Interest-Rate Smoothing and Financial Stability: Does Faster Monetary Tightening Really Rattle the Financial System?

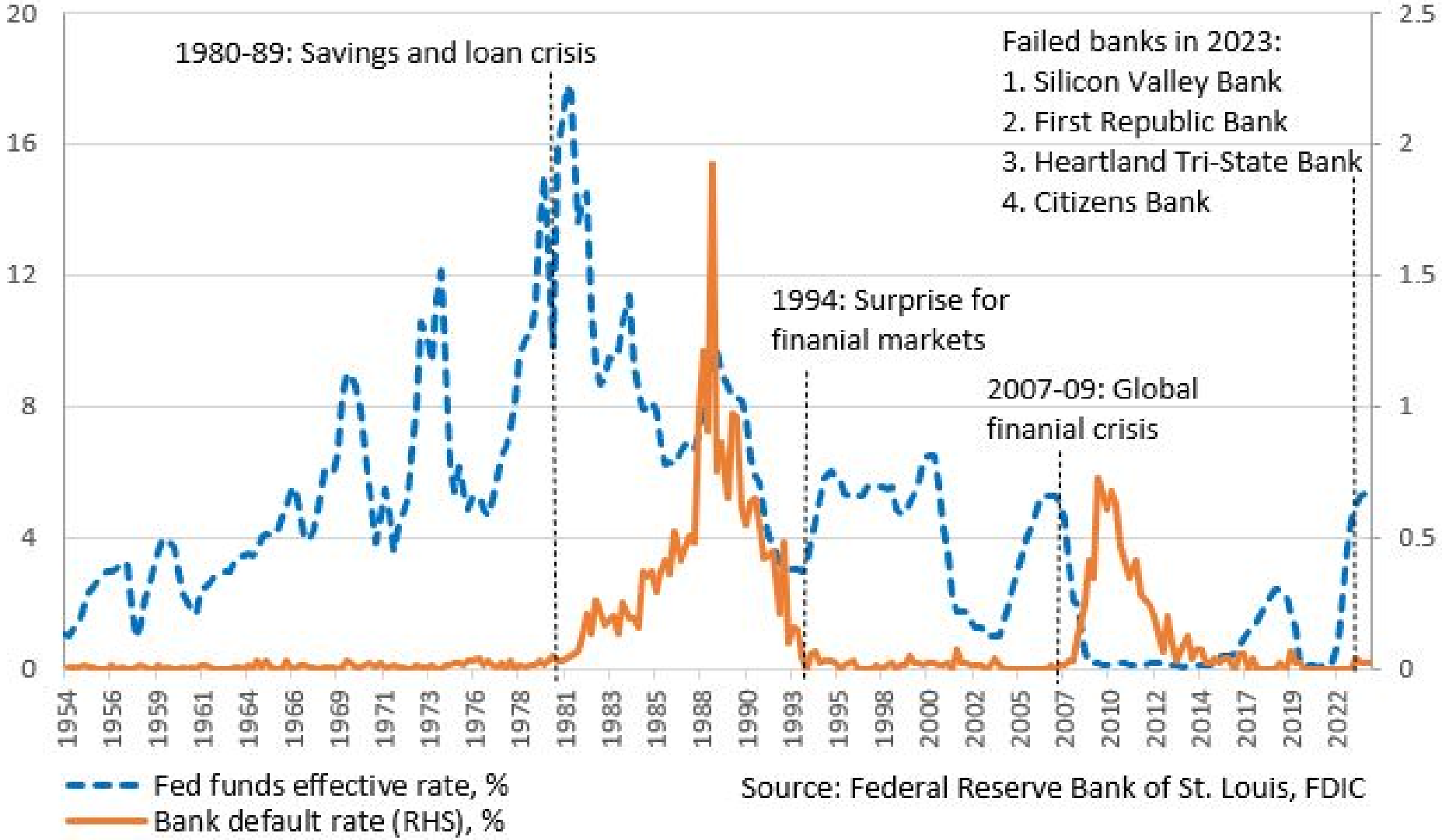
Oliver de Groot Yevhenii Skok

The University of Liverpool Management School

Navigating the Changing Landscape: Central Banks in a New Normal
National Bank of Ukraine and Narodowy Bank Polski

20 June 2024

US Fed Funds Interest Rate and Bank Default



Banks Exposed to Interest Rate and Liquidity Risks through Maturity Transformation

Bank's Balance Sheet	
Assets (**long-term**)	Liabilities (**short-term**)
Loans:	Deposits:
mortgage loan (30 years)	1 month 6 months 1 year

Filling a Gap in the Literature

- "In a 2004 speech devoted precisely to the question of monetary policy inertia, then-Governor Bernanke noted that this form of gradualism (or **interest rate smoothing**) in monetary policy has several potential benefits: ..., and it **may reduce financial sector instability** because of the increased predictability of interest rates." Coibion and Gorodnichenko (2012) pointed but not proven quantitatively

- We investigate how changes in the degree of the monetary policy interest-rate smoothing affect the stability of the banking sector (banks default risk)

Our Main Quantitative Findings

- 1. Higher interest-rate smoothing fosters financial stability since fewer banks default [expected, proved]

  $\rightarrow$ **Faster monetary tightening can rattle the financial system**

- 2. The interest-rate smoothing effect is sensitive to the structure of interest rates in bank balance sheets [new]

