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Abstract

This paper examines the existence and magnitude of an "LCR premium" in Peru's interbank market by exploiting the July 1, 2019 reform that eliminated the punitive outflow weights on repo collateral under the Liquidity Coverage Ratio (LCR). Using daily transactions from January 2019 to February 2020, a Difference-in-Differences (DiD) design reveals repo rates declined by an additional 3–4 pp relative to unsecured loans. We then embed this supply-shock in a structural IV-2SLS framework, finding that a 1 pp increase in the rate reduces repo volumes by 2,495.5 mm PEN. Robustness checks — including alternative ±3/4/6-month windows, dynamic DiD and placebo DiD— confirm instrument validity and parallel trends. Post-reform, average monthly repo activity jumped from ~5,800 mm to ~22,400 mm PEN, demonstrating that even modest liquidity-rule adjustments can quickly eliminate the pre-reform penalty on secured funding and reorient banks toward collateralized trades.

Keywords: Liquidity coverage ratio, Liquidity coverage ratio premium, interbank funding, repo markets

JEL: G21, G28, E43, C32.

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1. Introduction

The Liquidity Coverage Ratio (LCR) is a key regulatory measure introduced under the Basel III framework to ensure that financial institutions maintain sufficient stock of High-Quality Liquid Assets (HQLA) to withstand short-term liquidity stress scenarios. By imposing stricter liquidity requirements, the LCR aims to enhance the resilience of the banking system and reduce the likelihood of financial instability arising from liquidity shortages. In Peru, the LCR was formally introduced in 2012, with a phased implementation schedule that gradually increased the minimum coverage requirement from 80% in 2014 to 100% in 2019. While its goal is to strengthen the resilience of the banking system, the regulation also reshapes the liquidity management decisions of banks, particularly their preferences for short-term funding instruments.

A critical setting where these incentives play out is the interbank market, which serves as the first layer of monetary policy transmission and a key source of short-term liquidity for financial institutions. In this market, banks choose between secured transactions, such as repos backed by high-quality collateral, and unsecured loans, which carry higher counterparty risk. Regulatory frameworks like the LCR can alter the relative attractiveness of these instruments by changing how they are treated in liquidity metrics.

A well-functioning repo market plays a critical role in the stability and efficiency of the financial system. By enabling secured, collateralized lending, repos help reduce counterparty risk, facilitate liquidity management, and support price discovery, particularly in fixed-income markets (Adrian et al, 2013). These benefits are especially important under stress conditions, when secured funding channels can prevent disorderly deleveraging and fire sales.

As highlighted by the Committee on the Global Financial System (2017), repo markets play a central role in the transmission of monetary policy and in the smooth functioning of financial markets. Their resilience, however, depends on robust infrastructure, adequate collateral management, and appropriate regulatory calibration. Therefore, the development of deep and efficient repo markets —supported by prudent, transparent, and proportionate regulation— can significantly enhance systemic stability. Changes in the regulatory treatment of repos, such as their inclusion under LCR-eligible frameworks, may thus have far-reaching implications for funding behavior, market liquidity, and the effectiveness of monetary policy.

In July 2019, the Peruvian financial regulator updated the LCR framework, modifying the way interbank repo operations secured with Central Bank or government securities were treated. These securities began to fully qualify as HQLA, and the associated outflows were assigned a more favorable regulatory weight. In contrast, unsecured loans continued to receive no such benefit. This shift effectively reduced the regulatory cost of using repos, potentially incentivizing banks to change both the pricing and volume of secured interbank transactions.

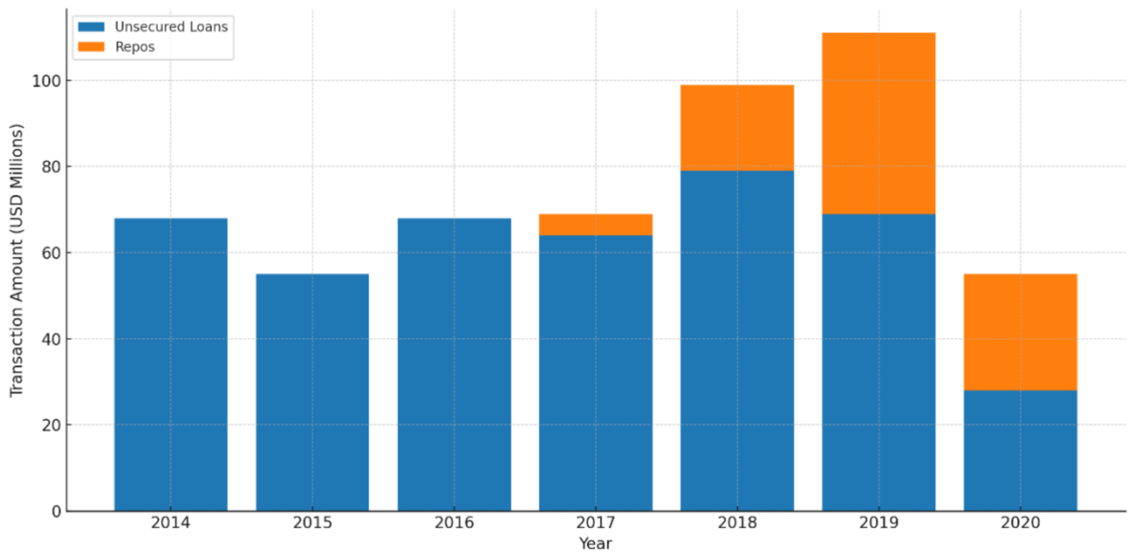
This study exploits this regulatory change as a quasi-natural experiment to assess its impact on the spread between secured and unsecured interbank rates. Using daily transaction-level data from Peru's interbank market and applying a DiD strategy, we estimate how the reform affected the relative cost of secured funding. By isolating the causal effect of the LCR adjustment, our findings shed light on how liquidity regulation shapes the funding choices of banks and influences short-term interest rate dynamics.

2. Background

The Peruvian interbank market plays a crucial role in short-term liquidity management and monetary policy transmission. Banks primarily use this market to manage very short-term liquidity mismatches, with unsecured loans historically dominating due to their operational simplicity. However, the development of the repo market has significantly enhanced the overall depth and robustness of interbank transactions. The introduction of Law No. 30052 in 2013 provided the necessary legal framework for repo operations, including clear definitions for collateral treatment and contractual obligations. Following this law, repos gained importance as they allowed banks to access liquidity at lower counterparty risk, promoting systemic stability during periods of stress (Miranda et al., 2023).

