The Heterogenous Bank Lending Channel of Monetary Policy

Jorge Abad[†] Saki Bigio[‡] Salomon Garcia-Villegas[†] Joel Marbet[†] Galo Nuño[†]

[†]Banco de España [‡]UCLA

CB Chile
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Does bank heterogeneity matter for monetary policy?

Banks: main conduit of monetary policy

- Policy rates change, banks adjust leverage $\rightarrow$ **credit supply shifts**
- But: **not all banks equal** — differences in risk exposure and risk-bearing capacity

Question: Which forms of bank heterogeneity matter, how much, and why?

- Should central banks spend resources on het bank models?

Paper: quantitative model w/ two forms of heterogeneity:

- ex-ante: variable vs. fixed rate (interest-rate exposure)
- ex-post: idiosyncratic portfolio risk

Why Het. Banks model?

Empirical Evidence of Heterogeneity:

- Liquid assets and size (Kashyap and Stein, 2000)
- Leverage (Jimenez et al., 2012; Dell'Ariccia et al., 2017; Altavilla et al., 2020)
- Rate risk exposure (Gomez et al., 2021). Rate fixation (Altunok, Arslan and Ongena, 2023)

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Cross-section alone can't tell us:

- **aggregate transmission** different?
- **counterfactual** policies

Need model:

- Understand **amplification channels** and nonlinearities.
- Simulate how transmission changes with bank regulation or MP timing
  - does heterogeneity change answers?

Insight

Sources of heterogeneity interact

- Without both, not very different from rep bank

Intuition: bank MPL and leverage dynamics vary w/ capital ratio

- Ex-post: per se not relevant, MPL almost flat
- Ex-ante: exposure to interest rate risk
  - risk-exposure matters if close to constraints
  - but...constraints activated only with idiosyncratic risk
  - strong adjustment costs
    - banks would be far from constraint w/o ex-post risk

Outline

1. Model

2. Quantitative Results

Model

The model – Banking sector

- Continuum of perfectly competitive banks
- Assets: risk-free short-term reserves and risky long-term loans
    - idiosyncratic credit risk: loan default shocks
    - lending frictions: convex loan origination cost
- Liabilities: short-term, insured deposits, and (accumulated) equity
- Capital Regulation:
    - *minimum capital requirement*: Failure to comply → bank's resolution (failure)

  Key features:

  1. ⇒ banks perform maturity transformation

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Key features:

1. banks perform maturity transformation
2. $\Rightarrow$ slow moving leverage

Bank - Balance Sheet

- Bank j starts with: legacy loans L_{jt}, accumulated pre-dividend equity E_{jt}
- Chooses: new loans N_{jt}, reserves M_{jt}, and deposits D_{jt}
- Bank's balance sheet

$$L_{jt} + N_{jt} + M_{jt} = D_{jt} + E_{jt} - X_{jt} \quad (1)$$

- Differentiate between short- and long-term assets
  - key distinction from classic banking literature:
    Gertler&Kiyotaki (2010), Gertler&Karadi (2011), Mendicino et. al. (2021), Coimbra&Rey (2023)
  - banks' core function is maturity transformation
    consistent with EA balance-sheet

Assets: Loans

Long-term loan portfolio: continuum of risky loans

- Principal of 1 and avg. effective lending rate $\bar{r}_t^L$
- Law of motion:

$$L_{jt+1} = (1-\delta)(1-\omega_{jt+1})(L_{jt}+N_{jt}). \quad (2)$$

  - δ fraction matures with iid prob. (Leland and Toft, 1996)
  - $\omega_{jt+1} \sim F(p,\rho)$ stochastic default rate correlated at the bank level (Vasicek, 2002)
  - loss given default: fraction $\lambda \in (0,1)$ of the principal
- Technology: new loans N_{jt} incur a convex cost $f\left(\frac{N_{jt}}{L_{jt}}\right) E_{jt}$

Loan rate fixation: fixed vs. variable regimes

Fixed-rate regime:

- Loan rate r_t^N is fixed at origination and constant until maturity.
- Average rate on legacy loans evolves as:

$$r_{jt}^L = \frac{r_{jt-1}^L L_{jt-1} + r_{t-1}^N N_{jt-1}}{L_{jt-1} + N_{jt-1}}$$

Variable-rate regime:

- Loan rate adjusts with policy rate: $r_t^N = r_t^M + s_t^N$.
- Average spread on legacy loans evolves as:

$$s_{jt}^L = \frac{s_{jt-1}^L L_{jt-1} + s_{t-1}^N N_{jt-1}}{L_{jt-1} + N_{jt-1}}$$

Key distinction: In VR, rates track monetary policy directly; in FR, repricing is gradual as new loans replace old ones.

Equity and Profits

- Equity accumulated through retained earnings

$$E_{jt+1} = E_{jt} - X_{jt} + (1-\tau)\Pi_{jt+1}, \tag{3}$$

- Profits

$$\begin{aligned}
\Pi_{jt+1} = {} & \bar{r}^{L}_{jt}\left(1-\omega_{jt+1}-\lambda\omega_{jt+1}\right)\left(L_{jt}+N_{jt}\right) - r^{D}_{t} D_{jt} && \big(\text{net interest income}\big) \\
& + r^{M}_{t} M_{jt} && \big(\text{return of reserves}\big) \\
& - f\left(N_{jt}/E_{jt}\right) E_{jt} - \bar{\pi} E_{jt} && \big(\text{operational costs}\big)
\end{aligned}$$

Δr^{m}_{t} monetary policy $\rightarrow$ profits depends on leverage L_{jt}/E_{jt}

$\rightarrow$ net interest income effect: pass-through to $\{r^{L}_{t}, r^{D}_{t}\}$

$\rightarrow$ assets composition effect

Equity and Profits

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Δr^{M}_{t} monetary policy $\rightarrow$ profits depends on leverage L_{jt}/E_{jt}

$\rightarrow$ equity accumulation $\rightarrow$ lending

Regulation

- Pre-dividend equity must satisfy a *minimum capital requirement*:

$$E_{jt} \geq \gamma(L_{jt} + N_{jt}) \tag{5}$$

  - Failure to comply: bank resolution $\rightarrow$ endogenous failure
  - Assumption: Limited liability +costly asset liquidation (loss $\mu < 1$ of seized assets)

- *Liquidity requirement* proportional to bank deposits:

$$M_t \geq \theta D_t \tag{6}$$

The model – Bank problem and environment

- Recursive Bank's Problem

$$V_t^B(L_{jt}, E_{jt}, r_{jt}^L) = \mathbf{1}_{\{E_{jt} \geq \gamma L_{jt}\}} \left[\max_{\{N_{jt}, M_{jt}\}} X_{jt} + \beta \mathbb{E}_t[(1-\chi) V_{t+1}^B(L_{jt+1}, E_{jt+1}, r_{jt+1}^L) + \chi E_{jt+1}] \right]$$

$$\text{s.t.} \quad L_{jt} + N_{jt} + M_{jt} = D_{jt} + E_{jt} - X_{jt} \, , \qquad \text{(Balance sheet identity)}$$

$$E_{jt+1} = E_{jt} - X_{jt} + (1-\tau)\Pi_{jt+1} \, , \qquad \text{(Equity LOM)}$$

