

Cross-Border Effects of Fed Capital Requirements on Emerging Market Banks' Funding



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Resilience in the financial system: Shocks and financial stability

The global financial system is deeply interconnected but regulatory frameworks remain largely national. A deeper understanding of cross-border effects would enhance our understanding of *global financial stability*.

- **The goal:** regulation has evolved to make the financial system safer, specially after the 2008 financial crisis.
- **The scope:** regulatory authorities assess **their jurisdiction's financial system resilience**
 - using tools like stress tests or capital buffers- to ensure that their macroprudential policy evolves timely and properly.
- **The missing agent:** despite not being covered by their peer's regulatory framework, **entities from other jurisdictions** might face new or enlarged shocks due to changes in the regulation that their peers comply.

Resilience in the financial system: Shocks and financial stability

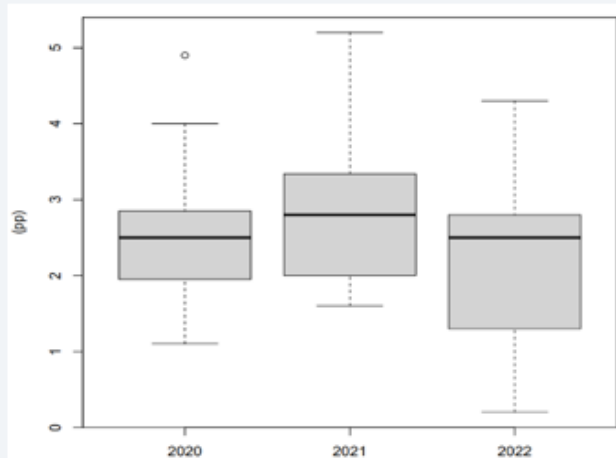
- Higher capital requirements can affect banks lending behavior on at least three margins:
 - Reduce lending offer based on debtor's risk
 - Focus on short term lending
 - Increase the funding cost
- For emerging markets, foreign credit lines are a financial stability variable that can also impact economic activity.
- Diversification might serve as a resilience buffer.

This work: Fed's 2022 Stress Capital Buffer increase and Colombian bank's funding

In response to heightened global risks, the Federal Reserve increased the stress capital buffer in 2022, therefore decreasing the bank's capital buffer.

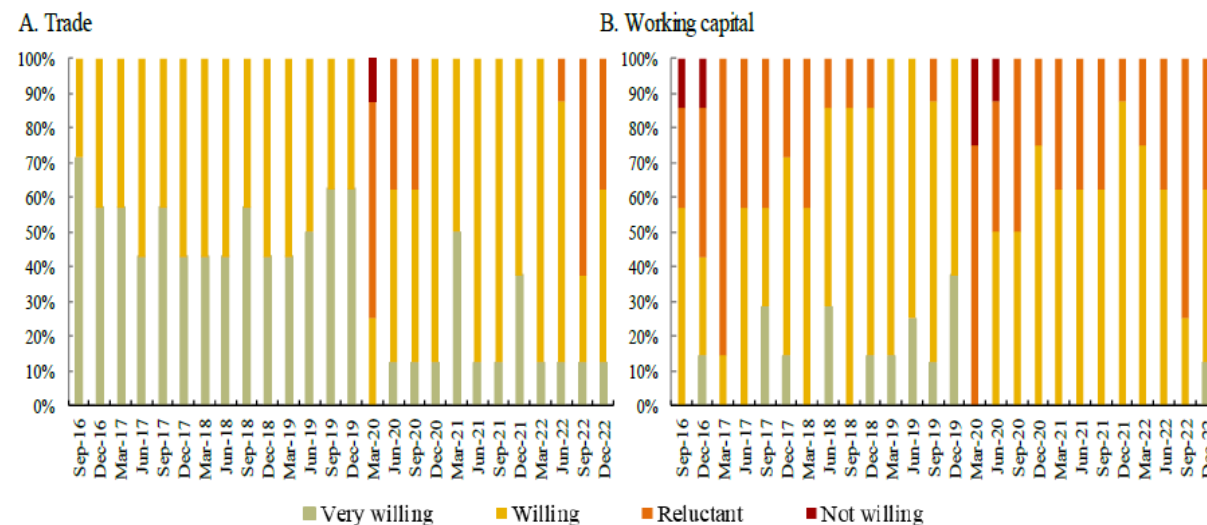
According to Banco de la República's quarterly survey of external financing, the 2022 capital requirements negatively affected U.S. banks' lending disposition and foreign credit supply

Capital buffers of affected U.S. lenders to Colombian Banks



CET1 before the exercise minus minimum + G-SIB premia + SCB. Source: Fed.