Unsecured loans have consistently represented the largest volume in the interbank market, ranging from approximately USD 56 million in 2015 to USD 112 million in 2019. Nonetheless, repo transactions experienced a remarkable increase, especially from 2017 onwards. Daily repo volumes grew from just USD 5 million in 2017 to USD 20 million in 2018, and further surged to USD 42 million in 2019, coinciding with the regulatory reform that allowed repos to fully qualify HQLA under the LCR framework. Despite a temporary drop in 2020-2022 —reflecting broader liquidity injections and pandemic-related distortions— repo volumes remained elevated at USD 27 million. Both unsecured loans and repo transactions are conducted in local currency (PEN).

Figure 1. Traded Amount distribution by operation type (mm)



This pattern illustrates the complementary nature of secured and unsecured instruments in the interbank market of Peru. The expansion of repos, rather than displacing unsecured loans, appears to have enhanced overall market depth and flexibility.

Peru formally adopted the LCR in December 2013 through Superintendency of Banking, Insurance of Peru (SBS) Resolution No. 9075-2012, which marked the official introduction of Basel III liquidity standards into the Peruvian financial system. The LCR is designed to ensure that financial institutions maintain a sufficient stock of HQLA to withstand a 30-day period of liquidity stress. It aims to strengthen the short-term liquidity positions of banks and reduce the risk of systemic crises triggered by liquidity shortfalls.

In Peru, the LCR for local currency (LC) is calculated using the following formulas:

$$LCR_{LC} = \frac{HQLA_{LC} + \min\{Inflows; 75\% \times Outflows\}}{Outflows}$$

Where:

LCR_{LC} represents LCR in LC.
HQLA are assets that can be easily converted into cash with minimal loss in value.
Inflows represent expected cash receipts over the 30-day horizon.
Outflows represent expected disbursements.
The inflow cap limits inflows to a maximum of 75% of outflows, meaning that at least 25% of liquidity needs must be covered by HQLA.

The implementation followed a phased schedule, beginning in 2014 with a minimum requirement of 80% increasing to 90% in 2018, and reaching 100% in 2019. This final step made the LCR fully binding for regulated institutions, pushing banks to optimize their liquidity positions in compliance with the updated standards.

A major regulatory milestone occurred with the issuance of SBS Resolution No. 682-2019, which amended the official liquidity risk regulation to align the treatment of repo operations with international Basel III standards. The resolution explicitly incorporated securities received in repo transactions as HQLA, provided that these instruments are legally and contractually available for the acquiring entity and are not re-used in subsequent transactions. This change allowed institutions to recognize as liquid assets government and central bank debt securities, investment-grade foreign public debt, and qualifying corporate bonds received through repos.

In addition, the 2019 resolution updated the treatment of repo-related cash flows in the LCR calculation, aligning Peruvian standards more closely with Basel III recommendations. Specifically, securities received as collateral in repo operations are now fully recognized as HQLA at a 100% weighting, provided they are freely available and unencumbered. Previously, these securities were not fully considered, limiting the attractiveness of repos as a liquidity management instrument.

Moreover, incoming flows (accounts receivable) from repo transactions, which were previously allowed as inflows with an 80% weighting, are now set to 0%, eliminating double counting and emphasizing the reliance on actual liquid assets rather than expected cash returns. On the liability side, accounts payable from repos collateralized with BCRP or central government securities —or executed directly with the central bank— are fully exempt from outflow recognition (0% weighting). These changes significantly reduce the regulatory liquidity cost of high-quality collateralized repo operations, thereby incentivizing their use relative to unsecured interbank loans. Additionally, by allowing these securities to be included in the HQLA pool, the reform directly enhances capacity of banks to comply with LCR requirements without constraining lending to the real economy.

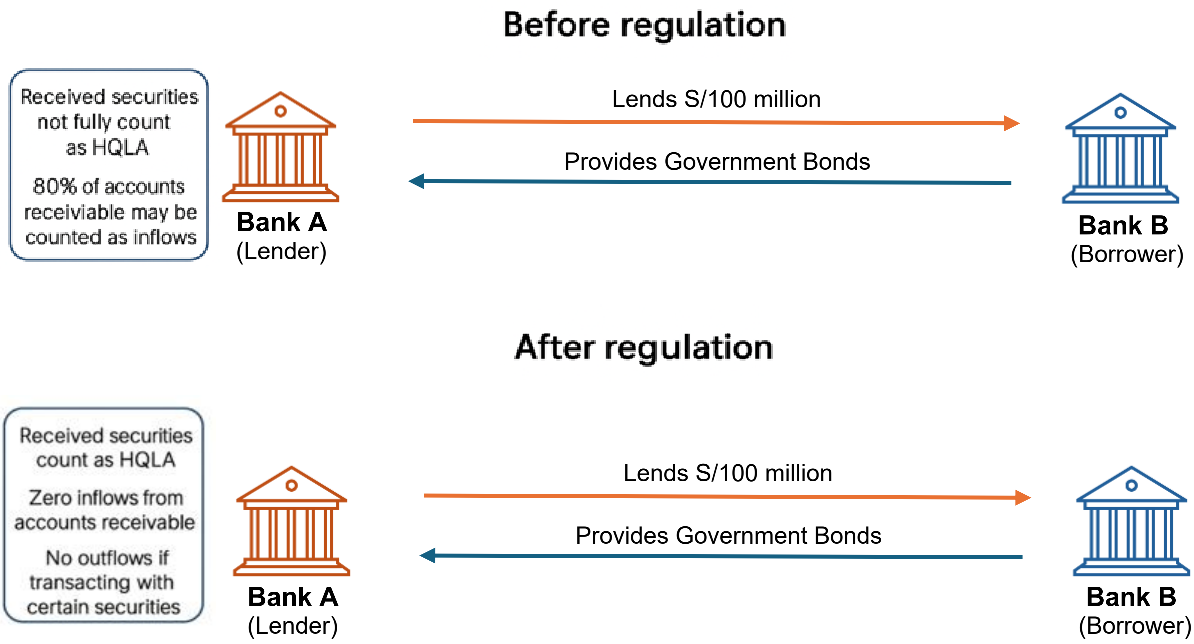
Table 1. Treatment of Interbank Loans and Repo Operation for the LCR for the supply side of the operation

Type of operation	Accounts	Weighting factors (%)		
		Basel	Before	After
Repo	HQLA cash or available at Central Bank	-100	-100	-100
	Securities*	100	0	100
	Incoming flow accounts receivable	0	80	0
Interbank loans	HQLA cash or available at the Central Bank	-100	-100	-100
	Incoming flow active interbank funds	100	100	100

*It is assumed that repos are carried out with securities issued by the Central Bank or the local goverment and that third party securities are freely available without any restriction.

