratio is defined as:

$$\text{LCR} = (\text{Stock of High-Quality Liquid Assets}) / (\text{Total Net Cash Outflows over 30 days})$$

Banks are required to maintain an LCR of at least 100 percent under normal operating conditions. This requirement implies that the stock of unencumbered HQLA must equal or exceed projected net cash outflows during a 30-day stress period.

During systemic stress episodes, temporary declines below the threshold are permitted, as liquidity buffers are intended to be drawn down in adverse conditions. However, such drawdowns are subject to supervisory review and monitoring.

The ratio consists of two principal components: the numerator (HQLA) and the denominator (net cash outflows). The regulatory calibration of these

components determines the behavioral incentives embedded within the framework.

3.3 High-Quality Liquid Assets (HQLA)

High-quality liquid assets are instruments that can be converted rapidly into cash with minimal loss of value during stressed market conditions. The Basel III framework classifies HQLA into three categories: Level 1, Level 2A, and Level 2B assets.

Level 1 Assets

Level 1 assets represent the highest-quality and most liquid instruments. These include cash, central bank reserves, and sovereign securities qualifying for a zero percent risk weight under the standardized approach to credit risk. Level 1 assets are not subject to haircuts and may comprise an unlimited proportion of total HQLA, although they must constitute at least 60 percent of the buffer.

Level 2 Assets

Level 2 assets serve as supplementary liquidity instruments and are divided into Level 2A and Level 2B categories.

Level 2A assets include high-quality corporate debt securities, covered bonds, and certain sovereign and public-sector exposures. These instruments are subject to a 15 percent haircut.

Level 2B assets include lower-rated corporate bonds, certain residential mortgage-backed securities, and qualifying equities. These instruments are subject to higher haircuts, ranging from 25 to 50 percent.

To preserve buffer quality, quantitative caps apply. Level 2 assets in aggregate may not exceed 40 percent of total HQLA, and Level 2B assets may not exceed 15 percent. These caps prevent excessive reliance on lower-quality instruments within liquidity buffers.

In addition to quantitative thresholds, assets must satisfy qualitative criteria, including low credit risk, ease of valuation, low correlation with risky assets, and active trading in deep and transparent markets.

3.4 Total Net Cash Outflows

The denominator of the LCR reflects projected liquidity pressures over a standardized 30-day stress horizon. Total net cash outflows are calculated as expected cash outflows minus expected cash inflows, subject to an inflow cap of 75 percent of outflows. This restriction ensures that banks maintain a minimum liquidity buffer equivalent to at least 25 percent of projected outflows.

Expected cash outflows are determined by applying prescribed runoff rates to various liability categories and off-balance sheet exposures. Retail deposits receive relatively favorable treatment, with runoff rates as low as 5 percent for stable

deposits. In contrast, unsecured wholesale funding and certain short-term liabilities receive substantially higher runoff rates.

Expected cash inflows are calculated by applying standardized inflow rates to performing loans and other receivables. However, inflows are capped to prevent excessive reliance on anticipated payments during stress conditions.

3.5 Incentive Mechanisms Embedded in the LCR

Although the LCR does not explicitly mandate changes in liability composition, its calibration modifies the regulatory cost associated with different funding sources. Because retail deposits carry lower runoff rates than wholesale funding instruments, increasing deposit funding mechanically reduces projected net cash outflows in the denominator of the LCR.

Substituting high-runoff wholesale funding with low-runoff retail deposits improves the LCR without requiring additional holdings of high-quality liquid assets. Consequently, banks operating below the regulatory threshold face implicit incentives to rebalance their funding structures toward stable retail deposit sources.

This incentive structure forms the central behavioral mechanism examined in this study.

3.6 Phased Implementation

Recognizing potential transitional effects on credit intermediation and funding markets, the Basel Committee implemented the LCR gradually:

- 2015: 60 percent
- 2016: 70 percent
- 2017: 80 percent
- 2018: 90 percent
- 2019: 100 percent

The phased implementation allowed banks time to adjust balance sheet structures without abrupt disruption.

For emerging market jurisdictions included in this study, implementation status was assessed under the Regulatory Consistency Assessment Programme (RCAP), ensuring alignment with Basel III standards.

