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The Impact of Monetary Policy on Bank Liquidity Management Strategies: Empirical Evidence from the Diamond-Dybvig Framework

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Abstract. The purpose of this paper is to examine how changes in monetary policy affect banks' liquidity management strategies. Building on the classic Diamond-Dybvig framework, it has been constructing an extended model that incorporates liquidity regulatory constraints. Using dynamic panel data and the System Generalized Method of Moments (System GMM) approach, it has been analyzing the mechanisms and heterogeneous effects through which monetary policy adjustments influence commercial banks' liquidity management strategies. The main findings are threefold. First, expansionary monetary policy significantly increases banks' liquidity creation by lowering funding costs, but it also induces greater risk-taking, evidenced by an average 12.3% increase in the allocation of high-risk assets. Second, structural monetary policy tools (e.g., targeted liquidity facilities) have a disproportionate effect on large banks' liquidity, with optimization impacts about 1.8 times greater for large banks than for small and medium banks, thus exacerbating liquidity stratification. Third, each 1 percentage point increase in the Liquidity Coverage Ratio (LCR) requirement reduces monetary policy transmission efficiency by approximately 0.15 standard deviations. These findings highlight the important moderating role of bank-specific characteristics in monetary policy transmission, and they provide a theoretical and empirical basis for improving coordination between macroprudential policies and micro-level regulations.

Keywords: Monetary Policy, Liquidity Management, Diamond-Dybvig Model, Liquidity Coverage Ratio (LCR), System GMM

1. Introduction

Bank liquidity management is central to the transmission of monetary policy. The seminal work of Diamond and Dybvig demonstrated that banks inherently face liquidity risk due to the maturity mismatch between short-term liabilities (deposits) and long-term assets (loans) [1]. Monetary policy decisions can directly influence banks' risk exposure by altering funding costs and guiding asset allocation choices. For example, lower interest rates reduce banks' cost of funds and can stimulate credit expansion. Following the 2008 global financial crisis, the interaction of quantitative easing policies with the new Basel III liquidity regulations (notably the LCR introduced by the Basel

Committee in 2013) led to structural shifts in banks' liquidity management strategies [2]. Although prior studies confirmed that expansionary monetary policy generally spurs bank lending and credit growth, there is still limited analysis of how banks of different sizes might be affected differently [3].

Recent developments suggest that various targeted monetary policy tools (such as targeted reserve requirement cuts and central bank lending facilities) can induce divergent liquidity behaviors across banks. For instance, during the COVID-19 crisis, the Federal Reserve's emergency lending programs in 2020 increased the LCR of large banks by 18%, whereas community banks saw only a 6% improvement. This example underlines how structural tools may segment the market, benefiting bigger institutions relatively more. However, the mechanisms behind such heterogeneity remain unclear. In general, existing research on this topic has three primary gaps : (1) insufficient attention to the differential impacts of structural (targeted) monetary policy instruments on banks' decision-making; (2) a lack of quantitative analysis linking liquidity regulatory indicators (like the LCR) to monetary policy transmission; and (3) sparse empirical evidence on how bank-specific characteristics (such as size or capitalization) moderate policy effects in a cross-country context.

Against this backdrop, the study addresses three core research questions: How do expansionary or contractionary monetary policies influence banks' adjustments in their deposit-loan maturity structures? Do targeted monetary policy tools (e.g., selective liquidity facilities) exacerbate liquidity stratification between large versus small banks? How does the LCR liquidity requirement affect the efficiency of monetary policy transmission to bank lending?

To answer these questions, it has been developing an extended model that incorporates regulatory liquidity constraints into the Diamond-Dybvig framework. Using this model, it has been found that banks with lower capital buffers (capital adequacy ratios below 10%) exhibit about 34% higher sensitivity to changes in policy interest rates than well-capitalized banks. Furthermore, targeted monetary policy tools provide liquidity support to systemically important banks at a level roughly 2.3 times greater than that for non-systemically important banks. These results underscore significant heterogeneity in policy transmission. Compared to the existing literature, the contributions lie in: (1) quantitatively evaluating the costs of liquidity regulation (e.g. LCR constraints) on monetary policy effectiveness; (2) revealing how bank size and capital adequacy act as moderating mechanisms in the transmission process; and (3) proposing a three-dimensional analytical framework that links policy tools – bank characteristics – regulatory constraints as a unified system for analysis.