Foreign Banks lending disposition to Colombian banks



Source: Quarterly survey on external financing applied by Banco de la República.

This work: Fed's 2022 Stress Capital Buffer increase and Colombian bank's funding

Why Colombia is a clean laboratory

≈30%

of Colombian banks' total outstanding external credit came from U.S. banks at end-2022

Granularity of the data

Weekly supervisory reporting of every foreign credit line, by counterparty and maturity allows us to track better the dynamics.

Fed's regulatory cycle events



What binds, and for whom

- CET1 requirement = 4.5% minimum + SCB (≥ 2.5 pp, from the stress test) + G-SIB surcharge
- Only banks with $\geq$ USD 100 bn in consolidated assets take the test — smaller U.S. banks face no SCB or G-SIB buffer
- Failing the requirement triggers automatic limits on distributions and discretionary bonuses
- **2022 severely adverse scenario was more stringent → measured buffers of U.S. lenders to Colombia fell**

Research question, contribution and methodology

This paper examines the effects of U.S. capital requirement regulations on Colombian banks' access to foreign credit lines, using the 2022 Fed capital requirement as a case study.

01

Timing and expectations

Exploiting announcement vs. publication vs. enforcement, we show credit not only responds to binding constraints, but also to expectations. **Anticipatory adjustment.**

02

Composition, not just level

The effects of capital regulation are heterogeneous across maturities: contraction is concentrated in short-term lines while long-term credit is untouched. **Regulation abroad reshapes the maturity structure of EM external funding.**

03

The limits of substitution

Bank-to-bank granularity lets us test reallocation directly: partial and delayed toward unaffected U.S. lenders, limited towards non-U.S. lenders. **Diversification helps but has a limited effect.**

Research question, contribution and methodology

- **The analysis relies on the Synthetic Difference-in-Differences (SDID) method** (Arkhangelsky et al., 2021) and is based on a detailed, weekly dataset submitted by local financial institutions to the Central Bank of Colombia.
 - This method constructs synthetic controls by reweighing untreated units and time periods to compare similar units.
- **Results indicate a significant reduction in credit from affected U.S. banks, primarily concentrated in short-term debt**, while long-term credit remains unaffected.
 - The credit reduction becomes statistically significant two weeks after the publication of individual stress test results, continues to grow over time and is particularly pronounced in the 39th week of 2022, when the capital requirements officially took effect.
- **Estimates indicate that credit lines limits decrease transitorily.**
- **The analysis of substitution effects shows that credit with unaffected U.S. banks increased following the stress test results, becoming statistically significant at the end of the study period.**

Data

5,002

credit-line × week
observations

12

Colombian borrower
banks

26

U.S. lender banks
in the panel

11

subject to Fed capital
requirements (treated)

- **Balanced weekly panel, Nov 2021 – Dec 2022**
- Window chosen to sit clear of the pandemic episode
- Each report lists every credit relation: balance and credit limit by counterparty, country, and maturity ($\leq 12m$ vs $> 12m$)
- Outcomes: total, short- and long-term credit, credit limit, and credit usage (stock/limit)
- Excluded: multilateral or governmental lenders (6) and lenders with unavailable fundamentals (3)