For instance, consider a transaction where Bank A lends S/100 million to Bank B through a repo backed by government securities. Prior to the 2019 regulatory reform, the securities received did not fully qualify as HQLA, and associated accounts receivable were only partially recognized as inflows, while outflows from the transaction were penalized. Following the reform, these securities are fully recognized as HQLA (100% weighting), and the outflow requirement for repos secured with government securities is effectively eliminated (0% weighting). Consequently, the regulatory liquidity cost for Bank A is significantly reduced.

Figure 2. Interbank Collateral Treatment and Funding Flows — Before vs. After LCR Reform



This structural shift effectively transforms repos from a marginal liquidity tool into a central component of short-term funding strategies, contributing to both microprudential resilience and systemic stability.

These provisions became effective on July 1, 2019 and constitute the legal foundation for the regulatory shock exploited in this study. By improving the regulatory treatment of secured transactions, the resolution increased incentives for banks to rely more heavily on repos, thereby reshaping short-term funding preferences and the structure of the Peruvian interbank market.

3. Related Literature

The research question of this paper is whether the change of the weight of the repo operations affected the transactions in this market in terms of the rate agreed in each transaction in comparison to the unsecured interbank loans. This change specifically affected the supply side of the operation because, before the reform, when a bank granted an unsecured interbank loan, the LCR was not affected, but when granting a repo loan, the LCR decreased. By aligning the LCR weights for both instruments, the reform aimed to eliminate this disincentive. We employ a DiD approach to assess whether the regulatory adjustment led to a decline in the repo market rate.

This question is relevant for both theoretical and policy reasons. From a theoretical perspective, the study is framed in literature related to the LCR premium (Fuhrer et al., 2017). This term refers to the fact that liquidity regulations impose costs on financial institutions, changing the incentives of their asset allocation and the price that institutions pay for the instruments. The LCR, by requiring banks to hold HQLA, creates a premium for the instruments that helps banks to fulfill this requirement, potentially distorting market dynamics (Fuhrer et al., 2017; Covas and Driscoll, 2014, Behn et al., 2019).

From a policy perspective, the interbank market (repo and unsecured loans) plays a critical role in the monetary policy transmission channel. An alteration in pricing in this market, and the potential existence of a LCR premium, could affect the effectiveness of central bank policies. Thus, understanding the effects of a liquidity regulation change in this market is crucial to ensure that monetary policy transmission functions efficiently.

This paper conducts an empirical analysis to evaluate the impact of the LCR regulatory change on July 1, 2019. Using a DiD methodology we find that this change had a negative effect on the repo rate market compared to the unsecured interbank market. This happened because the change in regulation eliminated the LCR penalty for suppliers of funding when granting repos versus unsecured loans.

The contribution of the paper is twofold. First, it provides empirical evidence on a specific regulatory adjustment regarding the change in the weights of LCR components, rather than examining the overall effect of the initial implementation of the LCR (Bonner and Eijffinger, 2016; Anderson and Tase, 2023). Furthermore, this study focuses on an emerging market and offers new empirical evidence, as most research has been conducted in developed countries (Bonner and Eijffinger, 2016; Anderson and Tase, 2023; Banerjee and Mio, 2018; Bonner et al., 2014), where market depth and institutional framework differ significantly.

The analysis is particularly important for policymakers aiming to design regulations for financial stability while minimizing potential unintended consequences, especially those that could affect monetary policy transmission. Moreover, since the shock evaluated in this study was directly aimed at the supply side of funding, we can argue that the premium we observe originates from a supply shock, while other studies analyze the LCR premium related to a higher interest rate arising from greater demand for HQLA instruments.

Related papers provide important context for this study. Bonner and Eijffinger (2016) analyze the effects of a quantitative liquidity requirement aligned with the LCR on the behavior of dutch banks in the unsecured interbank money market. Using micro-level panel data, they find that the regulation leads to an increase in long-term interest rates and in demand for long-term loans, particularly when aggregate system liquidity is low. While the policy does not appear to affect corporate lending rates directly, it does lead to a decline in interest margins of banks, suggesting that the cost of compliance is absorbed by the banks themselves.

For the United States, Anderson and Tase (2023) study the effect of the LCR in the federal funds market after its full implementation. They use a DiD approach with confidential bank-level data from April 2014 to February 2020 and find that banks subject to daily LCR compliance pay higher interest rates in the federal fund market compared to their borrowing in the Eurodollar market, where borrowing is less favorable in terms of LCR compliance. While they explore the unsecured interbank market and, like Bonner and Eijffinger (2016), find an increase in rates, we expect a negative effect on interest rates since our shock affects the supply side rather than the demand side.

Other studies have focused on the implications of liquidity regulations on balance sheet composition. Banerjee and Mio (2014) studied how banks in the United Kingdom responded to tighter liquidity regulation under the Individual Liquidity Guidance (ILG), a precursor to the LCR. Using a DiD approach, they show that affected banks did not contract the size of their balance sheets but instead rebalanced the composition of assets and liabilities. Specifically, banks increased their holdings of HQLA while reducing short-term interbank loans and shifted away from volatile wholesale and foreign funding toward more stable deposit sources. Importantly, the regulation did not result in higher loan rates or reduced credit provision to the real economy, suggesting that the constraint operated primarily within the interbank segment. Their findings imply that liquidity regulation can serve as an effective macroprudential tool-dampening intra-financial exposures without harming credit to non-financial borrowers. However, they also note that by shrinking the interbank market, such regulation could affect monetary policy transmission channels, especially in systems that rely heavily on short-term funding.

Similarly, King (2013) studied the Basel III Net Stable Funding Ratio (NSFR), a liquidity ratio designed to reduce funding risk by promoting stable, long-term funding sources. The study finds, through simulations, that the imposition of the NSFR incentivizes banks to modify their balance sheets by increasing stable funding, such as deposits and long-term debt, and reducing assets that require stable funding, like illiquid loans.

