Competition in the Colombian banking sector

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Introduction

- Lack of competition in the banking sector has first-order welfare effects (Greenwood et al, 2010)
- We analyze competition in the Colombian banking sector
  - Estimate changes in measures of banking power due to the exogenous introduction of a liquidity regulation
- We find that the exercise of market power increased in the short term after the introduction of a net stable funding ratio
  - Consistent with greater market power in loan market than in deposit market

Strategy

- Empirically estimate the impact that the implementation of the NSFR had on the banking sector in Colombia

- Rationalize the NSFR impact using a theoretical model to understand competition in the banking sector

Findings

- The Colombian banking sector is not particularly concentrated and lacks the power of a dominant firm.
  - This finding opens the door to explore whether the banking sector is robust enough to withstand potential sectoral crises

- In the short term, the NSFR regulation increased the exercise of market power. In the longer run, the effect dissolves.

What we learn

- When the NSFR is introduced, liquidity constraints for banks become more binding:
  - Banks must decrease loans or increase stable (long-term) funding
- If there is market power in loan and deposit markets, both loan rates and term long-term deposit rates increase:

- A higher Lerner index implies more market power in the loan market than in the deposit market

NSFR

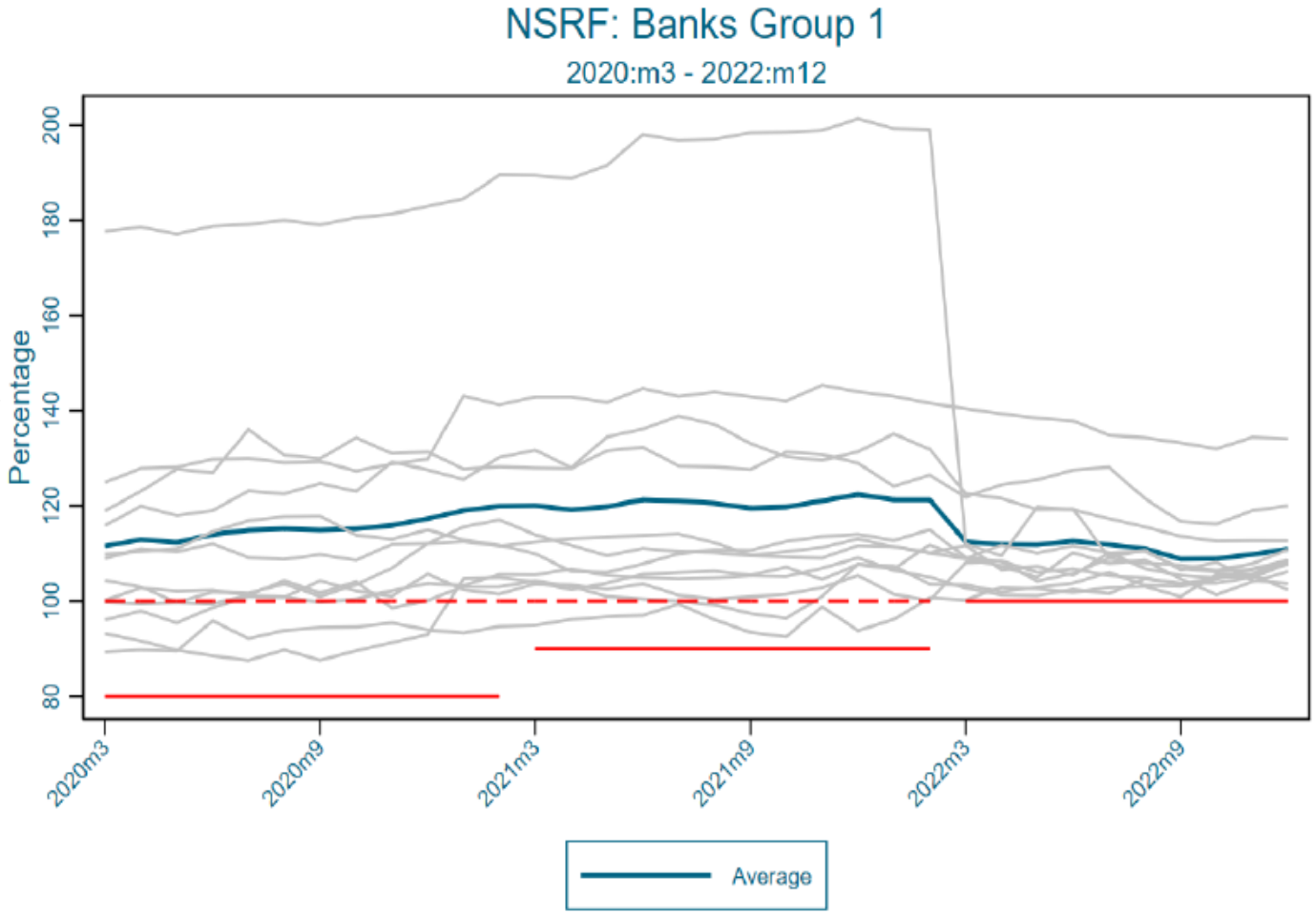
- Following the 07/08 global financial crisis, the Basel Committee developed two complementary strategies to deal with short-term liquidity and reduce longer-term funding risk:
  - The latter is NSFR

$$NSFR = \frac{Amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \geq 100\%$$

  - Longer-term liabilities are more stable than short-term ones

NSFR in Colombia

- Introduced in 2020
- NSFR has a one-year window.
- Introduced with a transition period, dividing financial institutions into two groups (large and small banks – by assets).
- Banks forced to seek long-term CDs from HH.
  - Retail is more stable.