Liquidity Constraint

Leverage Constraint

$$r_{jt}^L = \begin{cases} \text{updates spread} & \text{in a variable-rate economy,} \\ \text{updates rate} & \text{in a fixed-rate economy.} \end{cases} \qquad \text{(Effective Loan Rate)}$$

value-function | Entrepreneurs

Non-financial sector

- Aggregate credit demand by entrepreneurs:

$$N_t = \begin{cases} g(r_t^L), & \text{for fixed-rate loans} \\ g\left(r_t^L, r_{t+1}^L, \ldots\right), & \text{for variable-rate loans} \end{cases}$$

Non-financial sector

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- Aggregate deposit demand by households: $D_t = h(r_t^D)$

Non-financial sector

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$$N_t = \begin{cases} g(r_t^L), & \text{for fixed-rate loans} \\ g\left(r_t^L, r_{t+1}^L, \dots\right), & \text{for variable-rate loans} \end{cases}$$

- Aggregate deposit demand by households: $D_t = h(r_t^D)$
- Central bank supplies reserves M_t and sets policy rate r_t^M

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- Aggregate credit demand by entrepreneurs:

$$N_t = \begin{cases} g(r_t^L), & \text{for fixed-rate loans} \\ g\left(r_t^L, r_{t+1}^L, \ldots\right), & \text{for variable-rate loans} \end{cases}$$

- Aggregate deposit demand by households: $D_t = h(r_t^D)$
- Central bank supplies reserves M_t and sets policy rate r_t^M
- Government collects taxes and runs a deposit insurance scheme

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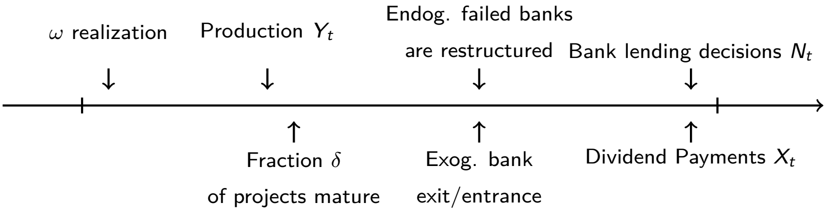
Timeline



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Loan rate fixation regimes: key modeling features

Fixed-rate regime:

- Interest rate on new loans fixed at origination and constant over the loan's life.
- Legacy portfolio reprices gradually as maturing loans are replaced by new ones.
- Monetary tightening initially compresses net interest margins (NIM) — funding costs rise but loan income lags.

Variable-rate regime:

- Interest rate on loans adjusts with policy rate — fixed spread over r_t^M.
- Both new and outstanding loans reprice quickly when policy changes.
- Monetary tightening can improve NIM initially — loan income rises with policy rate.

Implication: The speed of loan rate adjustment drives differences in profitability, capital ratios, and ultimately the lending response to monetary policy.

Quantitative Results

Calibration

- Quarterly frequency
- Matches euro area bank balance sheets (capital ratios, liquid assets, loan maturities)
- Replicates Basel III requirements
- Targets empirical responses of loan rates to monetary policy shocks

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- Targets empirical responses of loan rates to monetary policy shocks

$\rightarrow$ Today: full pass-through of monetary policy shocks to bank liabilities

$\rightarrow$ WIP: imperfect pass-through

- Much of the calibration testing, similar spirit to Jamilov and Monacelli 2025

Key functional forms in the model

Loan origination cost:

- Quadratic in new lending intensity:

$$f\left(\frac{N_{jt}}{L_{jt}}\right) = \eta\left(\frac{N_{jt}}{L_{jt}}\right)^2 \quad \text{with } \eta > 0$$

Default rate distribution:

- Based on the *Vasicek* model (Basel IRB foundation):

$$F_j(\omega) = \Phi\left(\frac{\sqrt{1-\rho}\,\Phi^{-1}(\omega) - \Phi^{-1}(p)}{\sqrt{\rho}}\right)$$

- p: average default rate; ρ: correlation.

Entrepreneur entry cost:

- Rising and convex in credit volume:

$$a(N_t) = \zeta_1 N_t^{\zeta_2} \quad \text{with } \zeta_1, \zeta_2 > 0$$

Calibration highlights: discipline from euro-area data

Pre-set parameters:

- Default rate: $p = 2.65\%$; Loss given default: $\lambda = 0.30$
- Loan maturity $\delta = 0.05 \Rightarrow$ average duration of 5 years.
- Capital requirement $\gamma = 7\%$; liquidity ratio $\theta = 11.8\%$
- Policy rate $r^M = 1\%$; tax rate $\tau = 20\%$

Sources: Basel III regulation, euro-area bank balance sheets, Mendicino et al. (2020)

Key estimated parameters: adjustment frictions and demand elasticities

Loan origination cost (η):

- Calibrated to match average voluntary capital buffer (target: 5.1%).

Entrepreneur entry cost:

- Level (ζ_1) targets average lending rates (3%).
- Curvature ($\zeta_2 = 0.50$) governs responsiveness of lending to policy.
- Matches semi-elasticity of new lending: -0.38 for 100bp shock.

Other calibrated features:

- Exit rate $\chi = 2\%$: replicates bank size distribution (power law).
- $\rho = 0.46$: targets dispersion in bank failure risk.

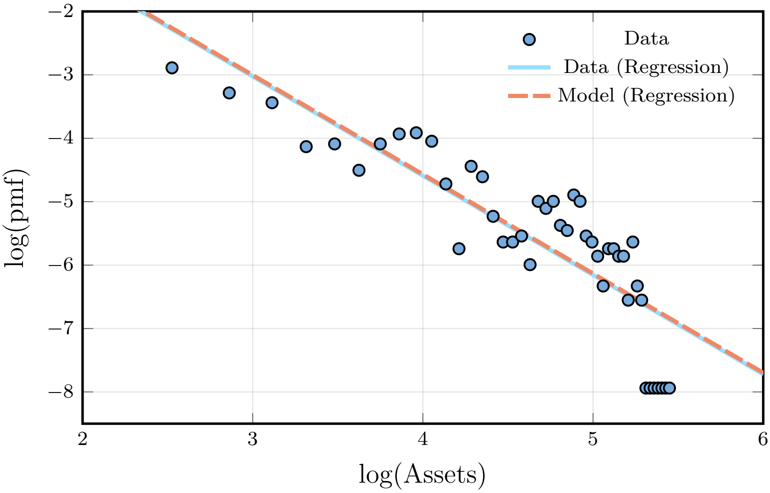
Balance Sheet Ratios

Table 1: Consolidated bank balance sheet composition: euro area 2013–2023 vs. model