2. Literature review

Research on the interplay between banks' liquidity management and monetary policy builds on three strands of theory: financial intermediation theory, monetary policy transmission channels, and regulatory economics. Below, it has been reviewing key literature in each area to highlight the theoretical foundations and remaining gaps.

Liquidity Creation and Financial Intermediation: Diamond and Dybvig's classic model established that banks create liquidity by transforming short-term deposits into long-term loans [4]. This maturity transformation improves economic efficiency by funding illiquid projects with liquid liabilities, but it also leaves banks vulnerable to runs if depositors panic. While the Diamond-Dybvig model provides a fundamental understanding of liquidity risk and bank runs, it does not explicitly incorporate monetary policy shocks or regulatory constraints. Subsequent studies quantified banks' liquidity creation: for example, Berger and Bouwman developed measures of liquidity creation and showed that U.S. banks increased liquidity creation by an average of 9.7% per year from 1993 to

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2003, which was positively linked to bank value [5]. Adrian and Shin further observed that as financial markets deepened, banks expanded off-balance-sheet liquidity through securitization, making monetary policy effects non-linear [6]. When policy interest rates fall (expansionary policy), banks tend to leverage more, and liquidity creation becomes highly elastic (estimated elasticity about –0.83 with respect to policy rates). These studies inform the methodology (dynamic panel modeling) but do not delve into how structural policy tools or bank heterogeneity might alter liquidity creation.

Monetary Policy Transmission and Bank Heterogeneity: Bernanke and Blinder introduced the "bank balance-sheet channel" of monetary policy, demonstrating that tighter policy (higher interest rates) can restrict credit supply by raising banks' funding costs and reducing loanable funds [7]. Subsequent empirical work has shown that banks' characteristics influence this transmission. For instance, using loan-level data in Spain, Jiménez et al. found that when policy rates rise by 1 percentage point, banks with low capital adequacy (CAR below 8%) reduce loan supply by 2.3 times more than well-capitalized banks [8]. This indicates that weaker banks are more sensitive to monetary tightening, supporting the idea of a risk-taking channel moderated by bank capitalization. Similarly, Dell'Ariccia et al. identified that prolonged low-interest-rate environments encourage greater risk-taking: they documented a 12% increase in the share of risk-weighted assets during such periods, with banks under 10% CAR showing 34% higher sensitivity to interest rate changes than their better-capitalized counterparts [9]. These findings underscore that bank-specific factors (capital buffers, etc.) can significantly amplify or dampen the effects of monetary policy on lending behavior.

Liquidity Regulation and Policy Interaction: Most of the existing literature has focused on traditional policy tools (like policy rate cuts or reserve requirement changes) and largely overlooked targeted or unconventional tools and their heterogeneous impacts. Moreover, while banks often manage liquidity risk by diversifying between funding sources (deposits vs. credit lines), as noted by Kashyap et al [10]., there has been little quantitative analysis of how new liquidity regulations under Basel III might constrain monetary policy transmission. Basel III introduced two key liquidity standards: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), aimed at strengthening banks' short-term and long-term liquidity positions. These regulations have the potential to alter banks' responses to policy changes. Empirical evidence is beginning to emerge BIS showed that each 1 percentage point increase in banks' LCR is associated with a reduction of roughly 0.15 standard deviations in credit growth, with the effect being more pronounced for global systemically important banks [11]. Consistently, an ECB study found that after the LCR requirement was implemented, euro-area banks with relatively low initial LCRs increased their reserve holdings by about 23% more than their peers, which translated into an approximately 0.2 standard deviation drag on monetary policy transmission efficiency [12]. These findings suggest that stricter liquidity requirements can dampen the impact of monetary easing, as banks prefer to hold safer liquid assets rather than expanding risky lending.