4. Data and Sample Construction

4.1 Sample Selection and Regulatory Scope

This study employs bank-level financial statement data drawn from the Bankscope database. The sample construction follows a structured, regulation-driven approach designed to ensure consistency with the implementation timeline of the Liquidity Coverage Ratio (LCR) under Basel III.

The analysis is restricted to emerging market jurisdictions that had formally adopted and implemented the LCR standard by 31 December 2016. Implementation

status is determined using official assessments conducted under the Basel Committee on Banking Supervision's Regulatory Consistency Assessment Programme (RCAP). Only jurisdictions classified as compliant or largely compliant with the Basel III LCR standard are included in the sample.

As of December 2016, eleven emerging market jurisdictions met this criterion:

Argentina
Hong Kong
India
Indonesia
Korea
Mexico
Russia
Saudi Arabia
Singapore
South Africa
Turkey

Restricting the sample to LCR-compliant jurisdictions ensures regulatory comparability across countries and reduces cross-country heterogeneity arising from differences in liquidity regulation frameworks.

4.2 Bank-Level Screening Criteria

The initial extraction from Bankscope yielded 91 banking institutions operating within the selected jurisdictions. However, not all institutions in the raw dataset qualify as traditional commercial banks engaged in deposit-taking and lending intermediation.

To ensure consistency in institutional characteristics and funding behavior, additional screening criteria were applied. Following the methodological approaches of Berger and Bouwman (2009) and Bruno, Onali, and Schaeck (2014), banks were excluded under the following conditions:

1. The institution reported zero deposit balances.
2. The institution reported no outstanding loan portfolio.
3. The institution did not hold commercial real estate loans or commercial and industrial loans.
4. The institution reported zero or negative equity capital.
5. The institution resembled a building society, defined as having residential mortgage loans exceeding 50 percent of gross total loans.

These filters serve two purposes. First, they eliminate specialized financial institutions and non-depository entities whose liability structures are not

comparable to commercial banks. Second, they remove distressed or inactive institutions whose balance sheet distortions could bias funding behavior analysis.

After applying these screening criteria, the final sample consists of 40 commercial banks observed annually from January 2011 through December 2016.

The panel is unbalanced due to occasional missing observations for certain variables. However, sufficient cross-sectional and time-series variation remains to support dynamic panel estimation.

The six-year observation window captures the transitional period surrounding the phased implementation of the LCR requirement, thereby providing an appropriate empirical setting to examine regulatory-induced funding adjustments.

4.3 Variable Definitions

Dependent Variable

The dependent variable is retail deposit funding, measured as the ratio of retail deposits to total funding (DEP/TF). This ratio captures the relative importance of stable deposit funding within banks' liability structures.

Changes in this ratio reflect adjustments in funding composition rather than absolute balance sheet expansion.

Key Independent Variable: Regulatory Pressure

The central explanatory variable captures regulatory pressure arising from the LCR requirement.

Following approaches used in capital regulation literature (e.g., Van Roy 2008; Kleff and Weber 2008; Ashraf et al. 2016), regulatory pressure is measured using a binary indicator (REGPRESS) defined as:

REGPRESS = 1 if the bank's LCR is below the Basel minimum threshold (100%)

REGPRESS = 0 otherwise

This specification distinguishes between banks operating below the regulatory liquidity requirement and those meeting or exceeding the threshold.

The premise is that banks facing LCR shortfalls are subject to heightened supervisory scrutiny and therefore have stronger incentives to adjust their funding structures.

Bank-Level Control Variables

The empirical specification includes several bank-specific characteristics that may influence funding behavior:

- **Bank Size (SIZE):** Natural logarithm of total assets.
- **Profitability (NIM):** Net interest margin (net interest income divided by interest-earning assets).
- **Asset Quality (NPL):** Ratio of non-performing loans to total loans.

- **Income Diversification (ID):** Ratio of non-interest income to total income.
- **Bank Capital (CAP):** Core Equity Tier 1 capital ratio.

Including these variables controls for heterogeneity in operational performance, risk exposure, and capital strength.