Furthermore, Bonner et al. (2014) analyzed the determinants of liquidity buffers of banks across countries, finding that liquidity regulation, such as LCR requirement, neutralizes bank-specific and country-specific incentives to hold liquid assets, demonstrating that liquidity regulation significantly influences balance sheet composition of banks. These works suggest that liquidity regulation can distort asset allocation of banks, reducing the attractiveness of instruments that do not help to comply with regulatory requirements, such as repo operations before the 2019 reform in Peru compared to unsecured loans.

4. Data

Our empirical analysis is based on a high-frequency panel dataset of daily interbank operations in Peru, obtained from the Central Reserve Bank of Peru (BCRP). The dataset covers the period from January 2019 to February 2020 and was constructed with the objective of rigorously identifying the impact of the July 2019 regulatory reform on the behavior of participants in the short-term interbank market. This 14-month window —six months before and eight months after the intervention— was strategically selected to provide a balanced sample that allows for the estimation of differential effects of pre- and post-reform. Importantly, this time frame deliberately excludes the suspension of the LCR that occurred in March 2020 in response to the COVID-19 emergency, thereby preserving the internal validity of our quasi-experimental design.

The dataset contains detailed transaction-level information on unsecured interbank loans and secured repo operations conducted in the local interbank market. Each record includes the agreed interest rate, maturity (in days), transaction amount, instrument type, and the currency used. We restrict our sample to overnight operations, defined as those with a maturity of one business day. In practice, this includes operations with a nominal maturity of 1 day, as well as those with a maturity of 3 days when initiated on a Friday and maturing the next business day (Monday).

Also, we use only the data on local currency since the operations subject of our study are only denominated in this currency. For repo operations, the data also specifies the type of collateral posted (such as central bank instruments or government securities), and whether the transaction qualifies as LCR-eligible under the revised regulatory framework introduced in July 2019.

To account for institutional heterogeneity in liquidity management and funding strategies, we complement this dataset with bank-level regulatory and balance sheet variables. These include the Liquidity Ratio, reserve requirement advance, wholesale funding dependence, and bank size categories (large, medium, small), as classified by the supervisory authority — for both the lending and borrowing banks involved in each transaction.

The final panel consists of 21 banks and 7,343 transaction-day observations, providing a rich and granular dataset to estimate the differential effects of the regulation across instruments and over time.

5. Empirical Strategy

On July 1, 2019, the Peruvian financial authority began fully recognizing repos collateralized with central bank or government securities as HQLA in LCR calculations. By lowering the regulatory cost of secured funding relative to unsecured loans, the reform generated a quasi-experimental setting in which pricing responses of banks can be observed.

We employ a DiD design to evaluate the impact of this regulatory reform on interbank funding costs. The treatment cohort comprises repo transactions backed by central bank or government securities, which benefited from full HQLA recognition. The control cohort comprises unsecured interbank loans, whose LCR treatment and regulatory cost remained unchanged. Because the implementation date was exogenous to individual negotiations, any post-reform divergence in repo rates relative to unsecured loan rates identifies the causal effect of the policy.

DiD reduced form

An initial reduced-form specification regresses the negotiated interest rate on a post-reform indicator, a treatment indicator (repo versus unsecured loan) and their interaction. This baseline DiD model yields a first estimate of the average reform effect on interbank rates.

We define the following:

$$Post_t = 1 \ \ if \ t \geq 2019/07$$

$$Treat_i = 1 \ if \ \ Type_i = Repo$$

Then, the baseline reduced-form specification for the negotiated rate on transaction i at date t is

$$\begin{aligned} Rate_{it} = \beta_0 + \beta_1(Post_t \times Treat_i) + \beta_2 Post_t + \beta_3 Treat_i + \beta_5 RRA_{it}^{lender} \\ + \beta_6 LR_{it}^{lender} + \beta_7 WF_{it}^{lender} + \beta_8 Big_{it}^{lender} + \beta_9 Medium_{it}^{lender} + \nu_{it} \end{aligned}$$

We consider control variables as net reserve-requirement advances (RRA), liquidity ratio (LR), reliance on wholesale funding (WF) and its size (dummies for big lenders and medium lenders). Under the parallel-trends assumption, β_1 identifies the average treatment-on-the-treated or the incremental change in repo rates relative to unsecured loan rates induced by the reform.

Structural Simultaneous-Equations Framework

Building on the reduced-form DiD specification, we acknowledge that price and volume may be determined simultaneously through bilateral bargaining. To address the simultaneous endogeneity between interest rates and loan volumes, we employ a 2SLS estimation strategy. This choice reflects the fact that both variables are jointly determined in credit market equilibrium: the interest rate affects the quantity of credit demanded and supplied, while the transacted volume can, in turn, influence the agreed-upon rate between borrower and lender.

To identify the structural parameters in each equation, we select instruments that are both relevant and exogenous. In the interest rate equation, we instrument for volume using borrower-specific characteristics. These factors primarily influence the willingness of borrower to demand credit, without directly affecting the contractual interest rate, which is also shaped by lender-side conditions and broader market dynamics. In this sense, we introduce an exogenous source of variation from the side of the borrower to explain loan volume, allowing us to isolate its causal impact on the interest rate.

Conversely, in the volume equation, we instrument the interest rate using lender-side indicators. These variables affect the funding of lenders constraints and pricing decisions and therefore influence the rate they offer to borrowers. However, they are unlikely to directly determine the specific volume contracted with any given borrower, making them valid instruments for the rate.

In Equation 1, α_1 measures the direct shift in offered rates caused by the LCR reform considering net reserve-requirement advances (RRA), liquidity ratio (LR), reliance on wholesale funding (WF) and size (dummies for big and medium lenders) of the lenders, each of which affects marginal funding cost. The term $Amount_{it}$ enters as an endogenous regressor to account for the fact that lenders adjust quoted rates not only to overall market conditions but also to the size of the facility being negotiated. We instrument $Amount_{it}$ in the rate equation with the borrower-specific cost measures $\{RRA_{it}^{borrower};\ WF_{it}^{borrower}\}$.

Equation 1

$$Rate_{it} = \alpha_0 + \alpha_1(Post_t \times Treat_i) + \alpha_2 Post_t + \alpha_3 Treat_i + \alpha_4 Amount_{it} + \alpha_5 RRA_{it}^{lender} + \alpha_6 LR_{it}^{lender} + \alpha_7 WF_{it}^{lender} + \alpha_8 Big_{it}^{lender} + \alpha_9 Medium_{it}^{lender} + \varepsilon_{it}$$

Symmetrically, Equation 2 treats $Amount_{it}$ as the dependent variable and allows it to respond to the negotiated rate and borrower-side cost conditions. In this equation δ_1 measures the elasticity of traded volume with respect to the negotiated rate, while considering RRAA, LR, WF and its size (dummies for big borrowers and medium borrowers) of the borrowers. Notably, there is no direct DiD_{it} term here: the reform influences transaction volumes through its impact on rates (a supply-side shock). we instrument $Rate_{it}$ with the monetary policy rate $\{RRA_{it}^{lender};\ WF_{it}^{lender}\}$.