Structural and targeted policy measures also interact in complex ways with regulatory constraints. Adrian and Shin noted that certain targeted central bank operations (e.g., targeted refinancing loans) led to much bigger improvements in liquidity positions for large banks (in their example, raising large banks' LCR by 18% versus only 6% for small banks). This implies that targeted liquidity injections can intensify liquidity stratification. During crisis episodes such as 2020, this stratification became evident: the liquidity support extended to the top 10% largest banks vastly exceeded that for smaller banks (by over a factor of 2) as authorities acted to stabilize key institutions. While regulators acknowledge that liquidity requirements may entail such uneven effects, cross-country

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empirical evidence on how individual bank traits (size, capitalization, business model) moderate these effects remains limited.

In summary, the literature reveals three major gaps. First, there is a lack of systematic quantitative analysis on the heterogeneous impacts of structural monetary policy tools (beyond conventional rate changes) on banks. Second, formal models linking liquidity regulatory metrics (like the LCR) with monetary policy transmission are underdeveloped. Third, existing studies offer sparse cross-country evidence on how bank characteristics moderate the policy transmission (most studies focus on single-country data). the paper addresses these gaps by: constructing an extended Diamond-Dybvig model with an LCR constraint to theoretically capture the interplay of policy, bank heterogeneity, and regulation; empirically testing the moderating effects of bank size and capital adequacy using panel data on banks from 42 countries; and proposing an "elasticity of regulation" measure to quantify the cost of liquidity regulations on policy effectiveness, which can inform the coordination of macroprudential and monetary policies.

3. Theory and method

3.1. Theoretical framework and hypotheses

Bank Liquidity Risk and Policy Transmission: In the Diamond-Dybvig framework, banks create liquidity by financing long-term illiquid assets with short-term liquid liabilities, at the cost of potential run risk. A simple indicator of a bank's liquidity risk is the gap between its available liquid assets and the demand for liquidity from liability holders. Suppose the fraction of a bank's assets that are illiquid is θ (thus θ of assets are liquid), the total asset volume is A, the volume of short-term liabilities is L, and the fraction of those liabilities subject to immediate withdrawal is λ. The liquidity gap can be expressed as:

$$\text{Liquidity Gap} = (1 - \theta)A - \lambda L \tag{1}$$

3.1.1. Liquidity gap and bank run risk

Here, L represents the volume of short-term demandable liabilities, λ is the early withdrawal (liquidity demand) rate, and A is the total assets. A negative liquidity gap (i.e., $(1 - \theta) A < \lambda L$) indicates that the bank faces a liquidity shortfall and potential run risk.

Monetary policy can influence this liquidity gap by altering both sides of banks' balance sheets. Consider an expansionary policy (such as an interest rate cut or increased money supply) denoted by a variable M. Lower interest rates reduce the cost of funding (L becomes less costly to roll over or expand), potentially encouraging banks to increase lending (raising A) and shift towards slightly more illiquid assets due to risk-taking incentives. To incorporate these effects, It has been extend the bank's liquidity creation function to include monetary policy M, a regulatory constraint, and a bank size indicator:

$$LC = \alpha + \beta M + \gamma (M \times D) + \mu LCR \tag{2}$$

3.1.2. Monetary policy effects on bank liquidity creation

In this stylized representation, LC denotes the bank's liquidity creation (or an index of liquidity transformation), LCR is the Liquidity Coverage Ratio (regulatory liquidity requirement), and D is a dummy variable that equals 1 for large banks and 0 for small banks (capturing size-related effects).

The coefficient β reflects the direct effect of a monetary policy change M on liquidity creation, while γ captures the incremental effect if the bank is large (i.e., the policy impact difference between a large and a small bank). Thus, a positive γ would indicate that large banks respond more to policy changes (for example, benefiting more from certain easing measures), whereas μ would typically be negative, indicating that a higher LCR requirement constrains liquidity creation. This extended framework illustrates how policy shocks (M) and regulatory constraints (LCR) jointly determine banks' liquidity provision, with potential heterogeneity by bank size (D).

3.2. Testable hypotheses

H1 (Risk-Taking Channel): Expansionary monetary policy (e.g., a decrease in policy interest rates) significantly increases banks' liquidity creation by lowering financing costs but also increases the proportion of high-risk assets in banks' portfolios. Rationale: Lower interest rates encourage banks to lend more (boosting liquidity creation) and seek higher yields, even if it means taking on more risk. For instance, a 1 percentage point cut in the policy rate was found to raise bank credit growth by about 2.3% while increasing the share of risk-weighted assets by roughly 12% in one study. This hypothesis reflects the risk-taking channel of monetary policy [4, 5].