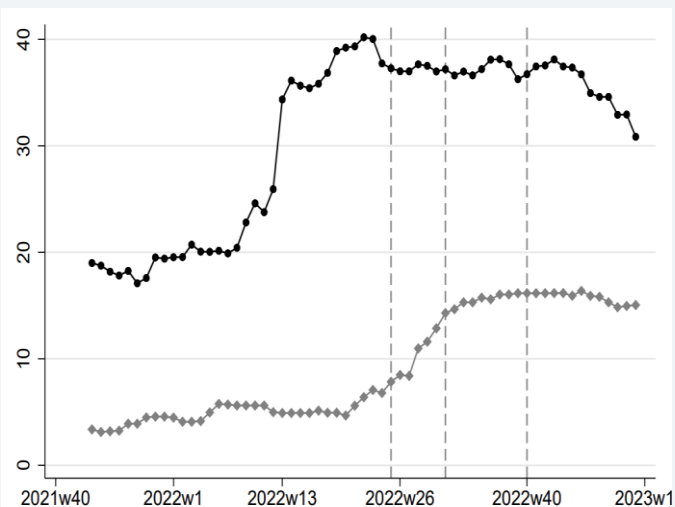
VARIABLE	Min	p25	p50	Mean	p75	Max	SD
<u>A. Credit line characteristics</u>							
Total credit (USD M)	0.00	0.00	0.00	22.80	25.00	242.20	44.34
Long-term credit (USD M)	0.00	0.00	0.00	2.69	0.00	160.00	18.41
Short-term credit (USD M)	0.00	0.00	0.00	20.11	20.00	242.20	41.01
Credit limit (USD M)	0.00	5.00	45.00	72.29	125.00	300.00	78.44
Credit usage (%)	0.00	0.00	0.00	25.86	49.21	136.88	34.85
<u>B. Lender characteristics</u>							
Ln (Assets)	9.10	13.54	14.48	14.01	14.90	15.28	1.18
CET1 (%)	8.95	10.60	12.50	12.51	14.00	22.60	2.15
ROA (%)	0.12	0.36	0.77	0.72	0.98	1.67	0.34
Loan/Deposits (%)	19.69	48.52	61.81	62.36	70.72	111.20	18.39
NPL (%)	0.00	0.46	0.60	1.17	1.80	5.17	1.11

Notes: USD M refers to Millions of U.S. Dollars.

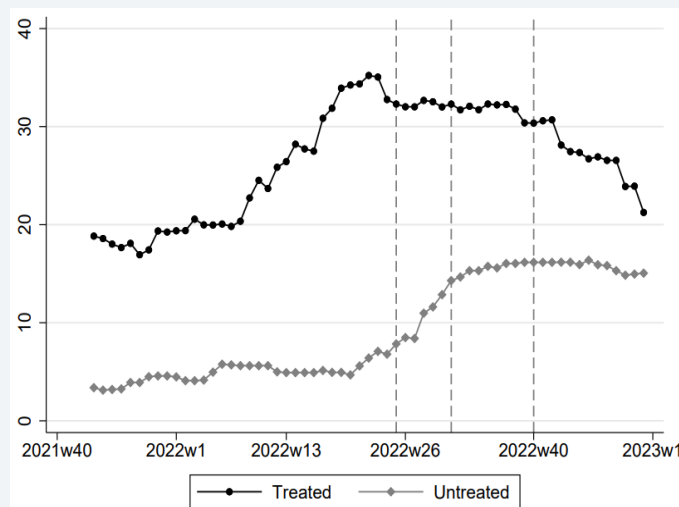
Data: average trends around key dates

- Following the publication of individual stress test results (2022w25), total credit exhibited stability for treated credit lines and reductions since October (2022w39), when the requirements became effective.
- In contrast, the average total credit for untreated credit relations increased even after the requirements were published.
- These movements in average total credit were explained mainly by short-term loans.