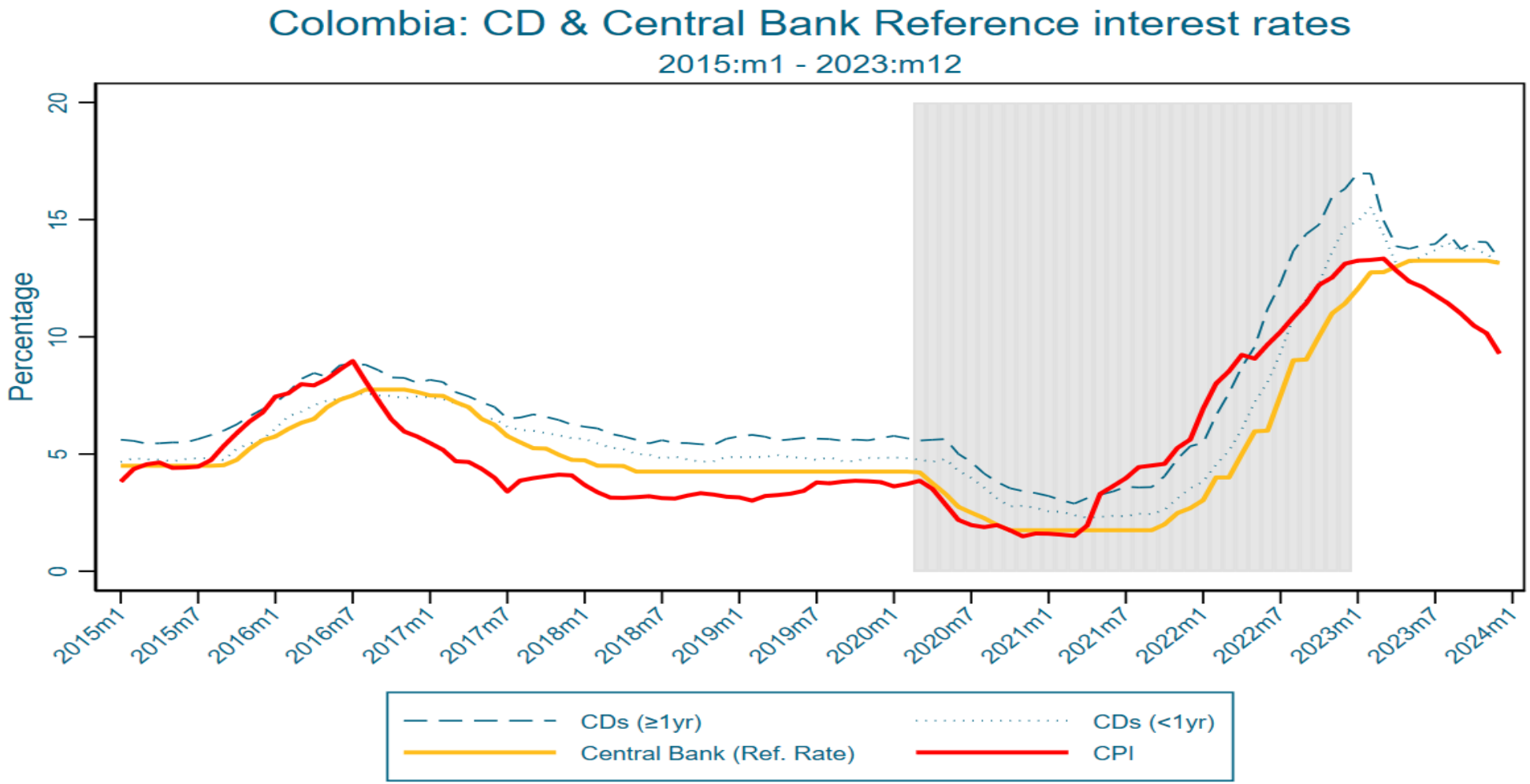


Note: Group 1: See text.
For illustrative purposes, the graph only displays those banks with NSFR less than two standard deviations from the mean.

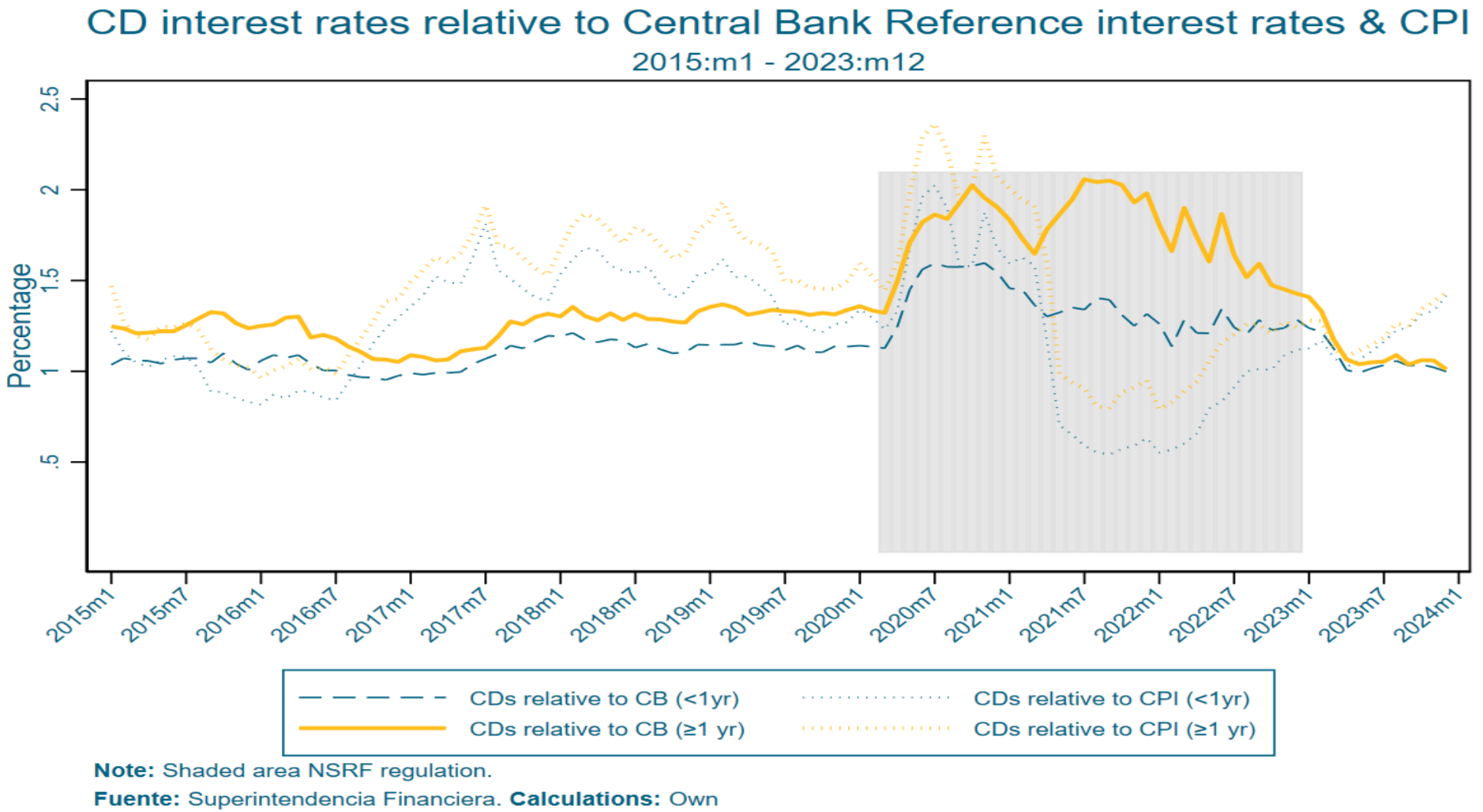
Source: Superintendencia Financiera. Own Calculations