Macroeconomic and Financial Variables

To account for broader economic conditions, the model incorporates:

- **Economic Conditions (GDP):** Real GDP growth rate.
- **Financial Sector Openness (OPENNESS):** Current account balance relative to GDP.
- **Financial Sector Development (FSD):** Ratio of broad money (M2) to GDP.

These variables capture macro-financial environments that may affect deposit flows and funding flexibility.

4.4 Descriptive Statistics

Table 1 reports descriptive statistics for the main variables used in the analysis.

The average retail deposit funding ratio (DEP/TF) equals 82.48 percent, with a standard deviation of 13.06 percent. This confirms that banks in the sample rely heavily on retail deposit funding. However, the range (34.08 percent to 99.43 percent) indicates substantial cross-sectional heterogeneity.

Table 1. Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Deposit funding (DEP/TF)	196	82.48	13.06	34.08	99.43
Bank capital (CAP)	163	10.20	4.42	9.41	45.75
Bank size (SIZE)	197	19.23	3.51	10.36	26.24
Bank profitability (NIM)	197	3.88	2.31	0.70	15.47
Asset quality (NPL)	183	4.36	10.46	0.02	100.00
Income diversification (ID)	197	32.70	12.36	5.23	65.90
Economic conditions (GDP)	192	4.20	2.28	-3.77	8.77
Financial sector openness (OPENNESS)	185	-1.42	3.12	-5.87	7.69
Financial sector development (FSD)	185	75.47	61.58	19.56	233.40

Source: Own calculations based on Bankscope data.

Note: DEP/TF denotes retail deposits to total funding. CAP represents Core Equity Tier 1 ratio. SIZE is the natural logarithm of total assets. NIM denotes net interest margin. NPL represents non-performing loans to total loans. ID denotes non-interest income to total income. GDP represents real GDP growth. FSD is measured as M2 to GDP. OPENNESS is measured as current account balance to GDP.

The Core Equity Tier 1 capital ratio (CAP) averages 10.20 percent, well above the Basel minimum requirement, suggesting that banks are not generally capital-constrained during the sample period.

Bank size exhibits meaningful variation, reflecting a mix of medium-sized and relatively large institutions. Profitability (NIM) averages 3.88 percent, indicating positive earnings across most banks.

Asset quality displays substantial dispersion, with non-performing loan ratios ranging from 0.02 percent to 100 percent. This variation underscores the importance of controlling for credit risk in funding behavior analysis.

Financial sector development (FSD) and openness (OPENNESS) also display cross-country variation, reinforcing the need to control for macro-financial heterogeneity.

5. Empirical Methodology

5.1 Empirical Framework

The central objective of this study is to examine whether regulatory pressure associated with the Liquidity Coverage Ratio (LCR) requirement influences banks' retail deposit funding behavior. Specifically, we test whether banks operating below the regulatory liquidity threshold adjust their deposit funding ratios more aggressively than compliant institutions.

Bank funding structures are expected to exhibit persistence due to depositor relationships, contractual frictions, and balance sheet rigidities. Moreover, adjustment toward target liability compositions is unlikely to occur instantaneously. Instead, banks gradually rebalance funding sources in response to regulatory incentives and market conditions.

To capture persistence and dynamic adjustment behavior, we employ a dynamic panel specification of the following form:

$$\Delta\left(\frac{DEP_{ict}}{TL_{ict}}\right) = \rho\left(\frac{DEP_{ict-1}}{TL_{ict-1}}\right) + \theta REGPRESS_{ict} + \gamma_1 CAP_{ict} + \gamma_2 SIZE_{ict} + \gamma_3 NIM_{ict} \\ + \gamma_4 NPL_{ict} + \gamma_5 ID_{ict} + \psi_1 GDP_{ct} + \psi_2 FSD_{ct} + \psi_3 OPENNESS_{ct} + v_i + \varepsilon_{ict}$$

Where:

- $\Delta(DEP_{ict} / TL_{ict})$ denotes the change in the ratio of retail deposits to total liabilities for bank i , in country c , at time t .

- $(DEP_{ict-1} / TL_{ict-1})$ represents the one-period lag of the retail deposit funding ratio, capturing persistence and partial adjustment dynamics in banks' funding structures.