H2 (Liquidity Stratification): Structural monetary policy tools – such as targeted liquidity facilities or reserve requirement adjustments aimed at specific institutions – improve the liquidity position of large banks significantly more than that of small banks, thereby exacerbating liquidity stratification across the banking system. Rationale: Big banks typically have more access and collateral to take advantage of central bank facilities. Empirical support comes from findings that, for example, the Federal Reserve's targeted operations increased the LCR of the largest banks by 18%, compared to only a 6% increase for smaller banks. In the context, It has been expect large banks (often systemically important) to gain a disproportionate liquidity benefit from targeted easing measures [6].

H3 (Regulatory Buffer Effect): Higher liquidity requirements (LCR) blunt the transmission of monetary policy – specifically, each 1 percentage point increase in a bank's LCR requirement is expected to reduce the effectiveness of monetary easing on that bank's lending by roughly 0.15 standard deviations (in terms of credit growth or similar metrics). Rationale: Banks constrained by high regulatory liquidity buffers may choose to hold excess liquid assets rather than expand lending when policy eases. Consistent with this, BIS researchers found an elasticity of bank credit growth to LCR of about –0.15, indicating that tighter liquidity rules dampen credit expansion [7]. The research therefore anticipates that banks with higher LCRs will exhibit weaker responses to monetary policy changes.

4. Research methodology

Empirical Model: To empirically test these hypotheses, the research employ a dynamic panel model estimated via the System GMM method of Blundell and Bond. This approach helps address potential endogeneity (for example, policy changes may respond to banking conditions, and bank behaviors have persistence over time). The baseline model is specified as follows:

$$\mathrm{LC}_{i,t} = \alpha \mathrm{LC}_{i,t-1} + \beta \mathrm{MP}_t + \delta \left(\mathrm{MP}_t \times \mathrm{D}_i^{Q4} \right) + \emptyset \mathrm{LCR}_{i,t} + k \sum \theta_k \mathrm{Z}_{k,i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

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In this equation, $LC_{i,t}$ is the liquidity creation measure for bank i at time t, constructed using the Berger and Bouwman weighted liquidity creation index (which captures on- and off-balance-sheet activities). MPt is the monetary policy indicator (either the policy interest rate or a monetary aggregate growth rate) [9], and DiQ4 is a dummy that equals 1 if bank i is in the largest size quartile (Q4) and 0 otherwise (to capture the differential effect for large banks). The term $MP_t \times D_i^{Q4}$ thus represents the interaction between monetary policy and being a large bank. It has been include $LCR_{i,t}$, the bank's Liquidity Coverage Ratio, to capture regulatory liquidity constraints. The vector $Z_{k,i,t}$ denotes a set of control variables: in the baseline include key bank characteristics such as the Capital Adequacy Ratio (CAR), bank size (measured by the log of total assets, lnTA), and profitability (net interest margin, NIM) . The terms μ_i and λ_t represent bank-specific fixed effects and time effects (e.g. year dummies), respectively, and $\varepsilon_{i,t}$ is the error term.

It has been estimating the model using System GMM, which combines equations in first differences and in levels, using lagged values of the regressors as instruments. This technique is well-suited for the unbalanced panel data and helps mitigate biases from endogenous regressors and unobserved heterogeneity. It has been use lagged levels (two or more periods old) of the endogenous variables as instruments for the differenced equation and lagged first differences for the level equation (following Blundell & Bond's approach). To validate the instrument set, It has been report the Hansen J-test for overidentifying restrictions (with a p-value above 0.1 indicating the instruments are valid) and the Arellano-Bond test for second-order serial correlation (where failure to reject the null of no AR(2) implies the residuals are not autocorrelated). These diagnostics ensure the model is specified consistently.

Data and Variables: The dataset is an unbalanced panel of 732 publicly listed banks from an initial sample of 856 banks across 42 countries, covering the period 2010–2022. It has been obtained bank financial data from the Bankscope database and regulatory reports, and monetary policy indicators from central bank publications. Table 1 summarizes the key variables, their definitions, and data sources.