Data

- Publicly available monthly balance sheet data for the universe of the banking sector in Colombia.
- Period: January 2015 – December 2023
- Detailed information on assets, liabilities, equity; and profit and loss statements for each bank supervised by the Superintendencia Financiera de Colombia.
- Loan and deposit interest rate data at the bank level.
  - Loan: commercial and consumption loans.
    Deposits: certificate of deposit data, includes prices and quantities.
- Auxiliary information includes information on the number of offices per bank, and bank-level data on NSFR performance between March 2020 and December 2022.



During adjustment period term deposit rates increased more than reference rates



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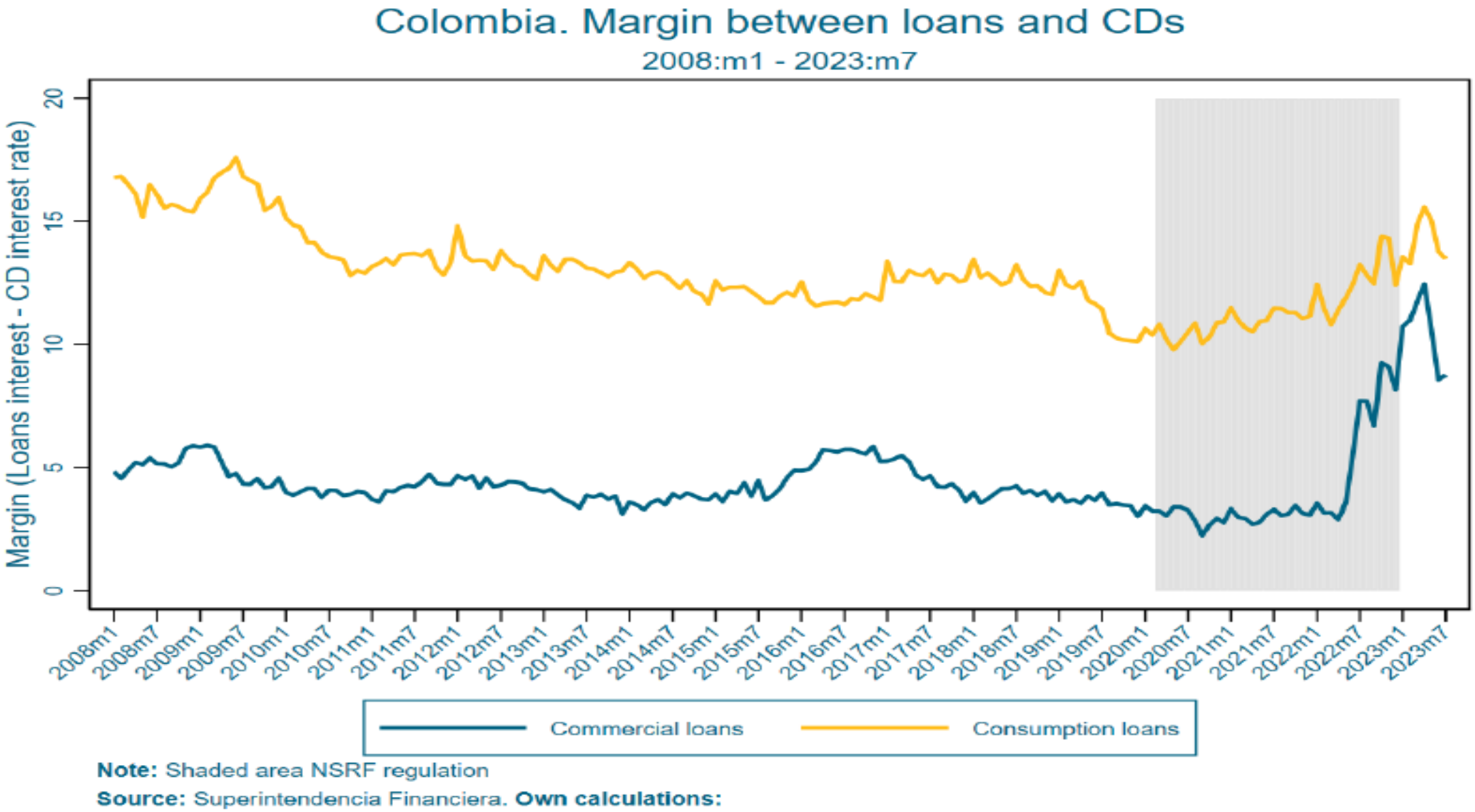
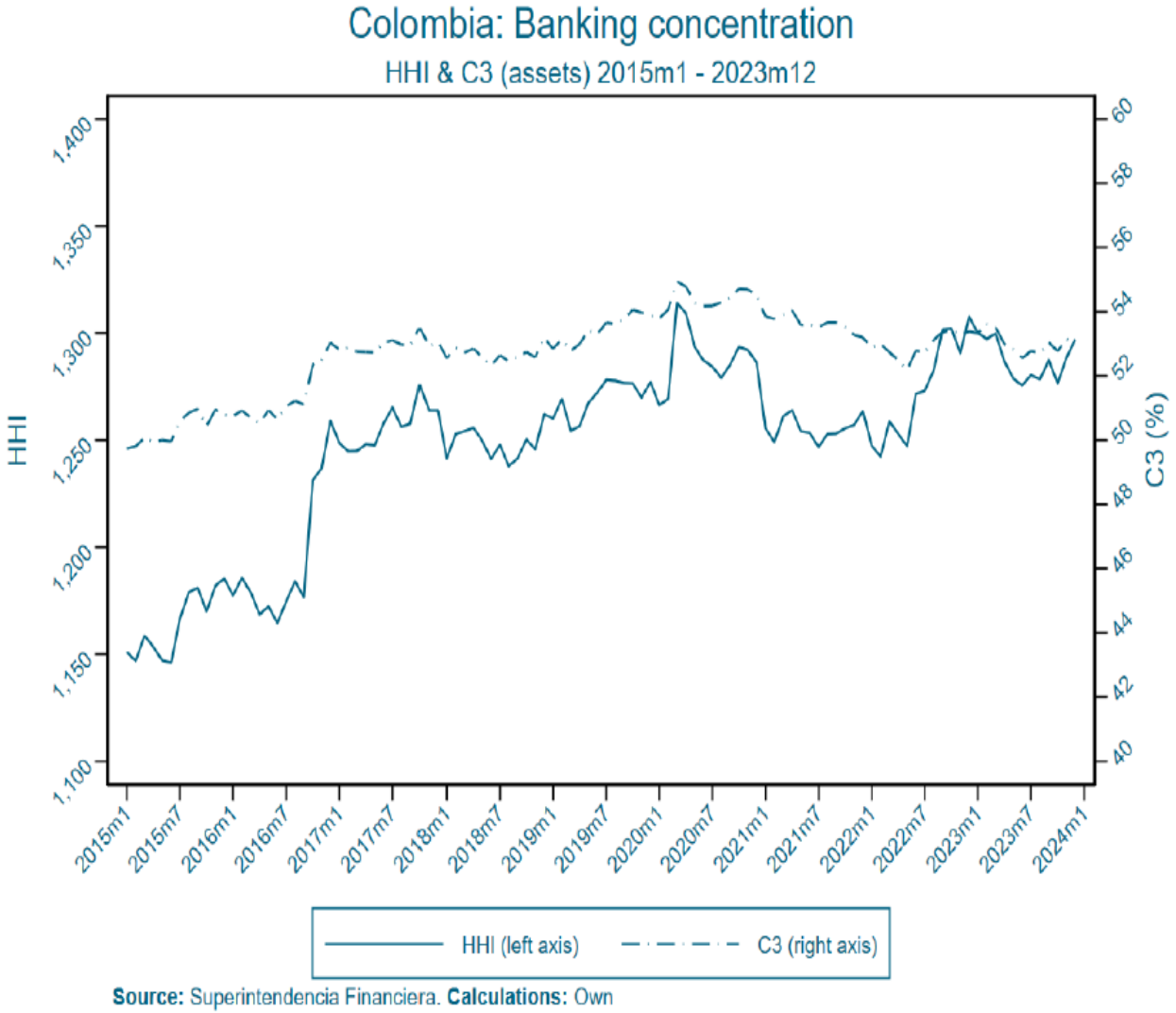
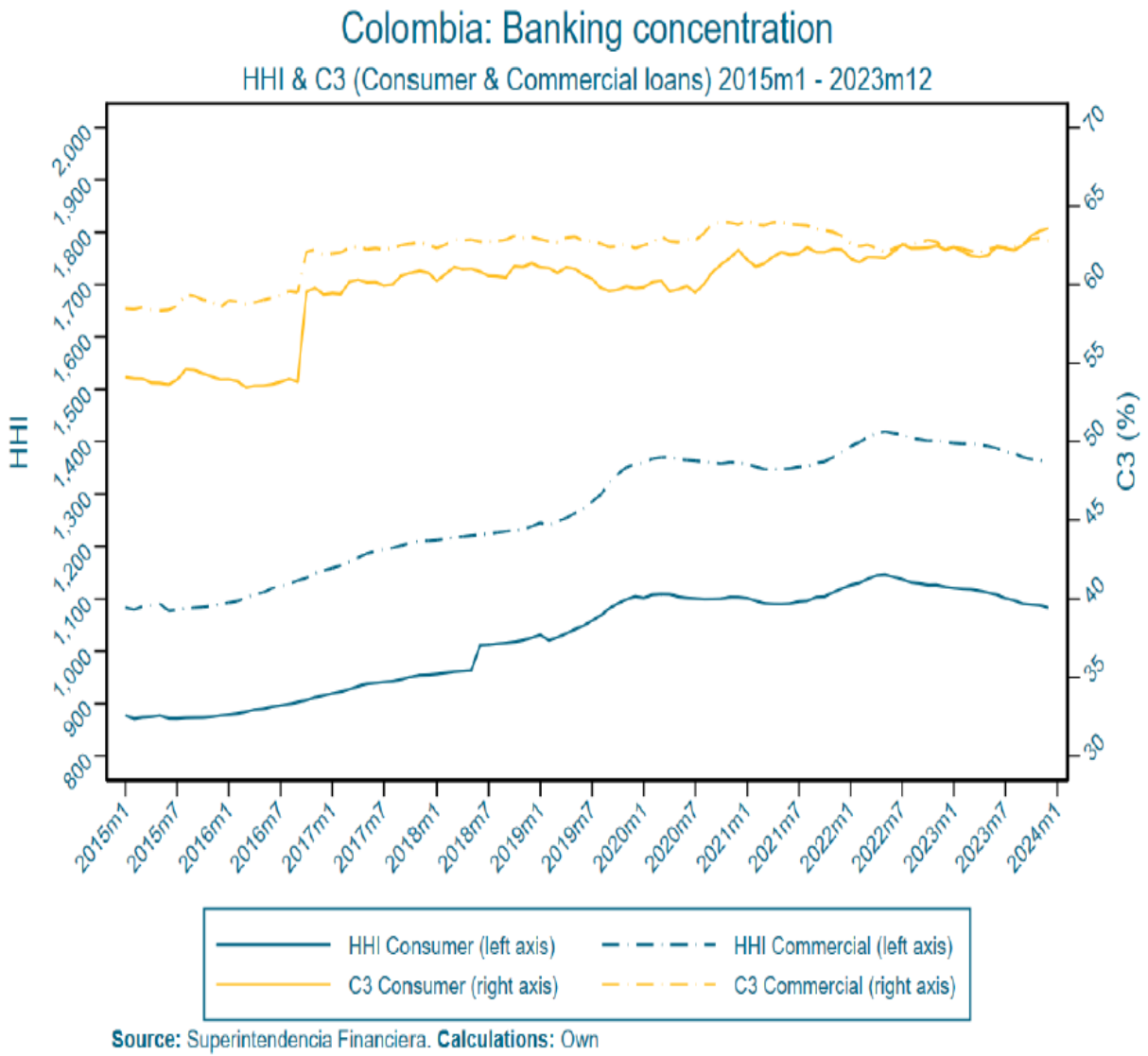
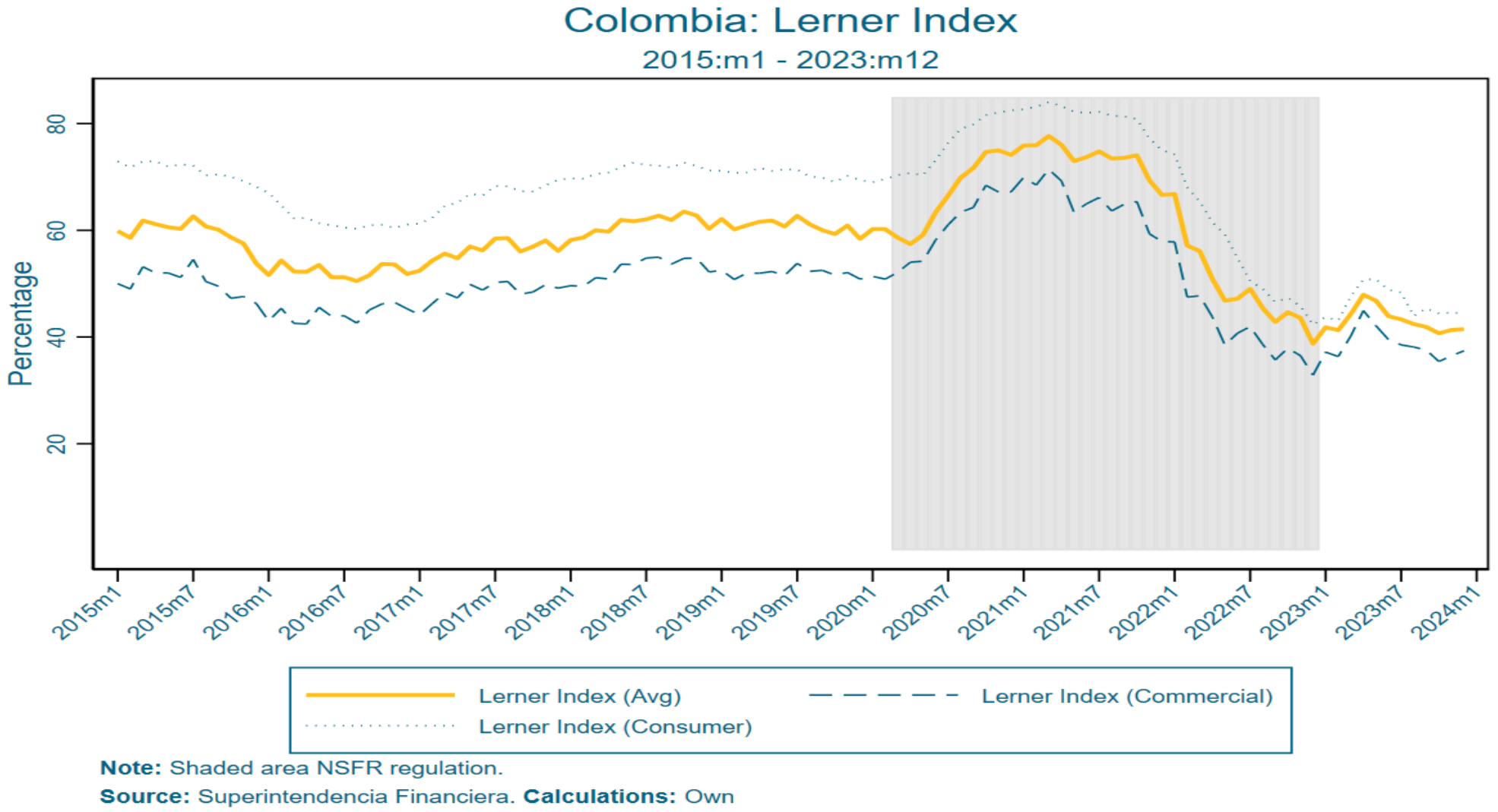