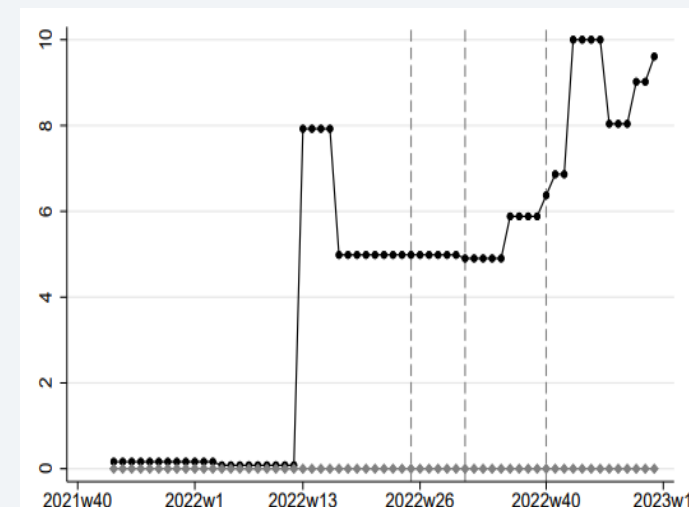
Total credit (USD M)



Short-term credit (USD M)



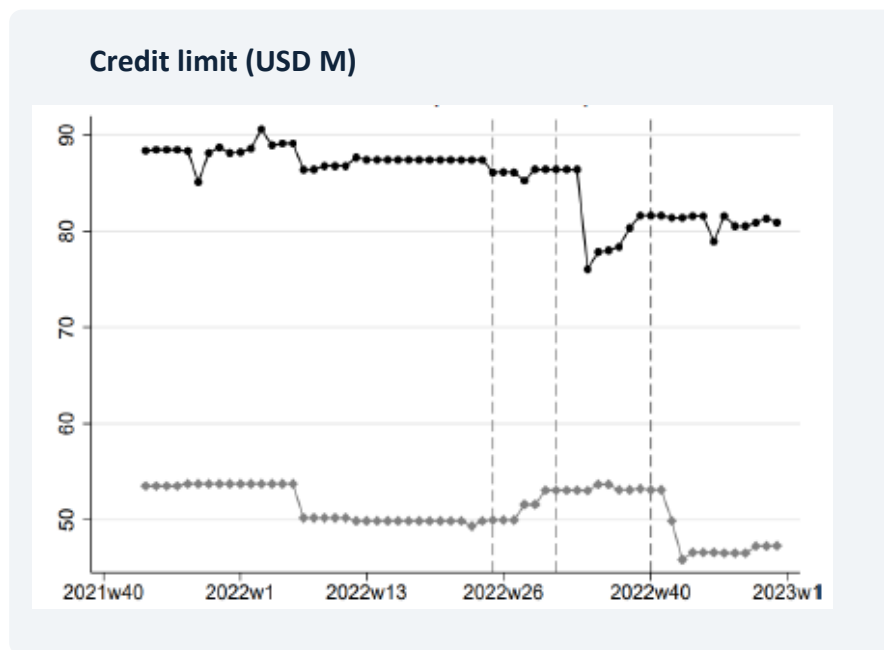
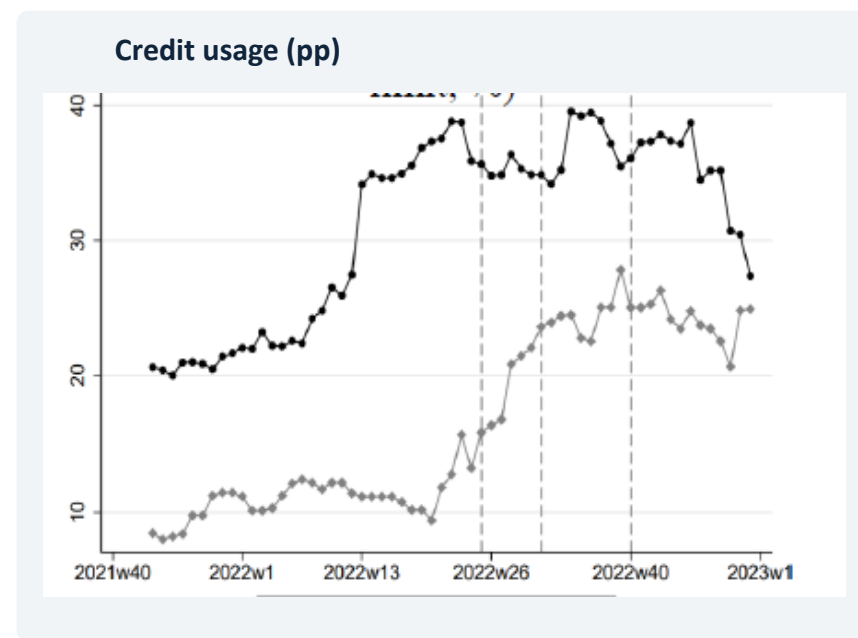
Long-term credit (USD M)