- **REGPRESS_{ict}** is a regulatory pressure indicator equal to 1 if the bank operates below the minimum Liquidity Coverage Ratio (LCR) requirement and 0 otherwise.

- **CAP_{ict}** denotes the Core Equity Tier 1 capital ratio of bank i at time t .

- **SIZE_{ict}** represents the natural logarithm of total assets, capturing bank size.

- **NIM_{ict}** denotes the net interest margin, defined as net interest income divided by interest-earning assets.

- **NPL_{ict}** represents the ratio of non-performing loans to total loans, capturing asset quality.

- **ID_{ict}** denotes income diversification, measured as the ratio of non-interest income to total income.

- **GDP_{ct}** represents real GDP growth in country c at time t , capturing macroeconomic conditions.

- **FSD_{ct}** denotes financial sector development, proxied by the ratio of broad money (M2) to GDP.

- **OPENNESS_{ct}** represents financial sector openness, measured by the current account balance relative to GDP.

- \mathbf{v}_i captures unobserved, time-invariant bank-specific effects.

- $\boldsymbol{\varepsilon}_{ict}$ denotes the idiosyncratic error term.

The inclusion of the lagged dependent variable allows for partial adjustment dynamics and persistence in funding behavior.

5.2 Identification Strategy

Identification of the regulatory effect relies on within-bank variation over time in regulatory status. The key source of variation arises from differences between banks operating below the LCR minimum threshold and those meeting or exceeding the requirement.

The regulatory pressure variable captures whether a bank faces a binding liquidity constraint in a given year. The coefficient on REGPRESS therefore measures the differential change in deposit funding associated with LCR shortfalls, controlling for bank characteristics and macroeconomic conditions.

By including bank-specific fixed effects, the model controls for time-invariant heterogeneity such as managerial quality, business model orientation, and institutional risk culture. Time-varying macro controls further mitigate omitted variable bias.

While reverse causality is theoretically possible—since changes in deposit funding may affect the LCR ratio—the dynamic specification and instrumental variable approach described below mitigate simultaneity concerns.

5.3 Endogeneity Concerns

Estimating dynamic panel models using pooled Ordinary Least Squares (OLS) or Fixed Effects (FE) estimators produces biased and inconsistent estimates when the lagged dependent variable is included. As demonstrated by Nickell (1981), the within transformation induces correlation between the lagged dependent variable and the transformed error term when the time dimension is short.

Additionally, explanatory variables such as profitability, capital adequacy, and asset quality may be endogenous. For example, deteriorating asset quality may simultaneously affect funding structure and be influenced by liquidity constraints.

Therefore, an estimation strategy capable of addressing:

- Dynamic panel bias
- Unobserved heterogeneity
- Potential simultaneity
- Reverse causality

is required.

5.4 System GMM Estimation

To address these econometric challenges, we employ the two-step System Generalized Method of Moments (System GMM) estimator developed by Blundell and Bond (1998).

System GMM combines equations in first differences with equations in levels. In the differenced equation, lagged levels of endogenous variables serve as instruments. In the level equation, lagged differences are used as instruments. This approach improves efficiency relative to the difference GMM estimator proposed by Arellano and Bond (1991), particularly when the dependent variable exhibits persistence.

The System GMM estimator is appropriate in this context because:

1. The panel has a relatively small time dimension ($T = 6$) and moderate cross-sectional dimension ($N = 40$).
2. The dependent variable exhibits persistence.
3. Several explanatory variables may be endogenous.

Following standard practice in banking panel studies, the lagged dependent variable is treated as endogenous. Bank-specific variables potentially subject to simultaneity (e.g., profitability, capital, asset quality) are treated as predetermined or endogenous, while macroeconomic variables are treated as exogenous.

To mitigate instrument proliferation, we ensure that the number of instruments remains lower than the number of cross-sectional groups. Excessive instruments can weaken overidentification tests and bias estimates toward OLS results.

Estimation is conducted using two-step robust standard errors to account for heteroskedasticity and autocorrelation.

5.5 Diagnostic and Specification Tests

Several diagnostic tests are conducted to validate the empirical specification.

Serial Correlation Test

The Arellano-Bond test for autocorrelation is applied to the differenced residuals. While first-order serial correlation is expected, absence of second-order serial correlation is required for valid moment conditions. The AR(2) test results indicate no evidence of second-order serial correlation, supporting the validity of the instrument set.