During adjustment period banks adjusted loan rates differently





Concentration in banking sector does not seem particularly high



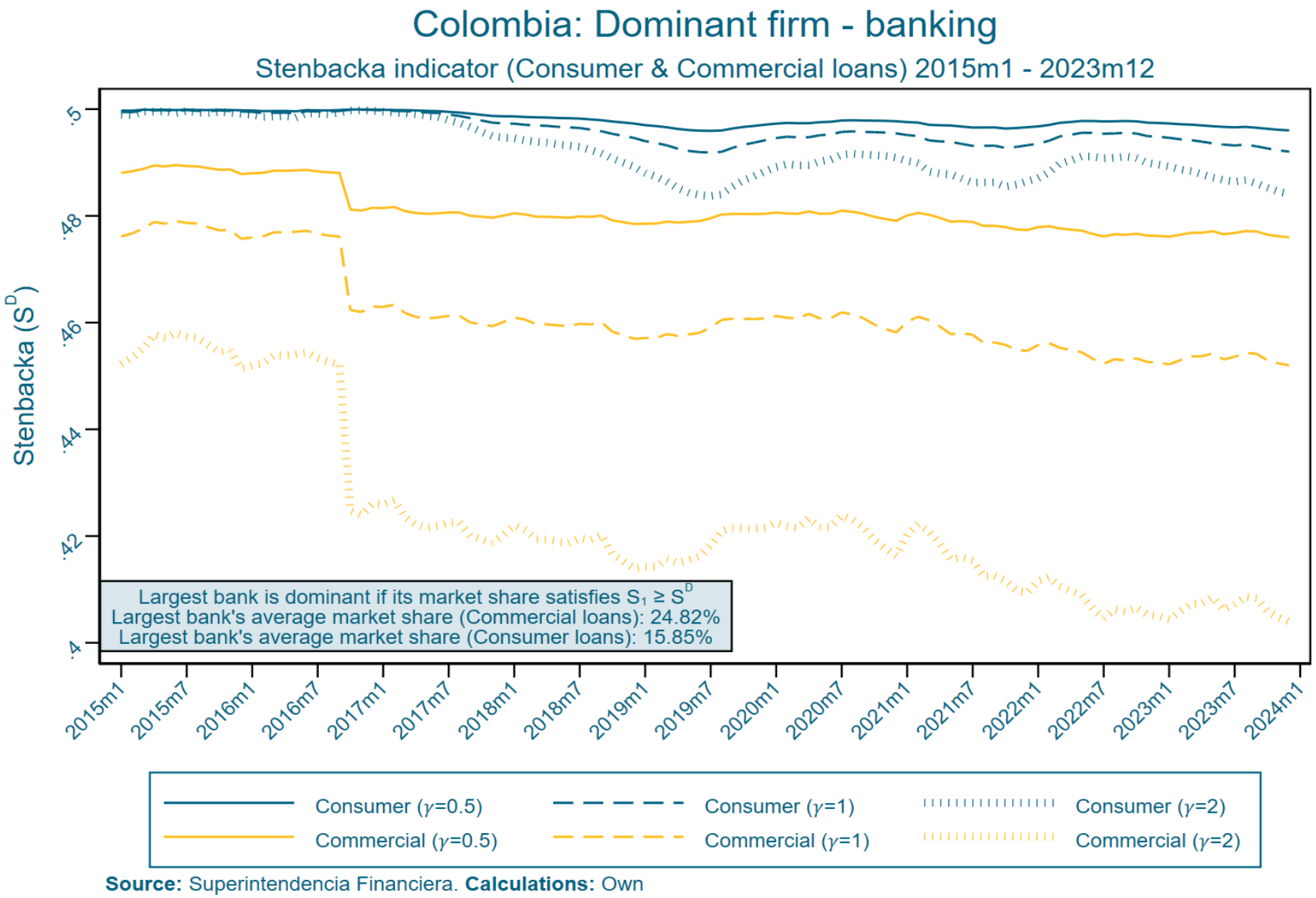
Lerner index increased at the beginning of implementation period and ended below average prior to introduction of NSFR

Dominant firm

- Stenbacka index: indicator to determine whether an individual firm has a dominant position

$$S^D = \frac{1}{2}\left(1 - \gamma(S_1^2 - S_2^2)\right)$$

  - S_i: market share of i-th largest firm
  - In a market with more than 2 firms, firm 1 is dominant if $S_1 > S^D$ (Melnik et al, 2008)
- If there is no dominant firm, it is safe to include HHI as exogenous variable



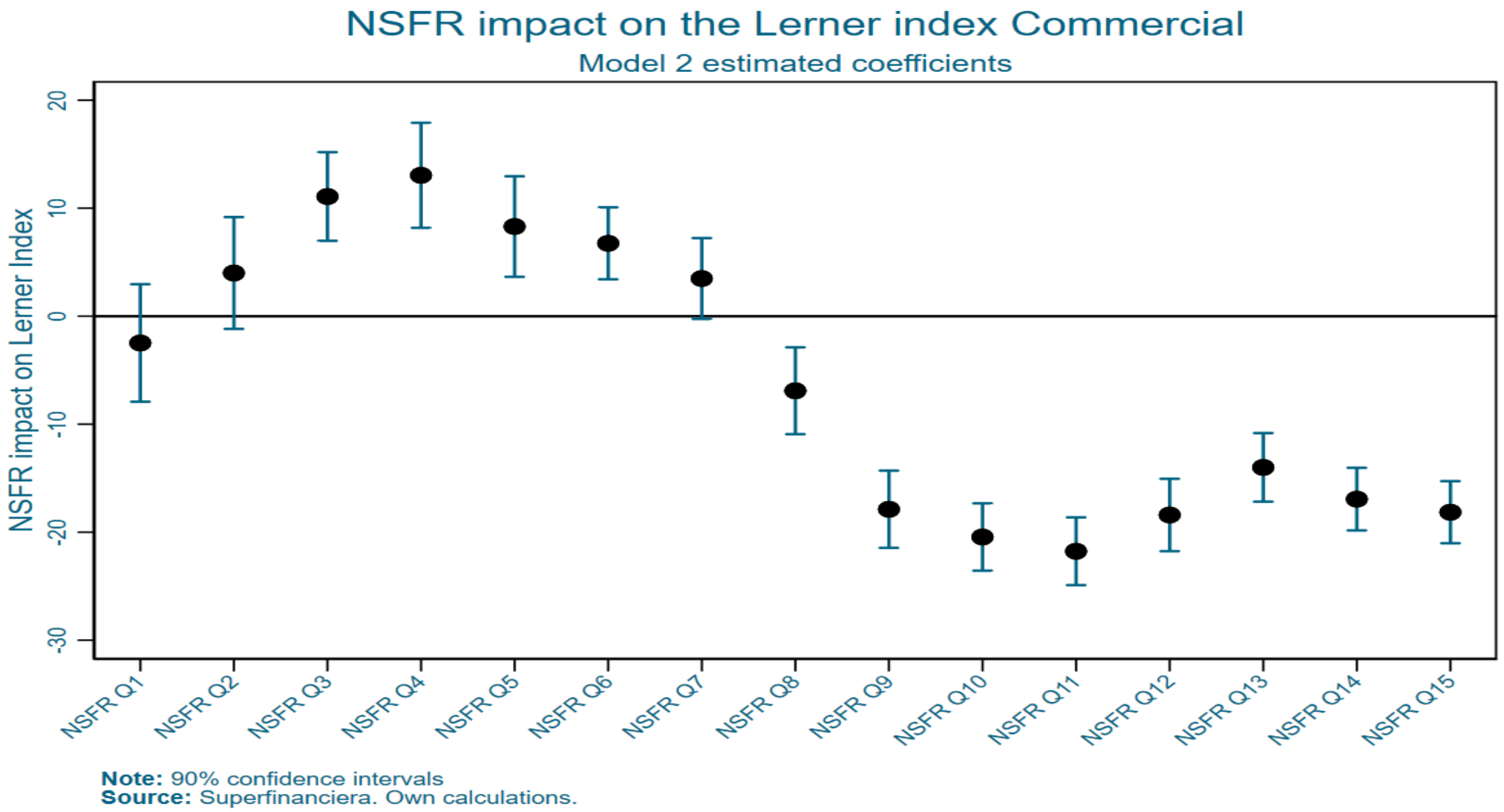
Source: Superintendencia Financiera. **Calculations:** Own