Black = treated (U.S. lenders subject to Fed requirements); grey = untreated. Dashed vertical lines: 2022w25, 2022w31, 2022w39.

Data: average trends around key dates

- **An important reduction is observed in credit limits for treated banks** after the capital requirement release in 2022w31; however, **credit limit usage exhibited a downward trend** since average credit stocks decreased in a higher proportion



Black = treated (U.S. lenders subject to Fed requirements); grey = untreated. Dashed vertical lines: 2022w25, 2022w31, 2022w39.

The identification problem: treated stocks flatten and fall after June 2022; untreated lines keep rising. However, the pre-trends are not parallel. This points out the necessity of finding comparable groups to evaluate the policy shock studied in this paper.

Empirical strategy: Synthetic DiD

The SDID deals with the challenge of non-parallel trends between the average of treatment and control banks by combining difference-difference (DID) and Synthetic Control (SC) methods, leveraging on the strengths of both techniques and providing a more robust analysis of the intervention's impact.

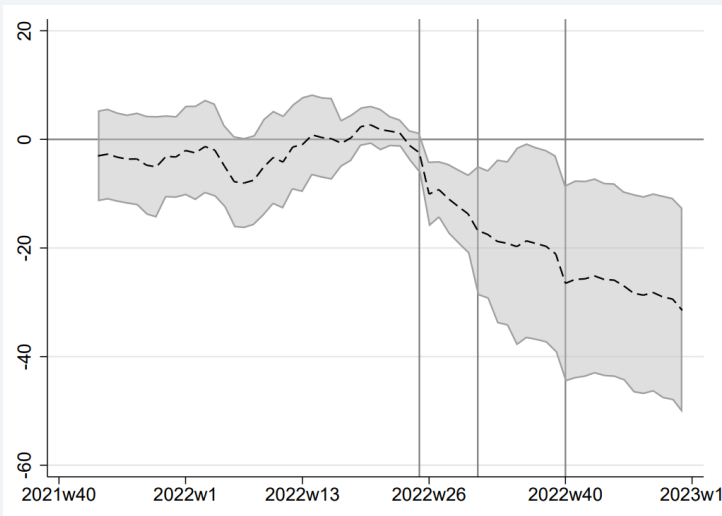
The SDID compares the treated group, which comprises credit lines with U.S. banks subject to the Fed's additional capital buffers, with a synthetic control group of unaffected credit lines where the lender is an U.S. bank that is only required to meet the minimum CET1 of 4.5%.

- The SDID constructs these synthetic controls by means of reweighting untreated units and periods so that similar units are compared.
- Comparison groups are adjusted to correct pre-trends (as in SC) while considering individual and time effects (as in DID), providing a more flexible model (Arkhangelsky et al., 2021).
- SDID also allows adjusting for the presence of lender explanatory variables which might affect treatment status so that estimated weights consider this information. We control for the following lender characteristics, measured quarterly: log of assets, CET1, ROA, loans-to-deposits ratio, and NPL.