Overidentification Test

Instrument validity is assessed using the Sargan test of overidentifying restrictions. The null hypothesis that instruments are valid and uncorrelated with the error term cannot be rejected, suggesting that the moment conditions are appropriate.

Joint Significance

The Wald test evaluates the joint significance of the explanatory variables. The reported statistic confirms that regressors are jointly significant in explaining deposit funding adjustments.

5.6 Speed of Adjustment

The coefficient on the lagged dependent variable allows calculation of the speed of adjustment toward target funding levels:

$$\text{Speed of adjustment} = 1 - \rho$$

The estimated adjustment speed suggests that banks correct a substantial proportion of deviations from target deposit levels within one year, consistent with active liability management in response to regulatory incentives.

6. Empirical Results

This section presents the results obtained from estimating the dynamic panel specification using the two-step System GMM estimator. The discussion proceeds in three steps. First, we assess model diagnostics and specification validity. Second, we examine the persistence and adjustment dynamics of deposit funding. Third, we evaluate the impact of regulatory pressure and control variables on funding behavior.

You're right – here's the **same empirical results table**, but recreated with the **Variable description** column included (journal style), and formatted so you can paste it into Word.

Table 2. Empirical Results (Two-step System GMM)

Dependent variable: $\Delta(\text{DEP}/\text{TF})$

Variable	Variable description	(1) DEP/TF
$(\text{DEP}/\text{TF})_{\{i,t-1\}}$	Lagged dependent variable	0.2224*
		(0.1337)
CAP	Bank capital	-0.2371
		(0.2930)
SIZE	Bank size	2.5252
		(2.1325)
NIM	Bank profitability	-1.5589
		(1.1294)
NPL	Asset quality	0.2426***
		(0.0353)
ID	Income diversification	-0.0343
		(0.0992)
REGPRESS	Regulatory pressure	9.4793**
		(4.5100)
GDP	Real GDP growth	0.7099
		(0.4718)
FSD	Financial sector development	0.0016
		(0.0653)
OPENNESS	Financial sector openness	-0.6753*
		(0.3881)
Arellano-Bond AR(2) test (p-value)		0.3268
Sargan test (p-value)		0.3629
Wald test (χ^2)		2928.52

Source: Own calculations based on Bankscope data.

*Notes: Robust standard errors are in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.*

6.1 Model Diagnostics

Before interpreting coefficient estimates, it is necessary to confirm the validity of the econometric specification.

Serial Correlation

The Arellano-Bond test for second-order serial correlation (AR(2)) in the differenced residuals yields a p-value of 0.3268. Since the null hypothesis of no

second-order autocorrelation cannot be rejected, the moment conditions underlying the System GMM estimator are valid. The absence of AR(2) correlation supports the appropriateness of the lag structure used for instrumentation.

Overidentification Test

The Sargan test of overidentifying restrictions produces a p-value of 0.3629. This indicates that the null hypothesis—that the instruments are valid and uncorrelated with the error term—cannot be rejected. Therefore, the instrument set appears to satisfy the required exogeneity conditions.

Joint Significance

The Wald test statistic of 2928.52 confirms that the explanatory variables are jointly significant in explaining variations in deposit funding behavior.

Taken together, these diagnostic tests support the reliability of the estimated coefficients and the appropriateness of the dynamic panel specification.

6.2 Persistence and Adjustment Dynamics

The coefficient on the lagged dependent variable (DEP_{t-1}) is positive and statistically significant at the 10 percent level, with an estimated value of 0.2224.

This finding confirms that deposit funding ratios exhibit persistence over time. Funding structures are not adjusted instantaneously; rather, banks gradually converge toward target liability compositions.

Using the estimated coefficient, the implied speed of adjustment is:

$$\text{Speed of adjustment} = 1 - 0.2224 = 0.7776$$

This suggests that approximately 78 percent of deviations from target deposit levels are corrected within one year. The relatively high adjustment speed indicates that banks in emerging market economies actively manage their funding structures and respond meaningfully to liquidity pressures.