Equation 2

$$Amount_{it} = \delta_0 + \delta_1 Rate_{it} + \delta_2 RRA_{it}^{borrower} + \delta_3 LR_{it}^{borrower} + \delta_4 WF_{it}^{borrower} + \delta_5 Big_{it}^{borrower} + \alpha_9 Medium_{it}^{borrower} + \mu_{it}$$

This identification strategy leverages exogenous variation to recover consistent estimates of both the supply-side shift (α_1) and the demand elasticity (δ_1). By using instruments from the opposite side of the market in each equation—borrower-side variables for the rate equation, and lender-side variables for the volume equation—we explicitly break the simultaneity between price and quantity, enhancing empirical identification.

The validity of this strategy hinges on two exclusion restrictions. First, lender-side instruments—specifically the lender's RRA and WF—should affect the interest rate through their influence on credit supply (i.e., funding costs and liquidity constraints), but not directly impact the volume of any given transaction once borrower characteristics are controlled for.

Second, borrower-side instruments—the borrower's RRA and WF—should influence the amount demanded via liquidity needs or funding constraints, but should not directly determine the contractual rate, which is primarily set by lenders based on their own cost structures and market conditions. These assumptions are economically plausible: the selected instruments reflect structural or regulatory frictions that are specific to one side of the market, and thus provide valid and relevant variation for identification.

6. Results

Table 2 summarizes the monthly average negotiated rates and traded volumes for repos (treatment) and unsecured loans (control) in the periods immediately before (January 2019–June 2019) and after (July 2019–February 2020) the LCR reform.

At the rate level, secured (repo) and unsecured (loan) funding exhibit virtually identical average rates pre-reform—both at 2.75 percent (SD ≈ 0.02 percent for loans, and 0.01 percent for repos). Post-reform, however, loan rates decline to 2.41 percent (SD ≈ 0.19 percent) while repo rates fall even further to 2.37 percent (SD ≈ 0.15 percent).

By contrast, transaction volumes diverge sharply. Monthly repo volumes rise from an average of 5,818 million PEN (SD = 3,981) before the reform to 22,375 million PEN (SD = 13,285) afterwards, while unsecured loan volumes increase only modestly, from 19,656 million PEN (SD = 3,879) to 21,301 million PEN (SD = 3,763). Thus, even though average rates do not differ at this aggregate level, the reform clearly drives a reallocation of funding toward secured repos.

Table 2. Monthly Repo vs Loan Summary (Pre- vs Post-Reform)

Metric	Pre		Post	
	Loan	Repo	Loan	Repo
Mean Rate (%)	2.75	2.75	2.41	2.37
SD Rate (%)	0.02	0.01	0.19	0.15
Mean Amt (PEN mm)	19,656	5,818	21,301	22,375
SD Amt (PEN mm)	3,788	3,981	3,763	13,285
Months (observed)	6	6	8	8

Figure 3 plots the corresponding monthly average interest rates for repos, loans, and the monetary policy rate (MPR). Before the policy change, repo and loan rates move in tandem and closely track the MPR plus a modest spread. After July 2019, repo rates decouple and decline more sharply while loan rates decline only marginally with broad monetary easing. The widening spread between secured and unsecured rates reinforces the graphical motivation for our reduced-form and structural analyses, suggesting a meaningful supply-side response to the lower regulatory cost of repos.

Figure 3. Monthly average rate (%)

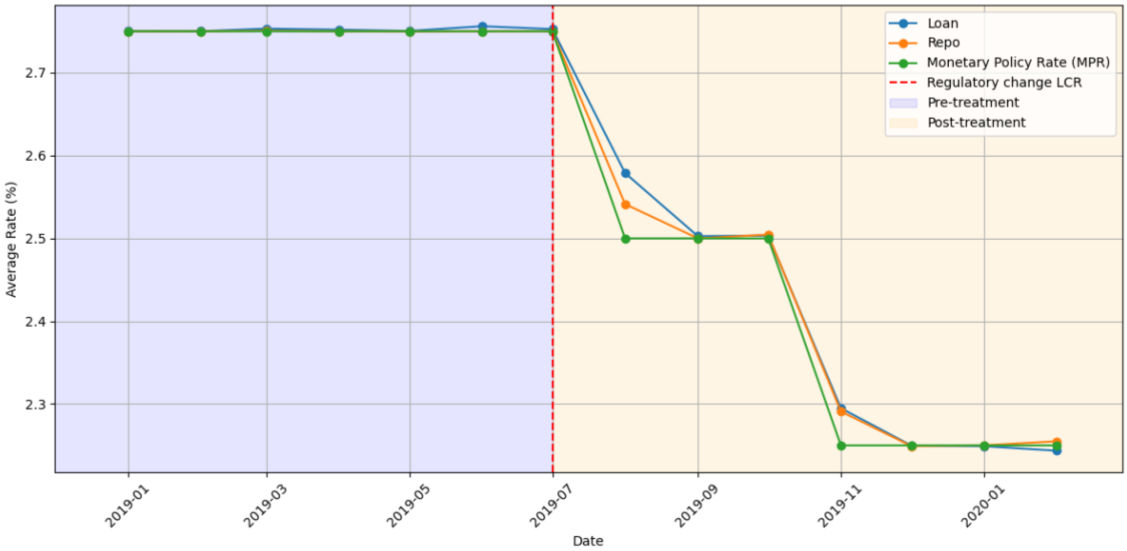
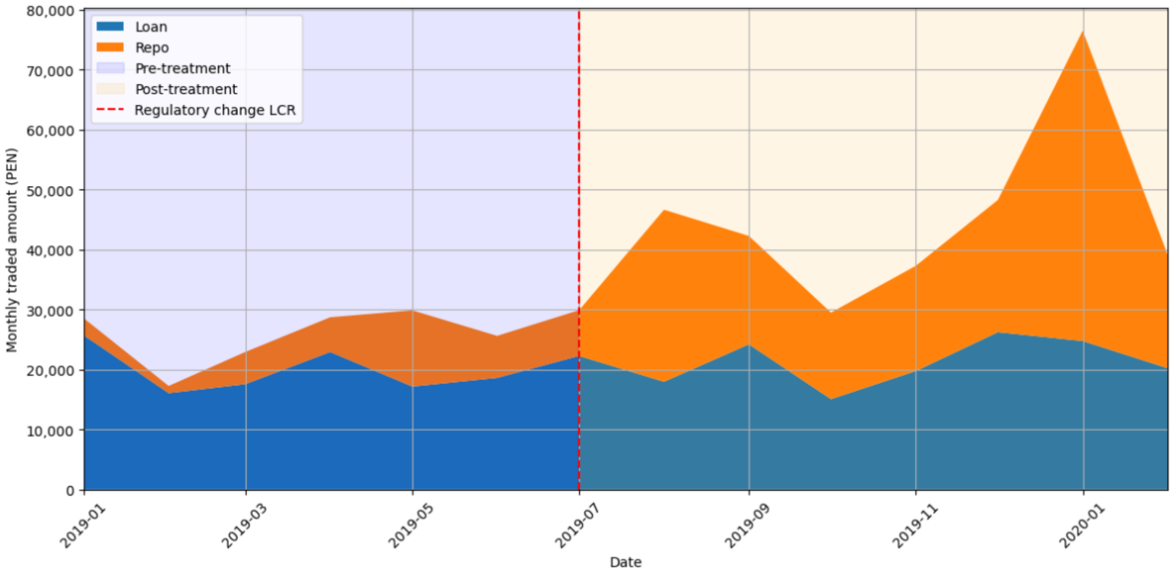