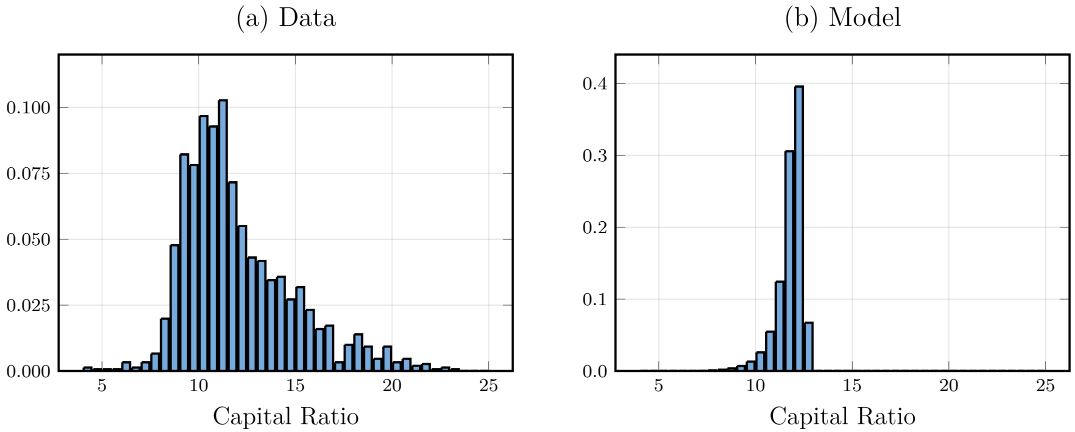
Assets		**Liabilities**	
Loans	0.88 (0.89)	Deposits	0.78 (0.81)
ST securities and reserves	0.12 (0.11)	Wholesale funding	0.14 (0.09)
		Equity capital	0.08 (0.10)

Note: variables as ratios of total assets. Model counterparts are shown in parentheses.

Size Distribution — Tail distribution given χ



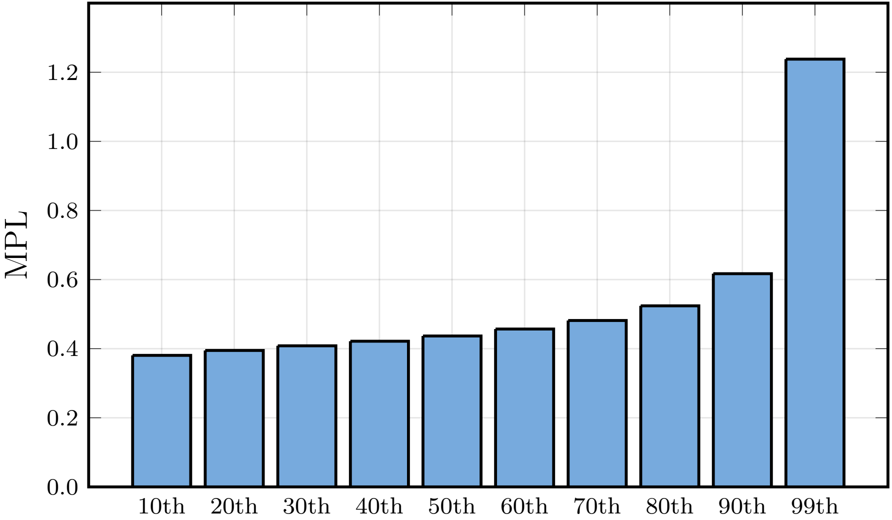
Distribution of Capital Ratios



Note: Capital ratios are defined as CET1 capital over risk-weighted assets.

MPL Distribution

Figure 1: Distribution of marginal propensity to lend (MPL)



Heterogeneity in responses to monetary shocks

- Panel Local Projections with country fixed effects (Jorda et al., 2015)

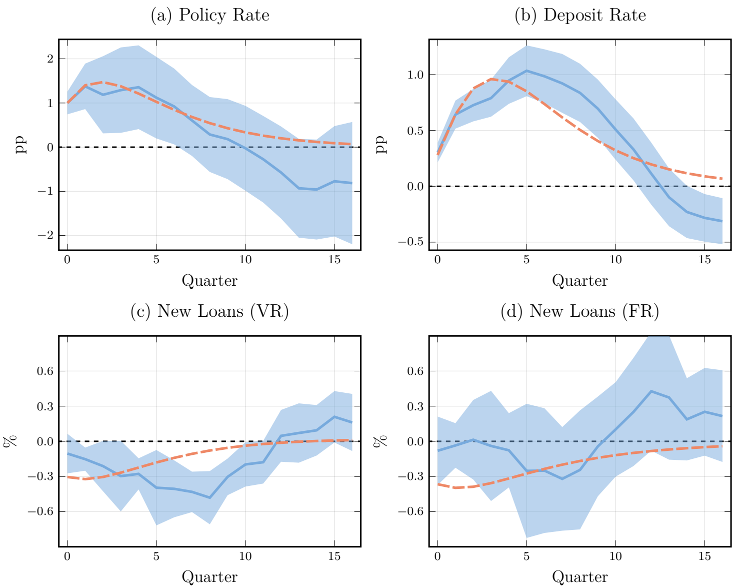
$$y^{\ell}_{c,t+h} = \alpha_{c,h} + \beta_{1,h}\varepsilon^{MP}_{t} + \beta_{2,h}\left[\varepsilon^{MP}_{t} \times I^{FR}_{c}\right] + \Gamma_h X_{c,t}(L) + e_{c,t+h}$$

ε^{MP}_{t}: ΔECB deposits facility rate instrumented (Jarocinski and Karadi,2020)

I^{FR}_{c}: 1 if country c operates with fixed-rate pricing

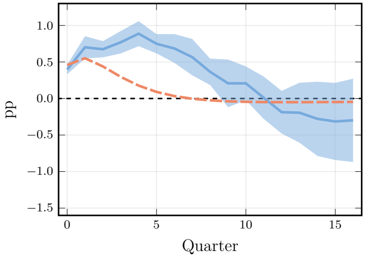
$X_{c,t}$: GDP growth, inflation, BBB corporate yield, 1y DE bond yield.