The presence of dynamic persistence also validates the use of a dynamic panel framework, as static estimators would fail to capture this adjustment process.

6.3 Regulatory Pressure and Deposit Funding

The primary variable of interest, REGPRESS, enters the regression with a positive and statistically significant coefficient of 9.4793 at the 5 percent level.

This result indicates that banks operating below the LCR minimum threshold increase their retail deposit funding ratio by approximately 9.5 percentage points more than banks already compliant with the regulatory requirement.

Economic Significance

Given that the sample mean deposit funding ratio is 82.48 percent, a 9.5 percentage point increase represents a substantial reallocation in liability structure. Relative to the standard deviation of 13.06 percent, the regulatory effect

corresponds to roughly 0.73 standard deviations—an economically meaningful shift.

This magnitude suggests that the LCR requirement does not merely produce marginal balance sheet adjustments but induces substantial behavioral change among non-compliant institutions.

Interpretation

The positive coefficient provides strong empirical support for the regulatory incentive mechanism embedded in the LCR framework. Because retail deposits receive lower runoff rates than wholesale liabilities, increasing deposit funding mechanically improves the liquidity ratio. Banks facing LCR shortfalls therefore have clear incentives to rebalance toward stable deposit funding.

The results are consistent with prior evidence documenting regulatory pressure effects in capital regulation contexts and extend this channel to liquidity regulation in emerging markets.

6.4 Bank-Level Control Variables

Asset Quality (NPL)

The coefficient on asset quality (NPL) is positive and statistically significant at the 1 percent level (0.2426).

This indicates that banks experiencing higher non-performing loan ratios increase their reliance on retail deposit funding. Two interpretations are plausible.

First, deteriorating asset quality may limit access to wholesale funding markets, forcing banks to rely more heavily on retail deposits. Second, banks facing rising credit risk may strengthen deposit funding as a precautionary liquidity measure.

In either case, credit risk conditions significantly influence funding structure adjustments.

Bank Capital (CAP)

The coefficient on capital adequacy is negative (−0.2371) but statistically insignificant.

Although liquidity and solvency are conceptually interconnected, variations in capital ratios do not appear to drive short-run deposit funding adjustments within the sample period. This suggests that funding rebalancing is primarily motivated by liquidity regulation rather than capital constraints.

Bank Size (SIZE)

The coefficient on bank size is positive (2.5252) but statistically insignificant.

This indicates that scale differences do not systematically explain deposit funding adjustments once regulatory pressure and other controls are considered. While larger banks may enjoy broader funding access, such advantages do not

translate into statistically distinguishable deposit adjustment behavior in the presence of LCR requirements.

Profitability (NIM)

The coefficient on profitability is negative (-1.5589) and statistically insignificant.

This suggests that differences in net interest margins do not significantly influence short-term changes in deposit funding. Although profitability may enhance financial flexibility, it does not appear to alter regulatory-driven funding adjustments.

Income Diversification (ID)

The coefficient on income diversification is negative (-0.0343) and statistically insignificant.

Variation in revenue composition between interest and non-interest income does not significantly affect funding structure decisions in this specification.

6.5 Macroeconomic and Financial Variables

Economic Conditions (GDP)

The coefficient on real GDP growth is positive (0.7099) but statistically insignificant.

While economic expansion may increase deposit accumulation through income and savings channels, macroeconomic growth does not significantly explain short-term funding adjustments once regulatory and bank-level factors are controlled for.

Financial Sector Development (FSD)

The coefficient on financial sector development is positive (0.0016) but statistically insignificant.

This suggests that differences in financial system depth across emerging markets do not significantly drive deposit rebalancing during the sample period.

Financial Sector Openness (OPENNESS)

The coefficient on financial sector openness is negative (-0.6753) and statistically significant at the 10 percent level.

This indicates that banks operating in more financially open economies tend to rely less on retail deposit expansion. Greater openness may provide access to alternative funding channels, reducing the need for aggressive deposit rebalancing.

This finding suggests that financial integration moderates the impact of regulatory incentives on funding behavior.

6.6 Summary of Findings

The empirical evidence provides strong support for the central hypothesis of this study. Regulatory pressure associated with LCR shortfalls significantly increases retail deposit funding among emerging market banks.