Figure 4 displays the monthly aggregated volumes of repos and loans, as well as their total amount. Between January and June 2019, loans averaged about 19,700 million PEN per month while repo volumes averaged only 5,800 million (≈ 23 % of the total). Following the July 2019 reform, repo volumes surged to an average of 22,380 million PEN per month—peaking near 47,000 million in August—whereas loan volumes rose only modestly to about 21,300 million. By January 2020, repos represented nearly two-thirds of total interbank flows, up from under one-quarter before the reform. This pronounced shift in the funding mix provides clear visual evidence that the July 2019 change altered banks' incentives to supply secured liquidity.

Figure 4. Monthly traded amount (mm)



Reduced-Form DiD estimates

Table 3 reports ordinary least squares estimates of our DiD specification with the transaction-level interest rate as the dependent variable. Column (1) presents the baseline model and column (2) reports results using lender–borrower-pair clustered standard errors. Across all specifications, the coefficient on the interaction term DiD captures the incremental change in repo rates relative to loan rates after the July 2019 reform.

In the baseline (Col. 1, β_1 = –0.044, SE = 0.010, p<0.01), the result indicates that, on average, repo rates fell by 4 bps more than unsecured loan rates post-reform. The magnitude and significance of this effect are unchanged when we cluster standard errors at the counterparty-pair level (Col. 2, β_1 = –0.040, SE = 0.014, p<0.01), confirming robustness to residual correlation within bilateral relationships.

The two-way terms Post and Treat behave as expected. The negative and highly significant post-reform dummy (β_{Post} ≈ –0.344, p<0.01) reflects an overall decline in interbank rates following broad monetary easing, while the treat dummy on its own is small and statistically insignificant. Among controls, higher lender reserve-requirement advances consistently lower quoted rates, and larger lender wholesale-funding dependence slightly raises rates.

Taken together, the reduced-form DiD estimates confirm a modest differential drop in repo rates relative to loans driven by the regulatory change, though much of the rate movement is shared across both instruments via the central bank policy rate.

Table 3. Reduced form DiD Estimates

Variable	(1) Baseline	(2) Clustered SE
PostxTreat	–0.044 *** (0.012)	–0.044 *** (0.015)
Post	–0.343 *** (0.004)	–0.343 *** (0.006)
Treat	–0.016 (0.011)	–0.016 ** (0.007)
RRA	–0.068 *** (0.005)	–0.068 *** (0.007)
WF	0.025 ** (0.010)	0.025 (0.020)
RL	–0.001 ** (0.000)	–0.001 *** (0.000)
Big	0.051 *** (0.005)	0.051 *** (0.010)
Medium	0.007 (0.004)	0.007 (0.008)
const	2.782 *** (0.004)	2.782 *** (0.005)

Variable	(1) Baseline	(2) Clustered SE
R-squared	0.611	0.611
R-squared Adj.	0.610	0.610
N	7 347	7 347

Standard errors in parenthesis. * p < 0.1; ** p < 0.05; *** p < 0.01.

Structural IV-2SLS Estimates

In Panel A of Table 4, the DiD coefficient on the regulatory shock (PostxTreat) is –0.0354 (SE = 0.0085, p < 0.001), indicating that treated banks experienced an additional 3.54 pp decline in their lending rate relative to controls, beyond the overall post-reform drop of 13.39 pp (*Post* = –0.1339, SE = 0.0016, p < 0.001). The positive Treat coefficient (0.1196, SE = 0.0232, p < 0.001) confirms that, prior to reform, treated banks faced rates about 11.96 pp above those of control banks. All controls align with theory: greater wholesale-fund dependence raises rates modestly (WF^{lender} = 0.0115, SE = 0.0045, p < 0.05), while higher reserve-ratio requirements (RL^{lender} and RRA^{lender}) and larger transaction size (*Amount*) exert downward pressure on rates.

In Panel B, we observe that the rate presents a large negative effect (*Rate*: –2,495.5, SE= 1,348.5, p < 0.06), implying that a one-percentage-point increase in the rate reduces trade volume by about 2,496 million PEN. Controls for bank size and reserve ratios behave consistently with theory: larger banks trade more ($Big^{borrower}$ = 72.31, SE = 8.00, significant at the 1% level; $Medium^{borrower}$ = 4.87, SE = 9.85, not significant at the 10% level), while higher reliance on wholesale funding reduces volumes.

The use of IV rather than OLS is justified: the Wu-Hausman test rejects exogeneity (F (1,7335) = 21.30, p < 0.001). While the adjusted R-squared in this specification is negative, this is not a concern in the context of our analysis. Since the goal is not to maximize predictive power but to identify the causal impact of the LCR reform on interbank rates, goodness-of-fit measures such as R-squared are not informative.