Targeted IRFs

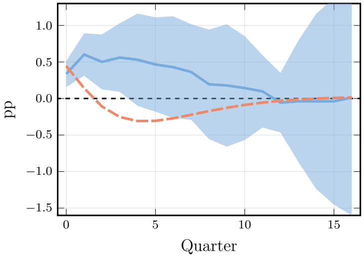


Untargetted IRFs

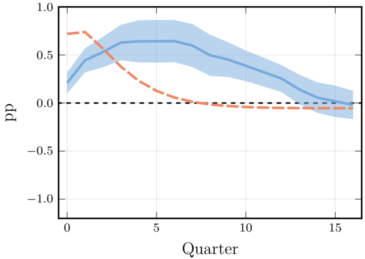
(a) New NIM (VR)



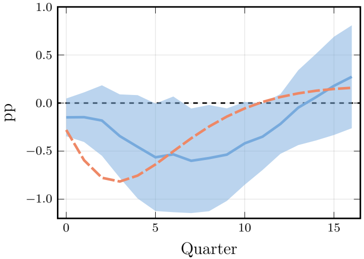
(b) New NIM (FR)



(c) Legacy NIM (VR)



(d) Legacy NIM (FR)

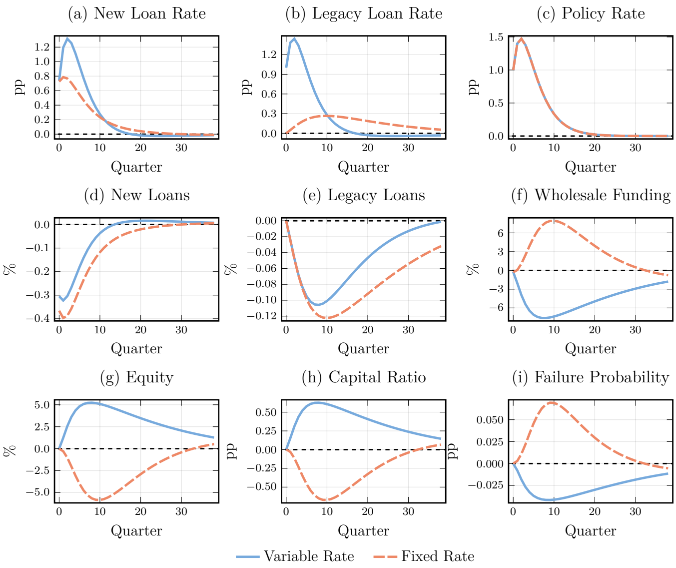


(e) Capital / Assets (VR)

(f) Capital / Assets (FR)

Does Heterogeneity Matter?

Ex-Ante Heterogeneity



Results: heterogeneous response to monetary tightening

- Monetary policy tightening triggers: decline in aggregate lending
- Most of contraction driven by banks near capital constraint
- These banks:
  - Have high interest rate risk exposure (fixed-rate lending)
  - Cannot absorb losses without breaching capital thresholds

Amplification mechanism: small differences in risk exposure lead to large asymmetries in behavior

Fixed-rate vs. Variable-rate banks: key differences

Variable-rate (VR) banks:

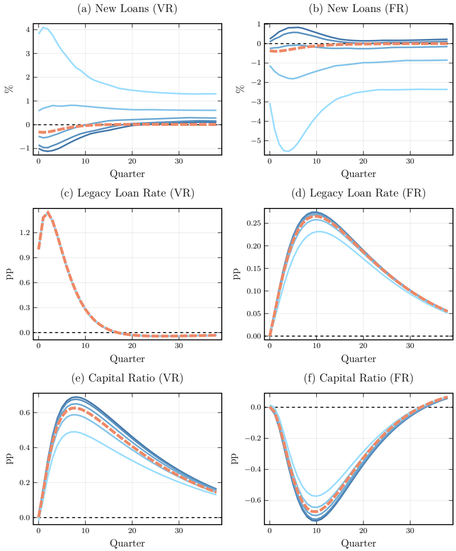
- Loan rates adjust quickly $\rightarrow$ NIM improves after rate hike.
- Higher profitability $\rightarrow$ rising equity & capital ratios.
- Lending expands & bank stability improves.

Fixed-rate (FR) banks:

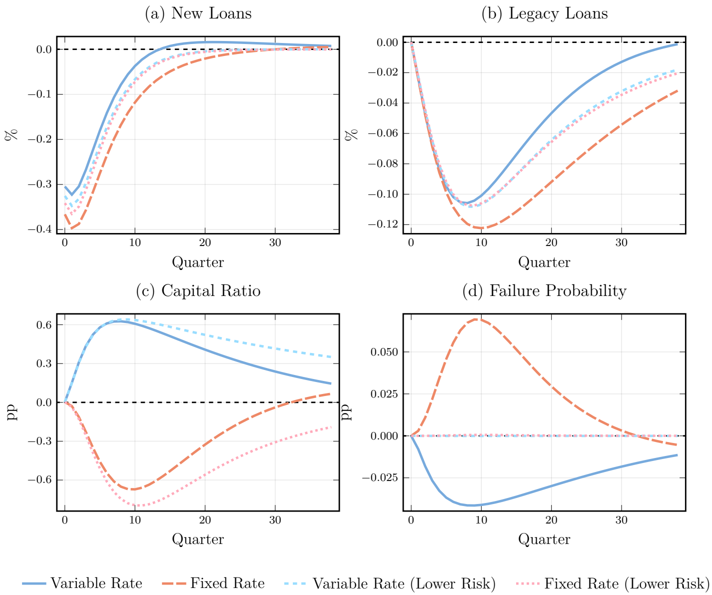
- Income on legacy loans remains fixed $\rightarrow$ NIM compresses.
- Funding costs rise $\rightarrow$ equity erosion & capital deterioration.
- Lending contracts sharply, failure risk increases.

Conclusion: Loan rate fixation patterns shape both the strength of the lending channel and financial stability outcomes.

Ex-post heterogeneity



vs. No Ex-post heterogeneity



Ex-ante vs. ex-post heterogeneity: role of idiosyncratic risk

- Ex-ante heterogeneity (e.g., FR vs. VR) matters **only if** banks face ex-post risk.
- Without idiosyncratic shocks:
  - Capital ratios still diverge (due to NIM dynamics).
  - But no bank fails $\rightarrow$ lending depends only on marginal profitability.
- Loan origination costs prevent banks from leveraging fully **even without risk**.
- Therefore, heterogeneity in capital constraints disappears when risk is muted.

Conclusion: Ex-ante heterogeneity is amplified *only* because ex-post heterogeneity binds for some banks.