The magnitude of the effect is economically meaningful, and the results are robust to the inclusion of bank-specific and macro-financial controls. Deposit funding behavior exhibits persistence and gradual adjustment, consistent with dynamic liability management.

Among control variables, asset quality emerges as a significant determinant of funding adjustments, while financial openness moderates deposit reliance. Traditional determinants such as capital adequacy, size, profitability, and financial development do not significantly influence short-run deposit rebalancing once regulatory pressure is considered.

These findings indicate that the Basel III Liquidity Coverage Ratio has materially influenced banks' liability management behavior in emerging market economies.

7. Robustness Considerations

Although the baseline results provide strong evidence that regulatory pressure associated with the Liquidity Coverage Ratio influences deposit funding behavior, several additional considerations are relevant for assessing robustness and identification validity.

7.1 Instrument Proliferation and Model Stability

A common concern in System GMM estimation is instrument proliferation, which can weaken overidentification tests and bias estimates toward pooled OLS results. To mitigate this risk, the number of instruments was restricted to remain below the number of cross-sectional groups. This precaution reduces the risk of overfitting endogenous variables and preserves the power of the Sargan test.

Furthermore, the stability of the coefficient on REGPRESS across alternative lag structures was verified during estimation. The regulatory effect remains positive and economically meaningful when limiting the instrument lag depth, suggesting that the results are not driven by excessive instrumentation.

7.2 Alternative Interpretation and Reverse Causality

One potential concern is reverse causality. Changes in deposit funding may themselves improve the LCR ratio, potentially influencing regulatory status. However, the empirical specification mitigates this concern in several ways.

First, the dynamic structure controls for persistence in funding behavior. Second, regulatory pressure is defined relative to a regulatory threshold, capturing supervisory status rather than continuous variation in the liquidity ratio. Third, the

use of lagged instruments in the System GMM framework reduces simultaneity bias.

While reverse causality cannot be entirely ruled out in observational data, the direction of adjustment observed – deposit increases among LCR-deficit banks – is consistent with the incentive mechanism embedded in the regulatory calibration.

7.3 Sample Size and Time Dimension

The panel consists of 40 banks observed over a six-year period. Although System GMM is generally applied in panels with large cross-sectional dimensions and short time spans, the sample size remains sufficient to support dynamic estimation, provided that instrument count is controlled.

Nevertheless, future research using longer post-implementation windows may further validate the persistence of the observed regulatory effect.

7.4 Cross-Country Heterogeneity

The sample includes banks operating in eleven emerging market jurisdictions. While regulatory implementation status is harmonized through RCAP compliance, structural differences across countries may still influence funding behavior.

Macroeconomic and financial development controls are included to mitigate cross-country heterogeneity. However, unobserved country-specific dynamics cannot be fully eliminated. Future research may incorporate country fixed effects or country-time interactions where data availability permits.

7.5 Alternative Funding Channels

The analysis focuses specifically on retail deposit funding as the behavioral response to liquidity regulation. Banks may also adjust liquidity positions through asset-side strategies, such as increasing holdings of high-quality liquid assets or reducing loan growth.

While the present study isolates the liability-side adjustment channel, further research may explore complementary asset-side responses to provide a more comprehensive view of regulatory transmission mechanisms.

8. Policy Implications and Limitations

8.1 Policy Implications

The empirical findings of this study carry several important policy implications for regulators, supervisory authorities, and financial stability frameworks in emerging market economies.

Liquidity Regulation and Behavioral Effectiveness

First, the results indicate that the Liquidity Coverage Ratio (LCR) has successfully altered banks' funding behavior. Institutions operating below the regulatory threshold increased their reliance on retail deposits at a statistically and economically significant rate. This suggests that the runoff calibration embedded

within the LCR effectively creates incentives for banks to rebalance liability structures toward more stable funding sources.

From a regulatory design perspective, this finding supports the view that liquidity standards can influence behavior even in banking systems already characterized by high deposit reliance. The LCR does not merely serve as a reporting requirement but functions as a binding regulatory constraint shaping funding decisions.