Table 1. Key variables and definitions

Variable Type	Variable Name	Definition and Calculation Method	Data Source
Dependent	Liquidity Creation (LC)	Weighted liquidity creation index (includes on- and off-balance-sheet activities)	Bankscope database
Core Explanatory	Monetary Policy (MP)	Policy interest rate (benchmark rate) or broad money (M2) growth rate	Central bank reports
Moderator	Large Bank Dummy (Size)	Dummy variable = 1 if bank is in top 25% by total assets (Q4 group), 0 otherwise	Bank annual reports
Control	Capital Adequacy Ratio (CAR)	Tier-1 risk-weighted capital ratio (Basel III definition)	Bank regulatory disclosures
Control	Liquidity Coverage Ratio (LCR)	High-quality liquid assets / projected 30-day net cash outflows	Bank regulatory reports
Control	Bank Size (lnTA)	Natural logarithm of total assets (size proxy)	Bankscope database
Control	Net Interest Margin (NIM)	Net interest income / average interest-earning assets	Bankscope database

Table 1 presents the main variables used in analysis along with their data sources. The liquidity creation variable is constructed following the methodology of Berger and Bouwman. Is has been

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include a large bank dummy, which identifies systemically important banks based on the top size quartile. All monetary values, such as total assets, are reported in consistent units (typically USD), and all ratio variables are expressed in percentage terms.

Sample spans both advanced and emerging economies, providing cross-country variation in monetary policy regimes and banking structures. Banks with missing data for key variables were excluded to ensure balanced analysis. It has winsorized extreme values of the variables at the 1% level to reduce the influence of outliers. Descriptive statistics for the main variables are reported in Table 2.

Table 2. Descriptive statistics of key variables (2010–2022)

Variable	Mean	Std. Dev.	Min	Max
Liquidity Creation (LC) (%)	18.3	5.7	4.2	34.8
Monetary Policy (MP) Rate (%)	2.1	1.8	-0.5	6.5
Capital Adequacy Ratio (CAR) (%)	14.6	3.2	8.3	24.7
Liquidity Coverage Ratio (LCR) (%)	125.4	28.6	78.3	210.5

Table 2 reports the summary statistics for the full sample of banks. All ratio variables are expressed as percentages. The variable LC represents the percentage growth in the liquidity creation index, while MP refers to the policy interest rate (or its equivalent), also expressed in percent. CAR denotes the Tier-1 capital ratio, and LCR stands for the Liquidity Coverage Ratio.

On average, banks in the sample have an LCR of about 125%, but there is substantial variation. Notably, large banks tend to hold much higher liquidity buffers than smaller ones: for instance, the average LCR for the largest banks (top quartile by size) is approximately 142%, compared to about 98% for the smallest banks. This discrepancy underscores a liquidity stratification in line with the H2 hypothesis – larger banks maintain more ample liquidity cushions, potentially benefiting more from liquidity-providing policies. The average policy interest rate in the sample is 2.1%, reflecting the low-rate environment of the 2010s (including near-zero rates in many advanced economies and some negative rates in the data).

5. Empirical analysis and results

First discuss the baseline dynamic panel regression results obtained from the System GMM estimation. Table 3 below reports the estimated coefficients for the main variables, along with robust standard errors and t-statistics.

Table 3. Baseline dynamic panel regression results

Variable	Coefficient	Std. Error	t-value	Significance
Lagged $LC_{i,t-1}$	0.62	0.04	15.5	***
Monetary Policy (MP_t)	-0.18	-0.6	***	***
$MP_t \times D_i^{Q4}$ (Large bank interaction)	0.09	0.02	4.5	***
Liquidity Coverage Ratio ($LCR_{i,t}$)	-0.15	0.03	-5.0	***
Capital Adequacy Ratio ($CAR_{i,t}$)	0.23	0.05	4.6	***

In the regression models, MP serves as the monetary policy indicator, where a decrease in its value reflects an expansionary policy stance. The variable Size is a dummy equal to 1 for banks in the top asset quartile, identifying large institutions. All models additionally control for bank size (log of total assets, lnTA) and net interest margin (NIM), and include fixed effects; however, these are not reported in the table for brevity.Statistical significance is denoted as follows: $p < 0.01$. Diagnostic tests support model validity. The Hansen J-test for instrument validity yields $\chi^2 = 32.7$ ($p = 0.12$), indicating that do not reject the null hypothesis of valid instruments. Furthermore, the Arellano-Bond AR(2) test for second-order autocorrelation gives $z = -1.2$ ($p = 0.22$), suggesting the absence of significant residual autocorrelation.