Applications

Several Applications/Questions (Very preliminary)

- Monetary policy gradualism ⇒

⇒ Gradual implementation smooths credit responses

- Macroprudential policy: smaller buffer requirements ⇒

⇒ Small gains, benefits more FR banking systems

Conclusion

Concluding remarks

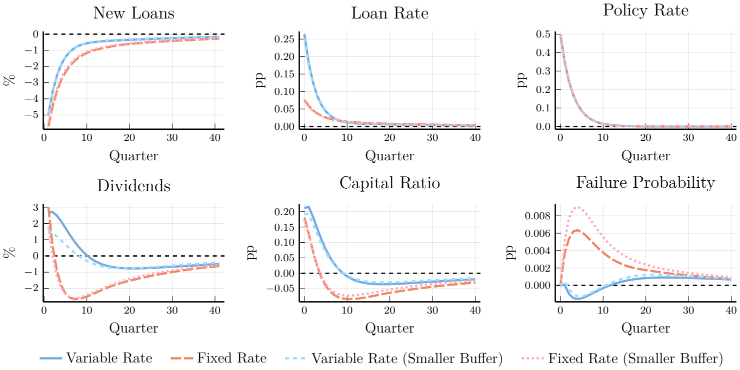
1. Heterogeneous-banks model with ex-ante and ex-post heterogeneity:
    - explains: cross-sectional distributional features
    - explains: estimates MP pass-through to rates, loans and NIM

2. Lessons:
    - stronger contraction in credit of banks with...
        - Fixed-rate loans
    - Both sources interact:
        - Only one, rep. bank without differences

Thank You for the Attention to this Matter

Appendix

Stance of Macropru matters for the MP transmission



- Smaller buffer (100 bp) $\rightarrow$ higher prob. of failure for fixed-rate banks

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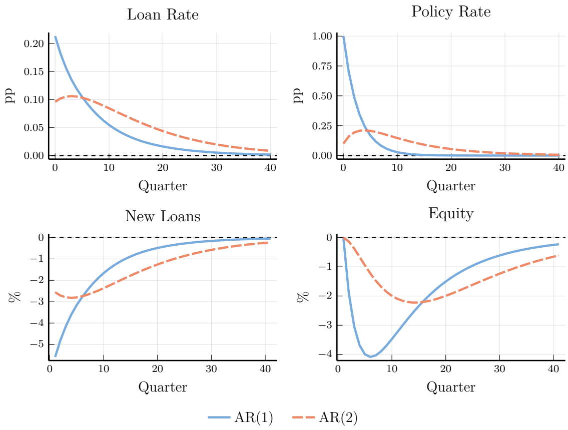
Monetary policy gradualism - Fixed rate banks



- Gradual implementation of monetary policy smooths effects on credit

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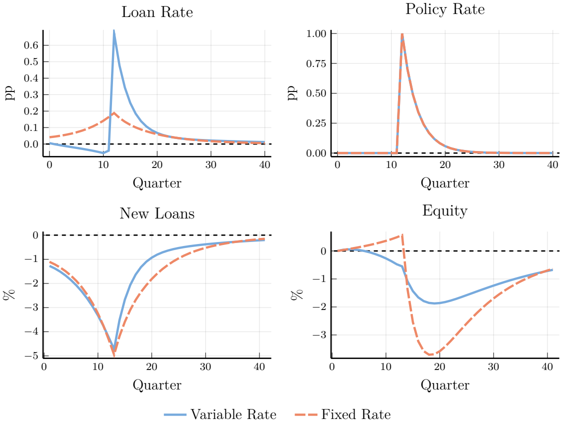
Anticipated monetary policy shock



- Forward guidance reduces the fixed-rate amplification on credit

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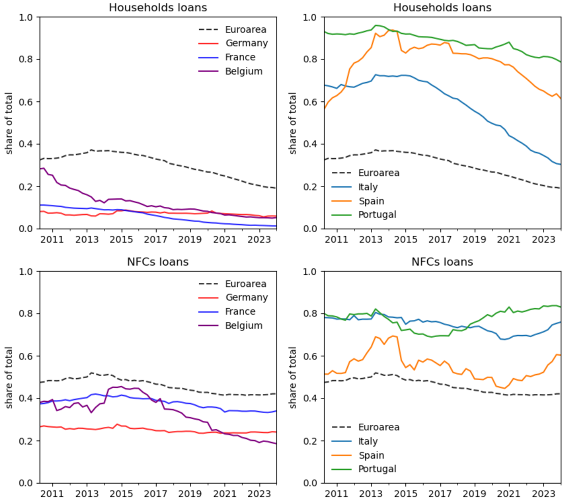
Lending at variable rates



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Equity and Profits

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$$E_{jt+1} = E_{jt} - X_{jt} + (1-\tau)\Pi_{jt+1}, \tag{9}$$

$\Rightarrow$ slow moving leverage L_{jt}/E_{jt}

- Profits

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Regulation

- Pre-dividend equity needs to satisfy a *minimum capital requirement*:

$$E_{jt} \geq \gamma L_{jt} \tag{11}$$

  - Failure to comply results in resolution of the bank $\rightarrow$ endogenous failure
  - Assumption: Limited liability +costly asset liquidation (loss $\mu < 1$ of seized assets)

- *Buffer requirement* constraints dividends and new lending:

$$\underbrace{E_{jt} - X_{jt}}_{\text{post-dividend equity}} \geq (1 + \kappa_t)\gamma(L_{jt} + N_{jt}) \tag{12}$$

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Recursive Bank Problem

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$$\text{s.t.} \quad X_{jt} = \psi \max\{0, E_{jt} - \gamma(1+\kappa_t)(L_{jt} + N_{jt})\}, \qquad \text{(Dividend payout rule)}$$

$$L_{jt} + N_{jt} + M_{jt} = D_{jt} + E_{jt} - X_{jt}, \qquad \text{(Balance sheet identity)}$$

$$L_{jt+1} = (1-\delta)(1-\omega_{jt+1})(L_{jt} + N_{jt}), \qquad \text{(Loan LOM)}$$

$$E_{jt+1} = E_{jt} - X_{jt} + (1-\tau)\Pi_{jt+1}, \qquad \text{(Equity LOM)}$$

$$E_{jt} - X_{jt} \geq \gamma (L_{jt} + N_{jt}), \qquad \text{(Capital requirement)}$$

$$M_{jt} \geq \theta D_{jt}, \qquad \text{(Reserve requirement)}$$

$$\Pi_{jt+1} = r_{jt}^L (L_{jt} + N_{jt})(1-\omega_{jt+1}) - \lambda \omega_{jt+1}(L_{jt} + N_{jt}) + r_t^M M_{jt} - r_t^D D_{jt} - f(N_{jt}/E_{jt}) E_{jt}, \qquad \text{(Profits)}$$

$$r_{jt}^L = \begin{cases} r_t^N & \text{in a variable-rate economy,} \\ \frac{\bar{r}_{jt-1}^L L_{jt-1} + r_{t-1}^N N_{jt-1}}{L_{t-1} + N_{t-1}} & \text{in a fixed-rate economy.} \end{cases} \qquad \text{(Effective Loan Rate)}$$

back

Non-financial sector

- Aggregate credit demand by entrepreneurs:

$$N_t = \begin{cases} g(r_t^L), & \text{for fixed-rate loans} \\ \\ g\left(r_t^L, r_{t+1}^L, \ldots\right), & \text{for variable-rate loans} \end{cases}$$

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Non-financial sector

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- Central bank supplies reserves B_t and sets policy rate r_t^B