Financial Stability Considerations

Second, increased reliance on retail deposits may enhance liquidity resilience. Retail deposits are generally more stable than short-term wholesale funding, particularly under stress conditions. A funding structure more heavily weighted toward stable deposits may reduce vulnerability to sudden liquidity shocks and mitigate procyclical funding spirals.

However, regulators must also consider potential second-round effects. If multiple institutions simultaneously intensify competition for retail deposits, upward pressure on deposit rates may emerge. Higher funding costs could compress bank profitability and potentially affect credit supply conditions. In extreme cases, synchronized regulatory adjustments could generate distortions in deposit markets.

Emerging Market Context

Third, the findings highlight the importance of regulatory transmission mechanisms in emerging market environments. Although emerging market banks are traditionally deposit-funded, regulatory pressure still induces measurable funding reallocation. This suggests that Basel III liquidity standards exert meaningful behavioral effects beyond advanced economies.

For policymakers in emerging markets, the results underscore the relevance of supervisory oversight in monitoring both the intended and unintended consequences of liquidity reforms.

8.2 Limitations

While the study provides empirical evidence of regulatory effects on funding behavior, several limitations should be acknowledged.

Sample Size and Time Horizon

The analysis is based on a panel of 40 banks observed over a six-year period (2011–2016). Although the dynamic panel framework is appropriate for the available data, a longer post-implementation period would allow assessment of whether the observed effects persist beyond the transitional phase.

Future research extending the sample to include fully phased-in LCR years (post-2019) may provide additional insights into the long-run equilibrium effects of liquidity regulation.

Measurement Constraints

The study relies on publicly available financial statement data from Bankscope. Measurement differences across jurisdictions and potential reporting inconsistencies may introduce noise into variable construction. While regulatory compliance status is harmonized through RCAP assessments, micro-level reporting practices may vary.

Identification Boundaries

Although the dynamic GMM framework mitigates simultaneity and endogeneity concerns, the analysis remains observational. Causal interpretation relies on the regulatory pressure mechanism and dynamic instrumentation. Unobserved shocks affecting both funding behavior and regulatory status cannot be entirely ruled out.

Focus on Liability-Side Adjustment

The analysis concentrates on liability-side adjustments, specifically retail deposit funding. Banks may also respond to liquidity regulation through asset-side strategies, including increased holdings of high-quality liquid assets or reduced lending activity. A comprehensive assessment of regulatory transmission would incorporate both asset and liability channels.

9. Conclusion

This study examines whether the Basel III Liquidity Coverage Ratio (LCR) requirement has influenced banks' retail deposit funding behavior in emerging market economies. Specifically, the analysis investigates whether banks operating below the regulatory liquidity threshold adjust their funding structures more aggressively than compliant institutions.

Using bank-level panel data from eleven emerging market jurisdictions that had formally implemented the LCR standard by the end of 2016, and employing a dynamic panel estimation strategy based on the two-step System Generalized Method of Moments estimator, the study provides evidence that regulatory pressure significantly affects liability composition.

The results indicate that banks facing LCR shortfalls increase their retail deposit funding ratios by approximately 9.5 percentage points more than banks already meeting the regulatory requirement. This effect is both statistically significant and economically meaningful. In addition, deposit funding behavior exhibits persistence and gradual adjustment dynamics, with banks correcting a substantial proportion of deviations from target funding levels within one year.

Among control variables, asset quality plays a significant role in shaping deposit adjustments, while financial openness moderates reliance on deposit funding. In contrast, capital adequacy, bank size, profitability, and financial sector development do not significantly influence short-run deposit rebalancing once regulatory pressure is accounted for.

These findings suggest that the LCR operates not merely as a passive reporting standard but as an active regulatory mechanism influencing banks' liability management behavior. By assigning differentiated runoff rates to funding sources, the framework embeds incentives that reshape balance sheet composition.

From a policy perspective, encouraging greater reliance on stable retail deposits may enhance liquidity resilience and reduce exposure to volatile wholesale markets. However, regulators should remain attentive to potential competitive pressures in deposit markets and broader implications for funding costs and credit intermediation.

Overall, the evidence indicates that Basel III liquidity reforms have materially influenced funding structures in emerging market banking systems. Continued evaluation of regulatory transmission channels remains essential to ensure that liquidity standards promote financial stability without generating unintended distortions.

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