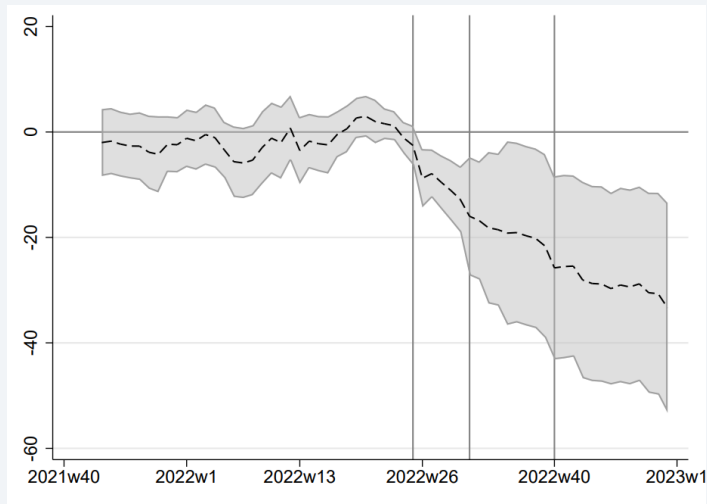
Results

- Estimates generally indicate that **the weights provided by the SDID method allow for comparable groups before treatment.**
- Total credit from affected U.S. banks has been on a downward trend since the release of the Fed's results on June 23, 2022 (2022w25)
 - The reduction becomes statistically significant two weeks after the announcement and increases over time and a more pronounced reduction is observed in 2022w39, when capital requirements were in force. The effect reaches close to -30 USD M by the end of 2022.
 - Effects are concentrated on short-term debt (up to twelve months).

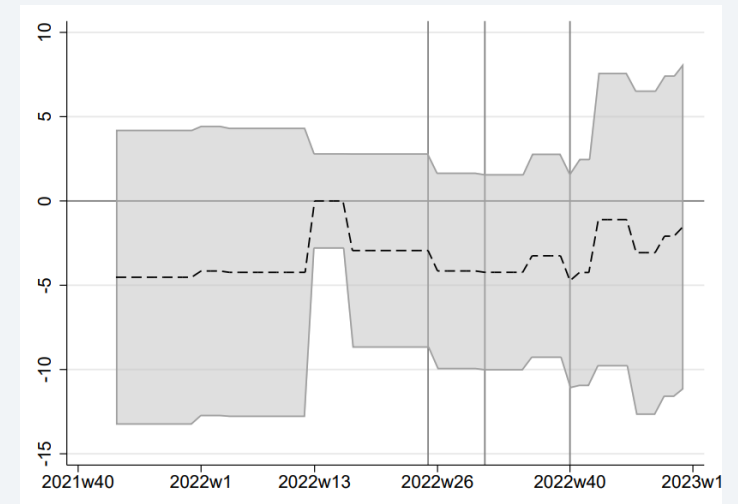
Total credit (USD M)



Short-term credit (USD M)