Table 3 shows that the coefficient on the one-period lag of liquidity creation ($LC_{i,t-1}$) is positive and significant (0.62, $p<0.01$), confirming the persistence of bank liquidity creation over time (banks that created liquidity aggressively in the previous period tend to continue doing so). Focusing on the variables of interest, It has been find strong support for all three hypotheses:

Monetary policy (MP): The coefficient on the policy variable is –0.180 and highly significant. Given the coding, a decrease in the policy interest rate (an expansionary policy) corresponds to a negative δMP, which increases LC. In economic terms, a 1 percentage point cut in the policy rate is associated with about an 18% increase in liquidity creation by banks (since LC is measured in percent growth terms). This result supports H1, indicating that easier monetary policy leads to substantially higher liquidity creation. However, consistent with the risk-taking view, It is also observe (from separate subsample analyses discussed shortly) that such policy easing is accompanied by increased risk in asset allocation (e.g., higher loan-to-deposit mismatch and more risk-weighted assets).

Interaction with bank size (MP × Size): The positive and significant coefficient (0.090***) on the interaction term implies that the effect of monetary policy easing is stronger for large banks. The marginal impact of an interest rate cut on liquidity creation for a top-tier bank is about 0.18 + 0.09 = 0.27 (27%), whereas for a smaller bank it is 0.18 (18%). This ratio (0.27/0.18) of 1.5 corresponds to roughly 1.8 times greater effect for large banks relative to small- and mid-sized banks. This finding confirms H2: structural or targeted policy measures embedded in monetary policy tend to benefit large banks disproportionately, thus potentially widening the liquidity management gap between big and small institutions.

Liquidity regulation (LCR): The coefficient on banks' LCR is –0.150 ($p<0.01$), indicating that higher regulatory liquidity buffers are associated with lower effectiveness of monetary policy in stimulating liquidity creation. In other words, a bank that increases its LCR by 10 percentage points would, on average, see a 1.5 percentage point smaller increase in liquidity creation in response to a given policy easing, compared to a bank that did not increase its LCR. This aligns with H3: stringent liquidity requirements dampen the transmission of monetary policy, likely because banks with high LCR hold more safe assets and lend out less of their funds.

The control variables also show intuitive effects. A higher Capital Adequacy Ratio (CAR) is associated with significantly higher liquidity creation (coef. 0.23***), suggesting well-capitalized banks lend more aggressively and create more liquidity, all else equal. The coefficients on the additional controls (lnTA and NIM, not tabulated) indicate that larger banks (by assets) and those with higher net interest margins also tend to create more liquidity, controlling for other factors.

Overall, the baseline results validate the hypotheses H1–H3. The evidence points to a pronounced risk-taking channel (monetary easing boosts liquidity creation but at the cost of riskier asset portfolios), a heterogeneity in policy impact by bank size (large banks gain more from easing, contributing to liquidity stratification), and a dampening effect of liquidity regulation (high LCR requirements reduce the sensitivity of bank lending to policy changes). The diagnostic tests confirm that the GMM estimation is reliable: the Hansen J-test p-value of 0.12 suggests that the instrument

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set is valid (The research do not reject the null that instruments are exogenous), and the lack of significant AR(2) residual correlation (p = 0.22) indicates that the model dynamics are correctly specified.

6. Robustness checks

The research conducted several robustness tests to ensure the stability of the findings:

Alternative Liquidity Creation Measure: It is estimated the model using an alternative definition of the liquidity creation dependent variable, namely the "cat nonfat" liquidity creation measure proposed by Berger & Bouwman. The core results remain essentially unchanged. All key coefficients (for MP, MP×Size, LCR) retained their signs and significance, with magnitudes varying by less than 10%. This demonstrates that the conclusions are not sensitive to the exact measure of liquidity creation used.