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- Aggregate deposit demand by households: $D_t = h(r_t^D)$
- Central bank supplies reserves B_t and sets policy rate r_t^B
- Government collects taxes and runs a deposit insurance scheme

back

Entrepreneurs

- Every period there is a mass of new risk-neutral, penniless entrepreneurs
  - Need one unit of initial investment
  - Project produces A_t units of final good in every period it operates
  - Project ends regularly with probability δ
  - Project fails with probability p ($1-\lambda$ of initial investment can be recovered)
  - Starting an investment project incurs a utility cost of $a(N_t)$ to the entrepreneur
- Due to free entry, entrepreneurs enter until the value of entering V_{it} equals $a(N_t)$
- V_{it} depends on the type of loan contract: fixed-rate vs. variable rate loans
- If $A_t = A$, one can show that the loan demand is given by

$$N_t = \left\{ \frac{\beta(1-p)(1-\chi)}{\zeta_1} \left[(A - r_t^L) + (1-\delta)\zeta_1 N_{t+1}^{\zeta_2} \right] \right\}^{1/\zeta_2}, \qquad \text{(Variable Rate)}$$

$$N_t = \left\{ \frac{1}{\zeta_1} \frac{\beta(1-p)(1-\chi)(A - r_{it}^L)}{1-\beta(1-p)(1-\chi)(1-\delta)} \right\}^{1/\zeta_2}. \qquad \text{(Fixed Rate)}$$

back

Remaining Model Elements

- Households solve a consumption saving problem with an asset-in-advance constraint similar to Bianchi and Bigio (2019), which yields a demand schedule of the form

$$D_t + B_t^H = \epsilon_1 (1 + r_t^D)^{\epsilon_2},$$

which implies that the demand for deposits is fully elastic (for sufficiently large ϵ_1)

- Furthermore, since households hold both deposits and bonds, there is a one-to-one pass-through in rates, i.e., $r_t^D = r_t^M$
- The consolidated government has the a budget constraint of the form

$$T_t + \left(B_t + B_t^H\right) + \tau \Pi_t = \left(1 + r_{t-1}^M\right)\left(M_{t-1} + B_{t-1}^H\right) + \Upsilon_t, \qquad (14)$$

where Π_t are aggregate profits from banks, and Υ_t represents the net operating deficit of the deposit insurance scheme, including the bank resolution cost.

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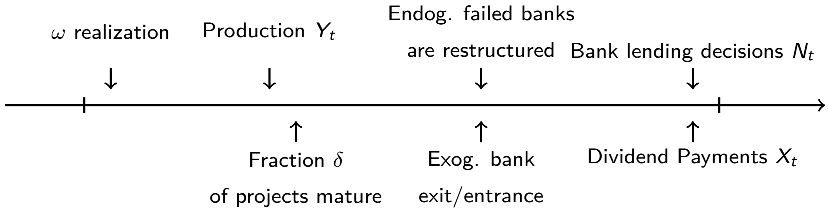
Timeline



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Calibration - Preset Parameters

Bank's Technology

Parameter	Description	Value	Target/Source
p	Loan default rate, mean (pp)	2.65	Mean annual corporate default, EA 1992-2016.
λ	Loan loss-given-default	0.30	Mendicino et al., 2020
μ	Bank resolution cost	0.30	Mendicino et al., 2020
δ	Loans maturity	0.20	Standard.
χ	Bank's exogenous exit rate	0.028	Gertler and Karadi, 2011
ξ	Largest deposit shock	0.11	Average liquidity (reserves) buffer. SDW ECB
η_1	Loan origination cost, level	0.022	Bank's marginal propensity to lend.
η_2	Loan origination cost, power	2.0	Quadratic convex origination cost.
r^D	Deposits rate (annual, pp)	1.0	Mean composite overnight deposits rate, 2003-2022.
r^M	Reserves rate (annual, pp)	1.0	Mean Deposits Facility Rate (DFR), 1999-2022.
ϵ_1	Deposit demand (level)	1.00	Level parameter.
ϵ_2	Deposit demand (power)	2.00	Standard.

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Calibration - Policy Parameters

Policy parameters

Parameter	Description	Value	Target/Source
θ	Reserve requirement	0.01	Minimum Reserve Requirement. ECB
γ	Capital Requirement	0.0825	Basel III risk-weighted formula. See Appendix.
κ	Capital buffer req.	0.3125	Avg. combined buffer requirements (2.5%).
τ	Corporate tax rate	0.20	Standard

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Calibration - Jointly Estimated Parameters

Parameter	Description	Value	Target	Data	Model
β	Bankers' discount factor	0.994	Banks return on equity (ROE), annual	6.4	5.8
ρ	Loan default correlation	0.46	Bank failure probability, annual	0.66	0.67
ψ	Target bank dividend	0.05	Voluntary buffer (excess capital).	5.1	6.3
ζ_1	Ent. entry cost (level)	14.14	Average lending rates	3.0	3.0
ζ_2	Ent. entry cost (power)	0.0025	Monetary shock pass-through on lending rates	0.4	0.3

Note: All moments are in percentage points.

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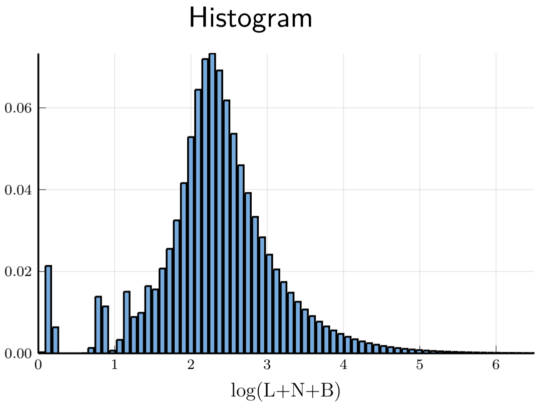
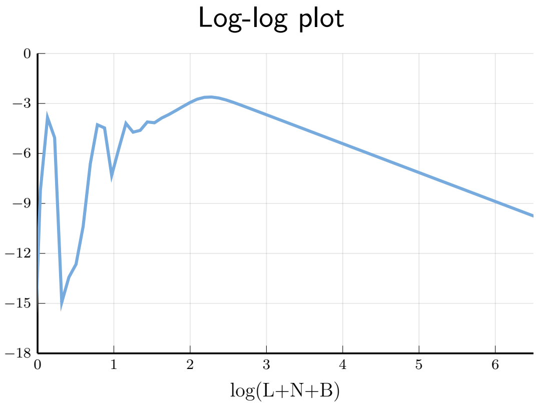
Long-run results: Distribution of bank assets





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Dataset for Capital Ratios

Bank-level panel w/ 163 European banks. 2008.Q1-2020.Q4.

- S&P Global (proprietary): CET 1 ratios, total assets, total risk-weighted assets.
- Supervisory (ECB, ESRB): CCoB, CCyB, bank specific: GSII, OSII, SRB, P2R.

Two measures:

- CET1 ratio = Common Equity Tier 1 / Risk-Weigthed Assets.
- CET1 buffer = CET 1 ratio - min requirement (4.5pp) - CCoB - CCyB - $\max\{GSSI, OSII, SRB\}$ - P2R.