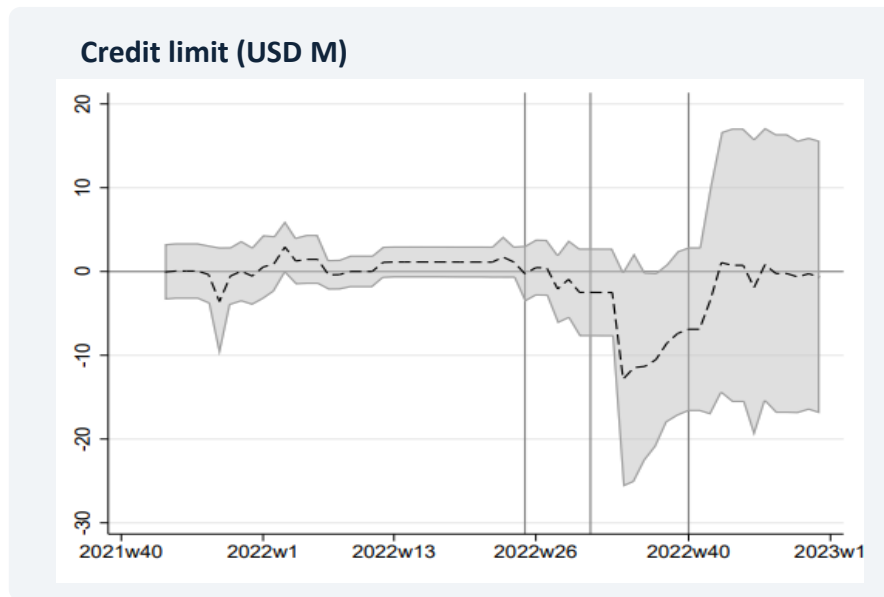
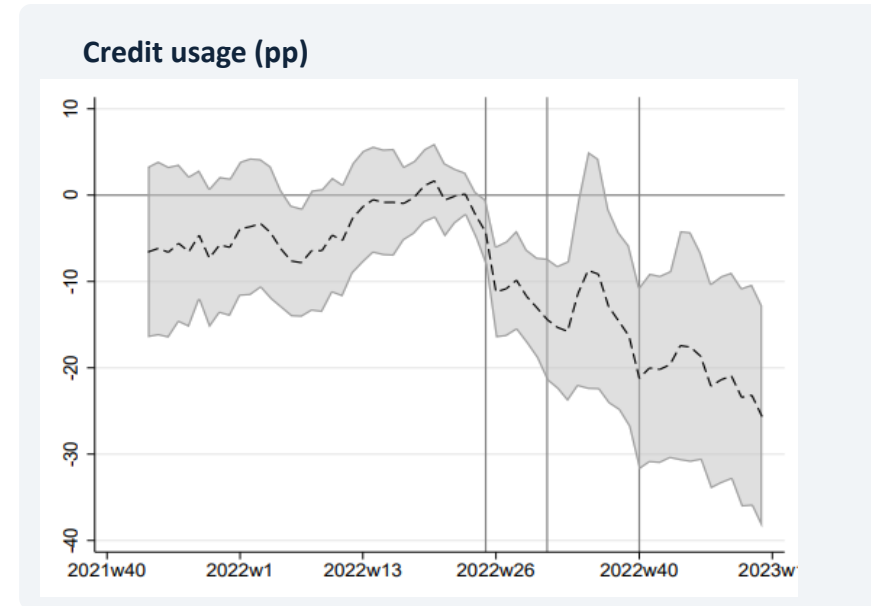
Long-term credit (USD M)



Black = treated (U.S. lenders subject to Fed requirements); grey = untreated. Dashed vertical lines: 2022w25, 2022w31, 2022w39.

Results

- Credit limits are reduced three weeks after the capital restrictions released by the Fed (2022w31). Afterwards, the effect is reversed, indicating a short-term response.
- Given the higher reduction in credit amounts and the low effects on credit limits, the credit usage ratio shows reductions.



Dashed vertical lines: 2022w25, 2022w31, 2022w39.

Results

Significant average post-treatment effects on total credit, short-term credit and credit usage are observed

VARIABLES	(1) Total credit (USD M)	(2) Short-term credit (USD M)	(3) Long-term Credit (USD M)	(4) Credit limit (USD M)	(5) Credit usage (pp)
ATT	-20.94*** (7.146)	-21.27*** (7.072)	-3.229 (3.191)	-3.296 (4.584)	-16.11*** (4.355)
Observations	5,002	5,002	5,002	5,002	3,904
Credit relations	82	82	82	82	64
Controls	Yes	Yes	Yes	Yes	Yes

Notes: Average post-treatment SDID estimates. Standard errors, calculated by a 100-repetition clustered bootstrapping procedure with replacement, are in parenthesis. Controls include the following lender characteristics, measured quarterly: log of assets, CET1, ROA, loans-to-deposits ratio, and NPL.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Substitution effects

Diversification allows local banks to smooth policy shocks by substituting funding from affected sources with those from unaffected ones.

- For instance, Colombian banks facing credit restrictions under the Federal Reserve's supervisory framework can increase their borrowing from U.S. banks not subject to these restrictions or from established credit lines outside the U.S.

We follow Önder et al. (2024) by replacing the outcome variable with Y_{i-jt} , that is, the loans contracted by local bank i with lenders different from U.S. bank j . The above allows us to inspect if debtor i can substitute sources from affected j U.S. banks.

We present two exercises:

Exercise 1

Y_{i-jt} is measured for the whole U.S. source of funding

(substitution effect in the U.S. economy between affected and unaffected banks).