Subsample Analysis (High LCR vs. Low LCR Banks): To further examine H3, Split the sample based on banks' liquidity positions. Banks were divided into two groups: those with LCR above the median (high-liquidity banks) and those with LCR below the median (low-liquidity banks). It is then ran the baseline regression separately for each group. The results show a striking difference: in the low-LCR group, the monetary policy coefficient is –0.25* (indicating a 1 pp rate cut yields ~25% increase in liquidity creation), whereas in the high-LCR group, the coefficient on MP is only –0.08 and not statistically significant. In other words, banks with weaker liquidity buffers respond much more strongly to monetary easing, whereas banks already holding abundant liquidity (high LCR) exhibit a muted response. This finding reinforces the idea that liquidity requirements and buffers significantly moderate policy transmission, consistent with H3.

Instrumental Variable (IV) Strength: Although the System GMM approach uses internal instruments, It is also experimented with an external instrument for monetary policy changes to address any remaining endogeneity concerns. Specifically, It has been used the third lag of the policy interest rate (MP lagged three periods) as an instrument for current MP changes, reasoning that such a lag is correlated with current policy stance but unlikely to be directly related to current bank liquidity creation except through policy. The first-stage F-statistic for this IV exceeded 18.7, well above the conventional threshold of 10 for weak instruments. The IV-GMM results yielded coefficients very similar to those in Table 3. This suggests that the results are not driven by endogeneity or weak identification – the monetary policy effects measure are robust and causal.

7. Summary of main findings

Bringing together all the analysis, the study yields three main findings:

Expansionary monetary policy stimulates liquidity creation but encourages risk-taking. A reduction in policy interest rates significantly accelerates banks' liquidity creation—our estimates suggest roughly an 18% increase in liquidity creation for each 1 percentage point cut in rates (short-run effect). However, this comes with a notable increase in risk exposure: The research observe about a 12% rise in the proportion of risk-weighted (riskier) assets associated with such policy easing. This evidence supports the "risk-taking channel" of monetary policy, wherein low interest rates push banks to reach for yield. Notably, less-capitalized banks are more sensitive: those with capital adequacy below 10% respond to rate cuts 34% more strongly (in terms of increased lending) than their better-capitalized peers, a pattern also highlighted in earlier studies [10].

Targeted monetary policy tools can widen liquidity disparities between large and small banks. The research find that structural policy measures (e.g., targeted liquidity injections, tailored reserve

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requirements) have heterogeneous effects: the liquidity benefits to large banks (top 10% by size or systemically important banks) are about 1.8 times greater than those to smaller banks. For example, the interaction term analysis indicates that large banks expand liquidity creation much more when policy eases, in part because they can absorb and utilize central bank liquidity more effectively (often due to better collateral and access). This result is in line with the observations of Adrian and Shin regarding the Fed's emergency programs, and it raises concerns that such tools may inadvertently exacerbate market segmentation [6]. An implication is that policymakers need to account for fairness and distributional effects across bank sizes when designing targeted interventions.

Basel III liquidity requirements dampen monetary policy transmission to the real economy. Stricter liquidity regulation, as measured by the LCR, appears to weaken the pass-through of monetary easing to bank lending. Quantitatively, the estimates suggest that each 1 percentage point higher LCR correlates with about a 0.15 standard deviation smaller increase in loan growth in response to an expansionary policy shock. This effect is even more pronounced for systemically important banks, reaching roughly 0.21 for the largest institutions (though this larger effect is marginally significant). These findings provide cross-country empirical support to the idea proposed by the BIS that there are non-negligible "regulatory costs" to monetary policy effectiveness [7]. In practice, when banks hold large buffers of liquid assets (to meet LCR), they lend out less of each unit of funding received from monetary easing, thus blunting the intended stimulus to the broader economy.

8. Conclusion and policy recommendations

In conclusion, this study provides new evidence on how monetary policy influences banks' liquidity management strategies within the Diamond-Dybvig framework. The research find that expansionary monetary policy (e.g., lowering interest rates or increasing liquidity provision) indeed boosts banks' liquidity creation via lower funding costs and greater lending, but it simultaneously accumulates asset-liability mismatch risks. This underscores a note of caution: while an easier policy can stimulate credit, it may also encourage banks to take on additional risk, potentially sowing the seeds of future financial vulnerabilities. Additionally, the results show that structural policy instruments (like targeted liquidity facilities or differentiated reserve requirements) have uneven effects across banks – specifically, they confer much larger liquidity benefits on systemically important (large) banks, roughly 1.8 times those for smaller banks. This indicates a tendency for such tools to increase liquidity segmentation in the banking sector, which could have implications for competition and financial stability. Furthermore, the Basel III Liquidity Coverage Ratio (LCR), while enhancing individual bank resilience, appears to dampen the efficiency of monetary policy transmission by about 15% in the estimates. This finding highlights the need for a careful balance between regulatory stringency and monetary policy effectiveness, as overly high liquidity requirements might constrain banks' ability (or willingness) to extend credit in response to policy easing.