No evidence of dominant firm

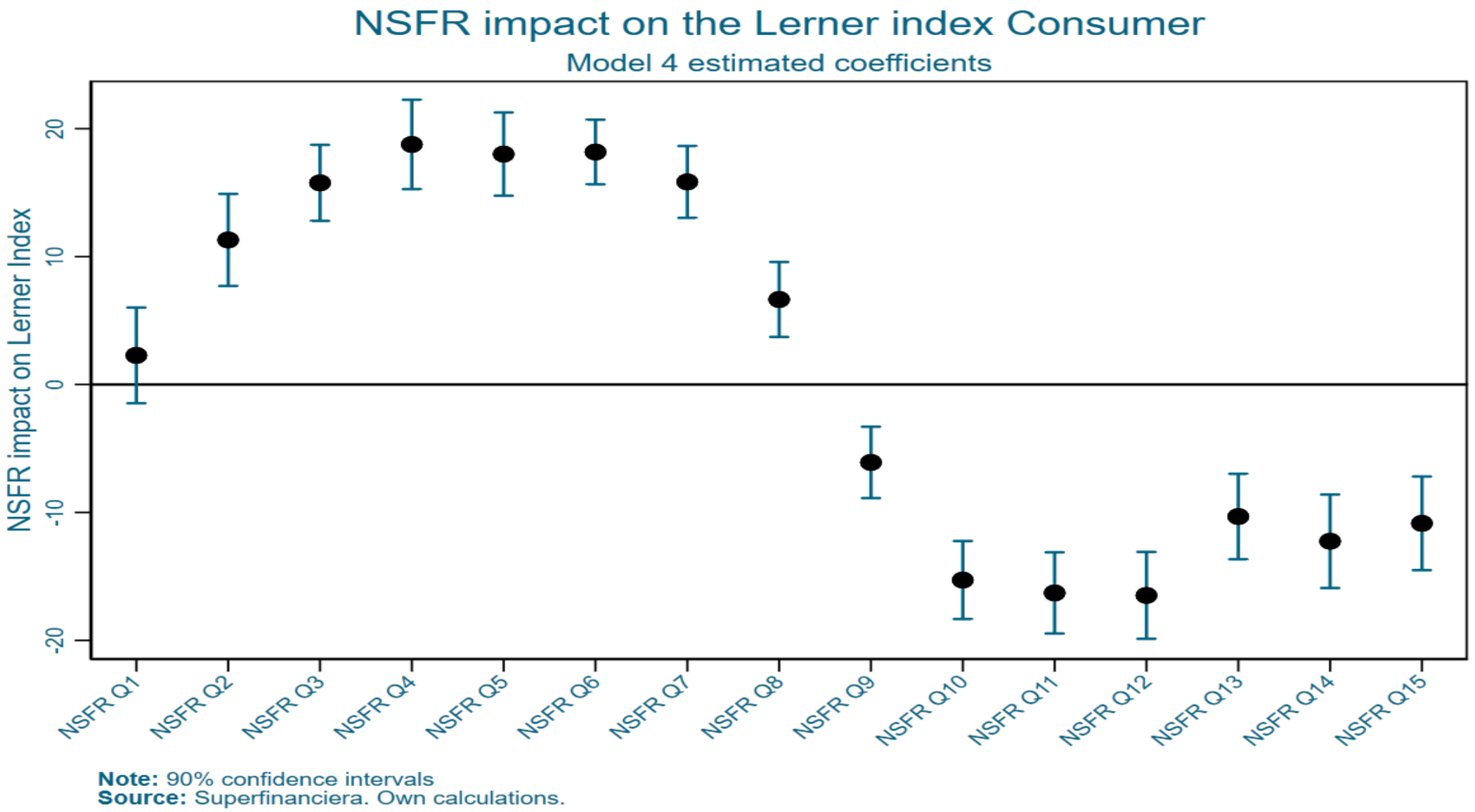
The impact of NSFR on competition & market power

$$z_{it} = \alpha_i + \lambda_t + \beta_0 NSFR + \gamma HHI_t + \theta X_t + \epsilon_{it}$$

- z_{it} → Exercise of market power/competition (Lerner index, NIM)
- $NSFR_t$ → 1 on or after April 2020.
- $NSFR_t$ → 1 quarterly starting 2nd 2020. Captures evolution.
- Identification →
  - HHI_t is exogenous to each bank (measured at the sectoral level – no dominant firm).
  - Pandemic: objective is to control for, not measure its effects.
    - Oxford stringency index → social aspects
    - Non-performing loans for all banks but *i*.
    - time trend - λ_t-
  - X_t Economic activity index (EAI), quarterly dummies, number of offices (proxy for banks network size).
  - α_i are bank fixed effects.