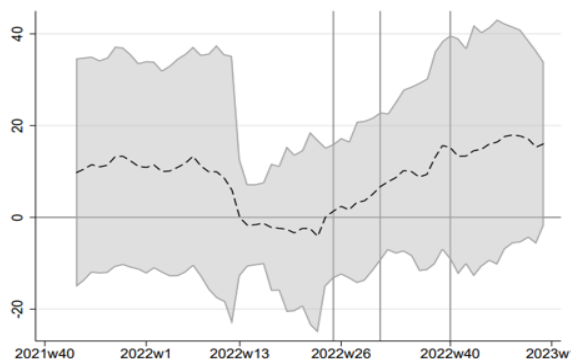
Exercise 2

Y_{i-jt} is measured considering only other jurisdictions

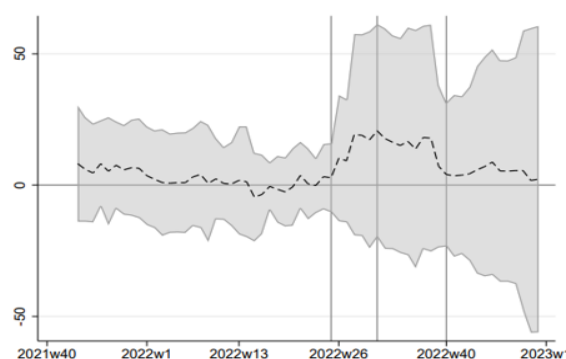
(geographic substitution effects).

Substitution effects

A. Total credit in the U.S. (USD M)



B. Total credit in jurisdictions different from the U.S. (USD M)



Notes: Event-study SDID estimates. Estimations include as controls the following lender characteristics, measured quarterly: log of assets, CET1, ROA, loans-to-deposits ratio, and NPL. Standard errors calculated by a 100-repetition clustered bootstrapping procedure with replacement. 95% confidence intervals. Vertical lines correspond to 2022w25, 2022w31, and 2022w39.

Within the U.S.: partial and delayed effects

- Credit from unaffected U.S. lenders rises after 2022w25, $\approx +16$ USD M by end-2022, significant only at 10%
- Against ≈ -30 USD M lost — roughly half the shock, and only with a lag

Outside the U.S.: no significant reallocation

- A visible rise between June and October, but never statistically distinguishable from zero
- **Average ATTs: +11.2 (U.S.) and +10.2 (other jurisdictions), both insignificant**

This could indicate a limited and transitory geographical substitution effect, which can be related to the primary role of the U.S. as a source of funding for emerging markets.

Conclusions

The 2022 stricter capital requirements for large banks in the U.S. generated spillover effects on Colombian banks

- Short-term credit lines were the most affected, consistent with their flexibility

Delayed substitution effects were also observed as Colombian banks sought alternative funding sources.

- Substitution effects concentrated on unaffected U.S. banks. However, they were insufficient to offset the reductions from affected banks, indicating challenges in fully mitigating regulatory spillovers.
- Outside the U.S., substitution effects were limited and temporary, with non-U.S. lending showing a marginal, statistically insignificant increase.

- **The findings emphasize the importance of diversified funding channels and well-established long-term sources of funding to mitigate unintended regulatory consequences.**
- **Findings also reveal financial institutions' preemptive actions during the interim between announcement and enforcement, such as reallocating exposure, to minimize adverse impacts.**
- **These insights underline the need for policymakers to consider cross-border liquidity dynamics and the broader implications of regulatory measures on global financial stability and access to credit in emerging markets.**

Closing remarks

01 Expectations transmit before constraints bind

Credit fell three months before the requirement took force. Policy effects evaluation should cover a timespan that considers anticipation

02 Composition is the mechanism

The maturity shifts support the importance of diversified funding channels and well-established long-term sources of funding to mitigate unintended regulatory consequences.

03 Diversification absorbs about half — with a lag

Partial substitution inside the U.S., none outside it.
Concentration of EM funding on U.S. counterparties is itself the vulnerability.

These insights highlight the importance of policy makers including cross-border liquidity dynamics and the broader implications of regulatory measures on global financial stability and access to credit in emerging markets.