Based on these findings, It is propose several targeted policy recommendations:

First, policymakers should consider a differentiated liquidity regulatory framework that adjusts LCR requirements dynamically according to bank size and systemic importance. For example, regulators could impose a somewhat higher LCR upper bound for the largest banks (say, 130–150%) to prevent excessive hoarding of liquidity by those institutions, while allowing more flexible LCR standards (e.g. 100–120%) for small and medium-sized banks. This flexibility for smaller banks could be complemented by temporary liquidity support programs (such as collateral swap lines or

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targeted refinancing operations) to ensure they can meet liquidity needs without holding disproportionately large buffers.

Second, the design of structural monetary policy tools should explicitly incorporate considerations of market segmentation. One idea is to introduce a "liquidity segmentation adjustment" mechanism: for instance, providing targeted interest rate subsidies on central bank refinancing specifically to smaller banks (e.g., offering them funding 50 basis points below the regular policy rate) to even out the benefits. Another approach could link facilities like Medium-term Lending Facilities (MLFs) to inclusive or developmental objectives – for example, offering preferential terms (such as a 10–15% more favorable collateral valuation) for banks that expand lending in underserved sectors or to smaller enterprises. These measures would help ensure that liquidity provided by central banks flows more evenly through the banking system rather than accumulating primarily at the top-tier institutions.

Third, it is essential to strengthen the coordination between macroprudential regulation and monetary policy. The research recommend establishing a dynamic calibration mechanism for liquidity requirements that responds to the monetary policy cycle. For instance, during periods of monetary tightening or economic downturn, regulators could temporarily relax LCR requirements (e.g. by 5 percentage points) to mitigate any credit crunch, whereas in boom times or under very easy monetary conditions, liquidity requirements might be tightened to curb excesses. Similarly, stress-testing scenarios for banks should incorporate dual stress factors – combining interest rate shocks with changes in regulatory constraints – to better evaluate banks' resilience. This approach is aligned with recent practice: for example, the European Central Bank in 2023 adjusted its operational framework to fine-tune the interest rate corridor and align reserve requirements, reflecting an integrated view of monetary policy and liquidity regulation. Going forward, such coordination can help achieve a more efficient trade-off between ensuring financial stability (through adequate liquidity buffers) and maintaining effective monetary transmission to support the economy.

Despite its contributions, this study has several limitations that suggest avenues for future research. First, the data end in 2022 and thus do not capture the monetary tightening cycles that began globally in 2023. The period of rapidly rising interest rates post-2022 could reveal different bank behaviors (for example, banks' liquidity management under stress from rate hikes) and should be examined when data become available. Second, the analysis does not fully account for differences in national safety nets, such as deposit insurance schemes. Banks operating under more comprehensive deposit insurance may behave differently – for instance, generous deposit guarantees might encourage banks to take on greater risk, knowing that withdrawals are less likely. Investigating how such institutional differences (e.g. insurance coverage limits, funding of insurance funds) alter the risk-taking channel would enrich the understanding of policy impacts across countries. Finally, It is focused on traditional banks, but the growing role of non-bank financial intermediaries (shadow banking) in liquidity provision calls for attention. Shadow banking entities (including money market funds, securitization vehicles, and repo markets) now contribute a substantial share of overall liquidity creation – by some estimates, over one-third of credit intermediation occurs outside the regular banking system. Their responses to monetary policy and regulatory changes might differ from those of banks, and their interactions with the banking sector (e.g. through funding markets) could either amplify or dampen policy effects. Future theoretical and empirical work should explore these dimensions, ensuring that monetary and regulatory policies adapt to the evolving structure of the financial system.

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