Table 4. Structural IV-2SLS Estimates

Panel A. Rate

Robust covariance (heteroskedastic), Debiased = False

Variable	Coef.
Intercept	1.0532*** (0.0054)
PostxTreat	-0.0354*** (0.0085)

Variable	Coef.
Post	-0.1339*** (0.0016)
Treat	0.1196*** (0.0232)
WF^{lender}	0.0115** (0.0045)
RL^{lender}	-0.0353*** (0.0031)
RRA^{lender}	-0.0003*** (0.000054)
Big^{lender}	0.0712*** (0.0092)
$Medium^{lender}$	0.0228*** (0.0039)
Amount	-0.0009*** (0.0002)
Observations (N)	7,343
R^2 (Adj.)	0.2966 (0.2958)
F-statistic (df=9)	9420.7 (p<0.001)
Endogenous	*Amount*
Instruments	$WF^{borrower}$, $RRA^{borrower}$
Wu-Hausman	F(1,7332)=45.62 (p<0.001)

Standard errors in parenthesis. * p < 0.1; ** p < 0.05; *** p < 0.01.

Panel B. Amount

Robust covariance (heteroskedastic), Debiased = False

Variable	Coef.
Intercept	2,404.08* (1295.1)
$WF^{borrower}$	-127.38** (61.99)
$RRA^{borrower}$	-45.45 (37.73)
$RL^{borrower}$	-2.03 (1.59)
$Big^{borrower}$	72.31*** (8.00)
$Medium^{borrower}$	4.87 (9.85)
Rate	-2,495.5* (1348.5)
Observations (N)	7,343
R^2 (Adj.)	-6.29 (-6.30)
F-statistic (df=6)	145.555 (p<0.001)
Endogenous	*Rate*
Instruments	$RRA_{it}^{lender}, WF_{it}^{lender}$
Wu-Hausman	F(1,7335)=65.33 (p<0.001)

Standard errors in parenthesis. * p < 0.1; ** p < 0.05; *** p < 0.01.

Taken together, these results show that the LCR reform exerted a statistically and economically meaningful downward pressure on secured funding rates, which in turn causally increased repo market activity.

Robustness checks

We conduct two complementary robustness exercises for the rate equation. First, we re-estimate the DiD specification over alternative symmetric event windows of ±3, ±4 and ±6 months around the July 2019 reform. As shown in Table 5, the estimated DiD term remains negative and highly significant in all specifications:

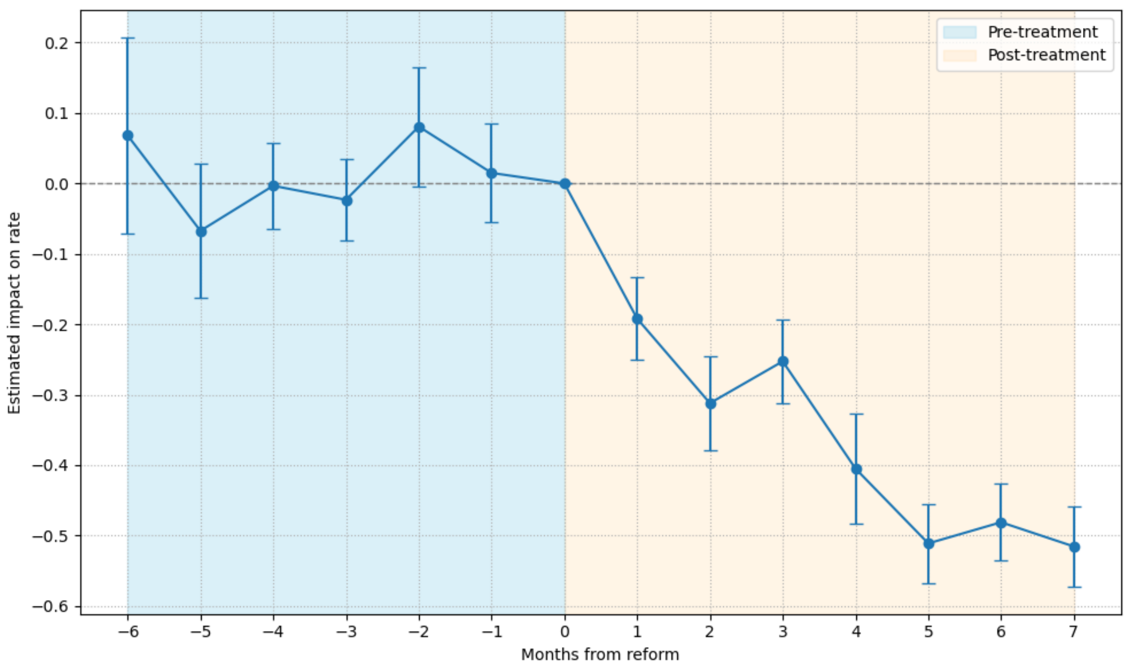
Table 5. Structural IV-2SLS Estimates

±Months	DiD	SE DiD	P value
3	-0.0430	0.0106	0.0000
4	-0.0376	0.0078	0.0000
6	-0.0665	0.0189	0.0004

These results confirm that our core finding—a further 3–7 pp reduction in secured-funding rates for treated banks—is not driven by the exact choice of window around the reform date.

Second, we estimate a dynamic DiD of the treatment indicator, clustering standard errors at the bank–date level. Figure 5 plots the coefficients (and 95% confidence intervals) for each month from six months before to seven months after the reform.