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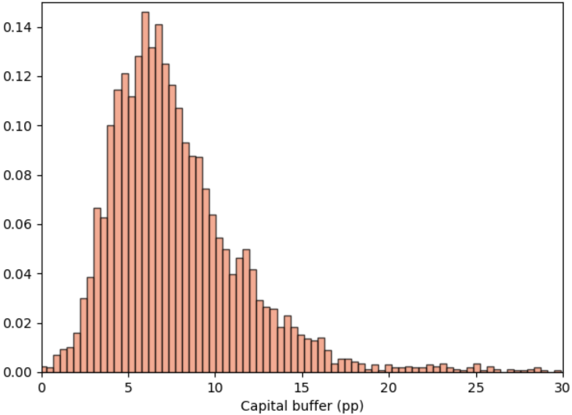
Heterogeneity in bank leverage: capital buffers

CET1 capital buffer distribution across European banks



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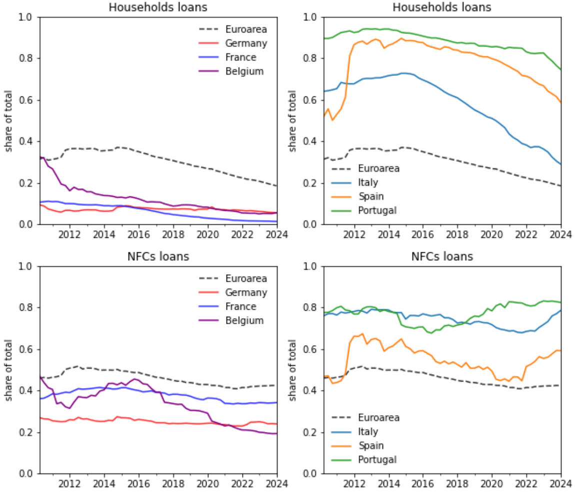
Lending at variable rates



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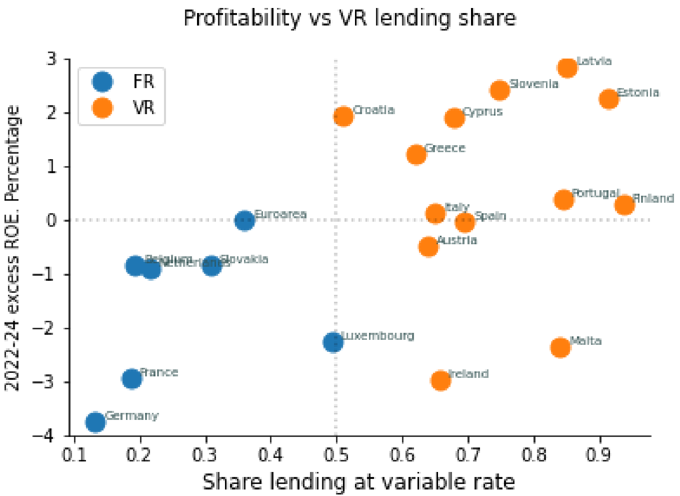
Loan Profitability across EA banks



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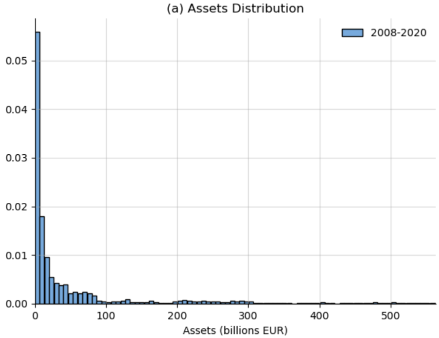
Banks Asset Distribution follows a Power Law



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EA Banks Balance Sheet

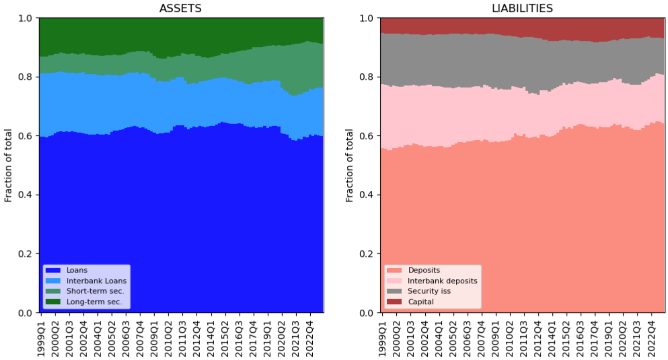

Figure 3: Euro Area MFIs Balance Sheet Composition, 1999-2023

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EA Banks Balance Sheet

Assets		Liabilities	
Loans	0.62	Deposits	0.60
Interbank loans	0.17	Interbank deposits	0.17
Short-term security holdings	0.09	Security issuance	0.16
Long-term security holdings	0.12	Capital	0.07

Table 2: MFIs Balance Sheet Composition, 1999 - 2023

Assets	Liabilities
Legacy Loans L_{jt}	Deposits D_{jt}
New Loans N_{jt}	Capital $K_{jt} \equiv E_{jt} - X_{jt}$
Reserves B_{jt}^{R}	

Heterogeneity in NIM responses

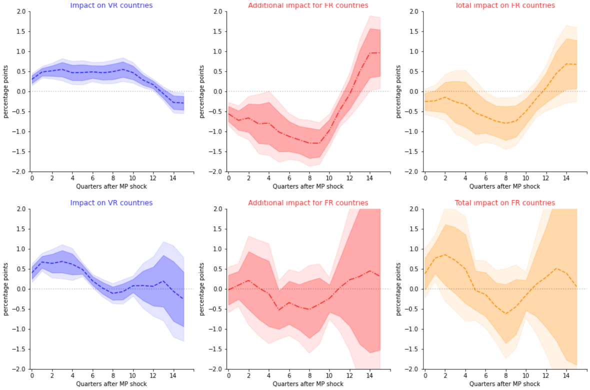

Figure 4: Net interest margin, stocks (top) and flows (bottom)

- The NIM on stocks for FR countries has a zero (or negative) response to a monetary tightening.
- The NIM on flows increases in response to a monetary tightening for FR and VR countries.