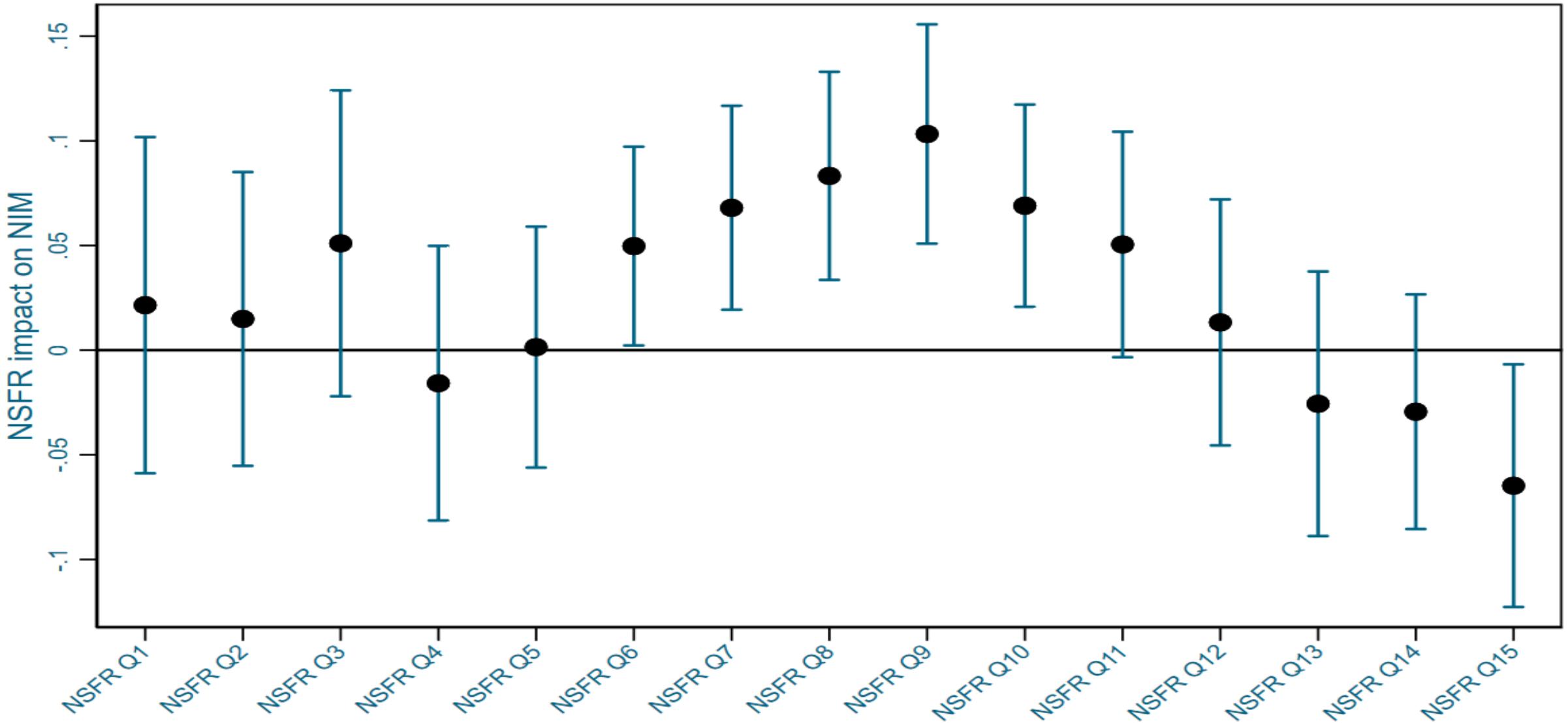
Exercise of market power increased after the introduction of NSFR



Exercise of market power increases after the introduction of NSFR

NSFR impact on the Net Interest Margin

Model 6 estimated coefficients



Note: 90% confidence intervals
Source: Superfinanciera. Own calculations.

Model of monopolistic competition to understand banks' optimal response to NSFR

<u>Model:</u>

- Short-term looking households: Demand short-term deposits.
- Forward looking households:

Demand CDs from banks. Market power in this market is related to σ

$$\max_{\{T(\omega))\}} C \equiv \left[\int_{\omega} c(\omega)^{\frac{\sigma-1}{\sigma}} dG_{\omega}(\omega)\right]^{\frac{\sigma}{\sigma-1}}$$

$$\text{s. t.} \int_{\omega} T(\omega) dG_{\omega}(\omega) = W^{T}$$

$$c(\omega) = r^{T}(\omega) T(\omega)$$

- Representative firm

  - Demands loans of all varieties $\omega \in \Omega$ to maximize profits.
  - It borrows $k(\omega)$ of capital of variety ω at interest rate $R(\omega)$
  - Market power in this market is related to α

$$\max_{\{k(\omega))\}} AK - \int_{\omega} R(\omega)k(\omega)dG_{\omega}(\omega)$$

$$\text{s. t. } K \equiv \left[\int_{\omega} k(\omega)^{\frac{\alpha-1}{\alpha}} dG_{\omega}(\omega)\right]^{\frac{\alpha}{\alpha-1}}$$

- Banks (a continuum of banks):
  - A competitive short-term deposits market.
  - Monopolistic competitors in the long-term deposits (CDs) market.
  - Monopolistic competitors in the loan market.
  - Bank's ability to convert net liabilities into loans given by z

$$\max_{L,R(\omega),r^t(\omega)D,T,B} \pi_2 + \beta\pi_3$$

$$\text{s. t. } L = k(\omega)$$

$$L = z(D + T - B)$$

$$\pi_2 = rB - r^D D$$

$$\pi_3 = R(\omega)L - r^T(\omega)T$$

$$\frac{T}{L} \geq N$$

Takeaways

- Tightening of NSFR:
  - Banks increase interest rates on loans to decrease loan supply
  - Banks increase interest rates on long term deposits to increase demand

- A greater Lerner index is consistent with banks having higher market power in loan market than in long-term deposits market

- Banks' optimal behavior when NSFR is binding.

PROPOSITION **7.**

(Behavioral market power when the NSFR constraint is binding)

When the NSFR constraint is not binding,

1. *The lerner index of a bank ω with loan productivity z is given by,*

$$\mathcal{L}(\omega) = 1 - \frac{r^T(\omega)}{R(\omega)} = 1 - \left(\frac{\sigma - 1}{\sigma}\right)\left(\frac{\alpha - 1}{\alpha}\right)\frac{\lambda(\omega) + r}{\frac{r}{z} + \lambda(\omega)N}$$

2. *$\mathcal{L}(\omega)$ is increasing in N and β, and decreasing in z, α, σ.*

Conclusions

- The Colombian banking sector is not particularly concentrated and lacks the power of a dominant firm.
  - This finding opens the door to explore whether the banking sector is robust enough to withstand potential sectoral crises
- NSFR has a short-term effect whereby market power tends to increase.
- Over a non-concentrated industry, the regulatory NSFR measure had an unanticipated significant effect on the exercise of market power
- Results consistent with banks having higher market power in loan market than in long-term deposits market