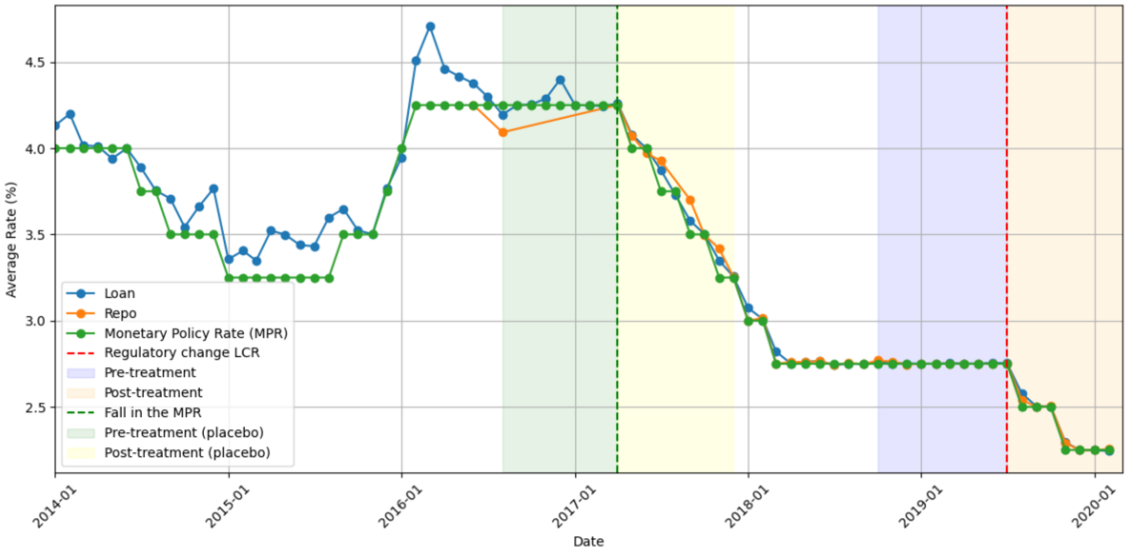
Figure 5. Event-Study: Dynamic DiD



The key patterns show no anticipatory effects: none of the six pre-reform leads differ significantly from zero, indicating that treated and control banks exhibited parallel trends in the run-up to July 2019. Second, there may be immediate and persistent impact. Beginning in month +1, the treatment effect jumps to –0.14 pp and deepens over subsequent months, reaching approximately –0.51 pp by month +5. All post-reform lags (months +1 to +7) are statistically significant at the 1% level, with magnitudes remaining stable around –0.3 to –0.5 pp.

To validate that our estimated LCR effect is not confounded by changes in MPR, we conduct a placebo DiD exercise centered around a previous 25 basis point MPR cut in April 2017. This date is chosen because it follows a sustained period of policy rate stability and precedes a gradual "stair-step" easing cycle. As illustrated in Figure 6, this provides a clean counterfactual to test whether reductions in the MPR alone induce a widening in the repo-loan spread.

Figure 6. Monthly average rate (%)



We re-estimate our baseline IV-2SLS model using April 2017 as the placebo treatment date. Results indicate that the placebo DiD coefficient is statistically insignificant (p=0.228) and has the opposite sign compared to our main findings (see Table 6). This suggests that, absent regulatory change, a 25 bp cut in the policy rate does not lead to a differentiated response between secured and unsecured interbank rates. In other words, the monetary policy stance itself is insufficient to explain the decline in repo rates observed after July 2019.

Table 6. IV-2SLS Placebo DiD

Variable	Coef.
Intercept	1.4746*** (0.0071)
DiD	0.0521 (0.0432)
Post	-0.1132*** (0.0014)
Treat	-0.0577*** (0.0176)
WF^{lender}	0.0062

Variable	Coef.
	(0.0038)
RL^{lender}	-0.007*** (0.0023)
RRA^{lender}	-0.0134*** (0.0028)
Big^{lender}	0.0039 (0.0139)
$Medium^{lender}$	-0.0092** (0.0042)
Amount	-0.0002 (0.0002)

Standard errors in parenthesis. * p < 0.1; ** p < 0.05; *** p < 0.01.

As an additional robustness check, we estimate a DiD specification over our original 2019-2020 window using the spread between the transaction-level repo rate and the MPR as the dependent variable. Since the policy rate fell by 25 basis points during this period, but transaction rates declined less sharply, the spread widened. Consistent with this, we find a positive and significant DiD coefficient of 0.05, reinforcing the view that the regulatory change created and independent wedge in secured funding costs beyond what can be explained by monetary easing alone.

Together, these results strengthen our interpretation that the effects documented in this paper are driven by the LCR reform, not by concurrent changes in the MPR.

Table 7. IV-2SLS DiD on Spread of rate and TPM

Variable	Coef.
Intercept	-1.7791*** (0.0075)
DiD	0.0503*** (0.0117)
Post	0.2158*** (0.0022)
Treat	-0.1691*** (0.032)
WF^{lender}	-0.0103 (0.0064)
RL^{lender}	0.0004*** (0.0042)
RRA^{lender}	0.0197*** (0.0001)
Big^{lender}	-0.0937 (0.0126)
$Medium^{lender}$	-0.0263** (0.0054)
Amount	0.0012 (0.0002)

Standard errors in parenthesis. * p < 0.1; ** p < 0.05; *** p < 0.01.

7. Conclusions

This paper exploits the July 2019 LCR reform in Peru as a quasi-natural experiment to quantify how aligning the regulatory treatment of repos and unsecured loans has reshaped short-term funding markets. First, reduced-form DiD estimates reveal that repo rates declined by an additional ~4 pp relative to loan rates following the reform, confirming a non-trivial "LCR premium" was eliminated on the supply side. Second, structural IV-2SLS estimates isolate this supply-shock effect in a simultaneous-equations framework, showing that the reform induced an incremental 3.54 pp drop in the rates of treated banks (PostxTreat = –0.0354, SE = 0.0085) —above a broad post-reform easing of 13.39 pp— and that a 1 pp cut in the rate increases repo volumes by roughly +2,495.5 mm PEN (Rate coefficient = –2,495.5, SE = 1348.5).

Collectively, these results demonstrate that liquidity-coverage incentives materially influence the choice of the banks between secured and unsecured funding. By fully recognizing repos as HQLA and zero-weighting their associated outflows, the reform caused a pronounced reallocation of interbank volumes—repo trading surged from ~5,800 mm to ~22,400 mm PEN per month, whereas loan volumes rose only modestly—and drove repo rates below loan rates.

From a policy perspective, our findings highlight that even marginal changes in prudential treatment can swiftly and causally reorient funding away from unsecured corridors toward collateralized trades, with implications for monetary transmission, market liquidity, and systemic resilience. In this context, the development of robust and efficient repo markets is especially desirable: beyond their role in day-to-day liquidity management, repos contribute to price discovery, mitigate counterparty risk, and serve as a stabilizing force during episodes of stress by reducing the likelihood of fire sales and supporting the smooth functioning of fixed-income markets (CGFS, 2017).

For emerging markets, where repo markets may be less developed, these insights underscore the importance of calibrating liquidity regulations to avoid unintended distortions in core wholesale funding markets. Future work could explore longer-run balance-sheet adjustments and welfare trade-offs between enhanced resilience and potential liquidity fragmentation. Nonetheless, our study provides clear causal evidence that Basel III–style liquidity rules do more than "improve buffers"—they reshape the very mechanics of interbank funding.

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