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Heterogeneity in Lending rate responses

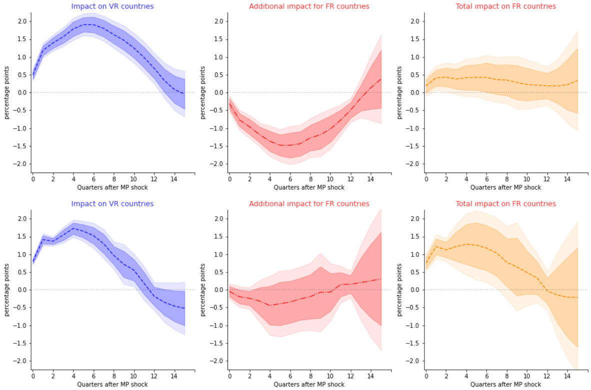

Figure 5: Avg lending rates, stocks (top) and flows (bottom)

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Heterogeneity in deposit rate responses

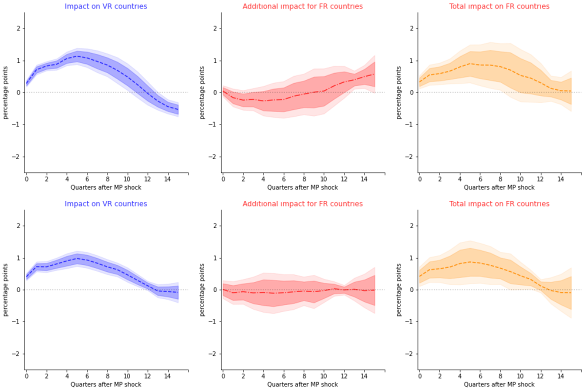

Figure 6: Avg deposit rates, stocks (top) and flows (bottom)

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Heterogeneity in Deposit rate responses: Overnight vs Time Deposits

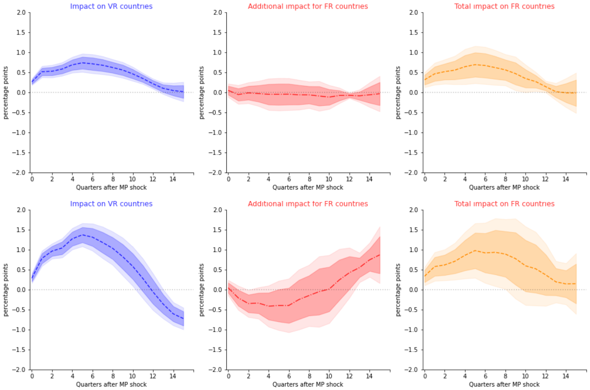

Figure 7: Avg deposit rates, Overnight (top) and Time Deposits (bottom)

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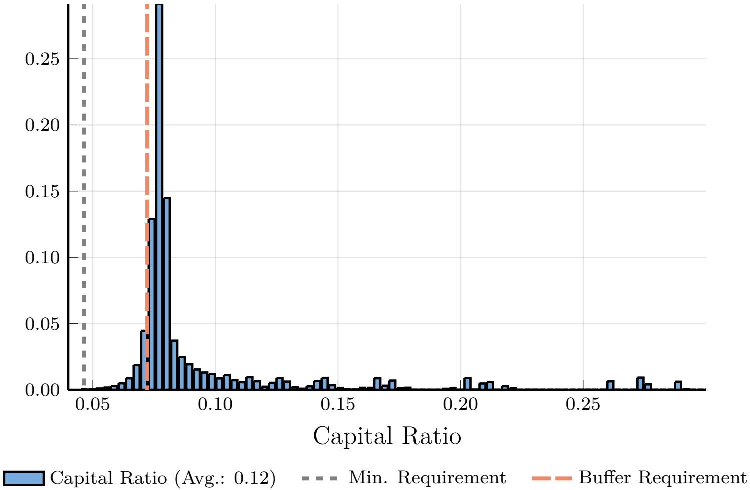
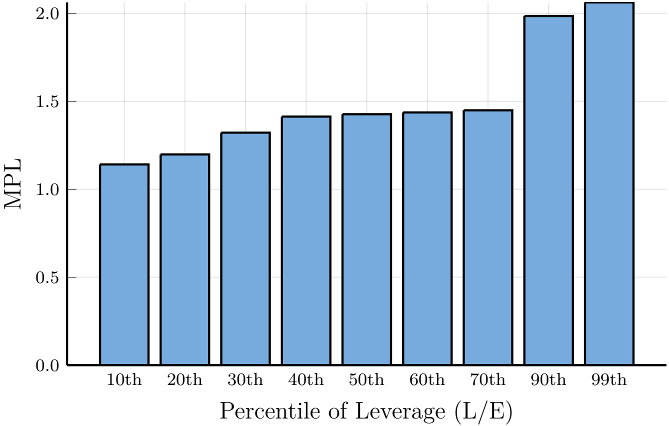
Long-run results: Capital ratios



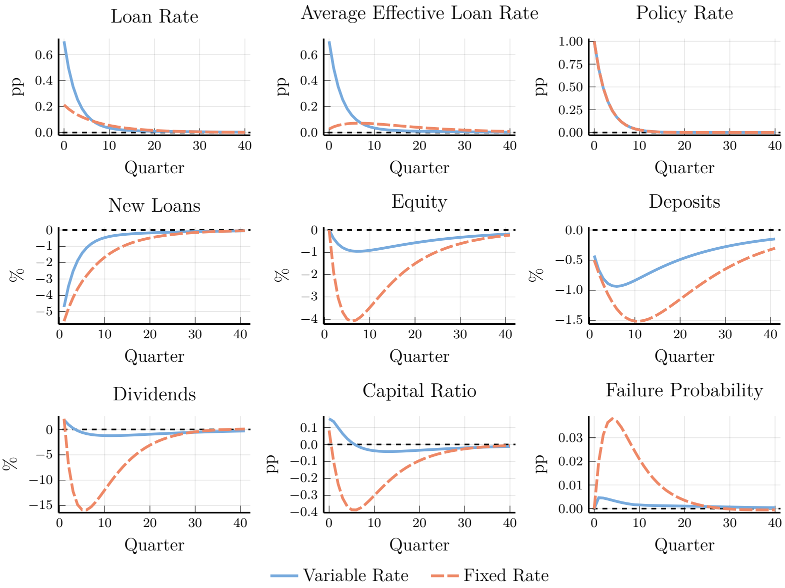
Assets

Long-run results: Leverage and marginal propensities to lend

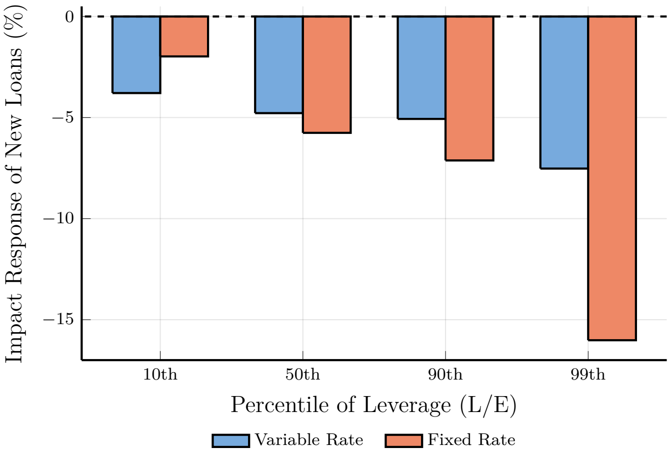
MPL_E: new lending response to a one-unit increase in equity



Aggregate responses to a MP shock



Cross-sectional heterogeneity in the transmission to lending



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