- 3. The impact of monetary policy on banks' default is nonlinear and increases as the economic shock intensifies [new]

The Model

- We use a new-Keynesian model with the bank default similar in spirit to Lewis and Roth (2018)

  The main features of the model

  - **Households:** consume, save, supply labor services
  - **Firms:** intermediate goods (monopolistic competition), Cobb-Douglas production function; final consumption goods (perfect competition); capital goods producers
  - **Nominal rigidity:** price stickiness (Rotemberg pricing)
  - **Monetary authority** sets nominal rate of interest
  - **Banks:** issue equities, nominal deposits, provide loans to firms
  - **Two types of default:** entrepreneurial firms, banks

  Calibration: the US economy

  Solution: first-order and third-order Taylor approximation

Banking Sector

- A continuum of banks on the unit interval indexed by $i \in (0, 1)$
- Bank balance sheet

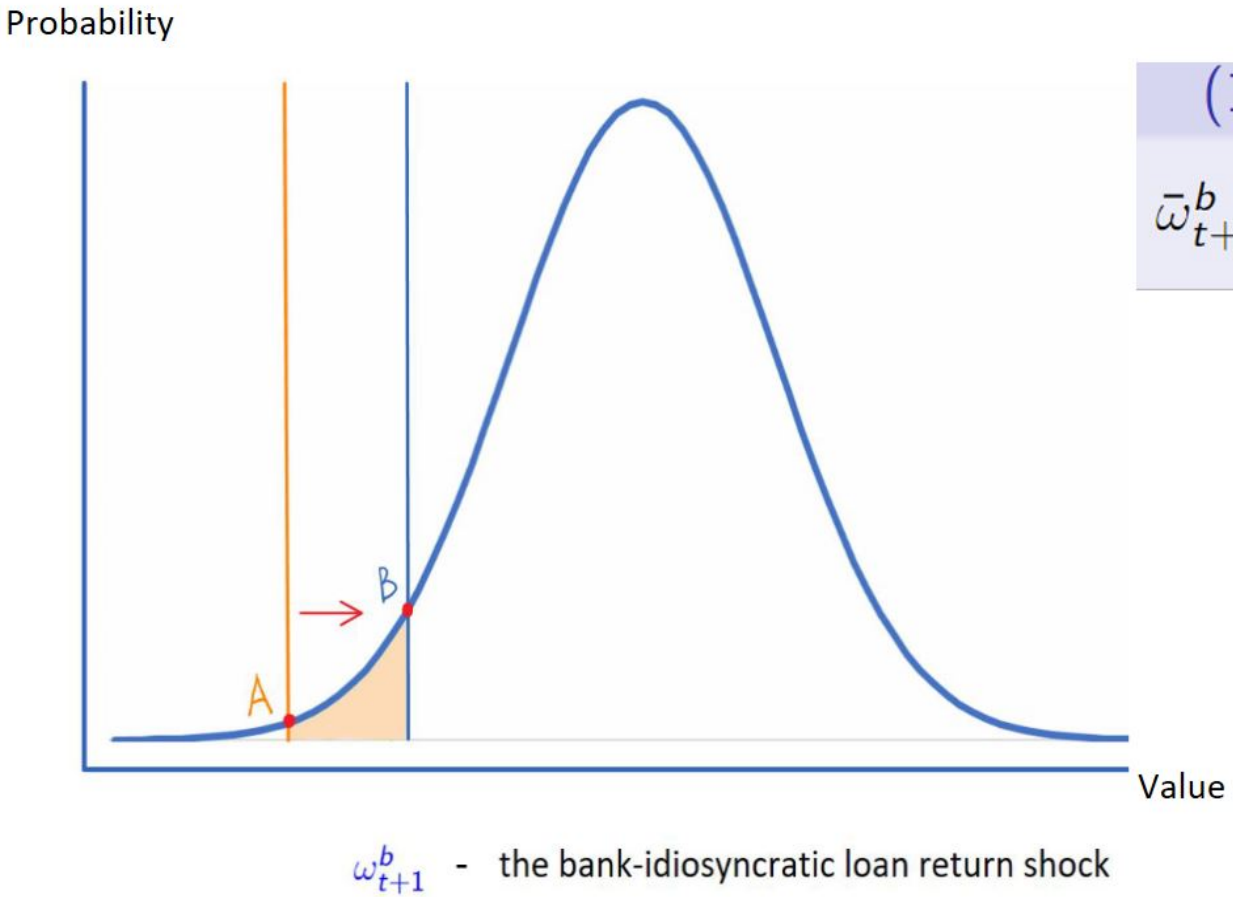
$$\underbrace{b_t^i}_{\text{loans}} = \underbrace{d_t^i}_{\text{deposits}} + \underbrace{e_t^i}_{\text{equities}} \tag{1}$$

- Banks maximize the net value of bankers' equity stake
- The bank defaults: return on loans $<$ deposit payments

$$\omega_{t+1}^{bi} \underbrace{R_{t+1}^f b_t^i}_{\text{return on loans}} = \underbrace{R_{t+1}^d d_t^i}_{\text{deposit payments}} \tag{2}$$

- ω_{t+1}^{bi} - idiosyncratic shock, *i.i.d.* log-normally distributed with mean $\mathbb{E}\{\omega_{t+1}^{bi}\} = 1$ and standard deviation σ

Changing the Bank Default Threshold



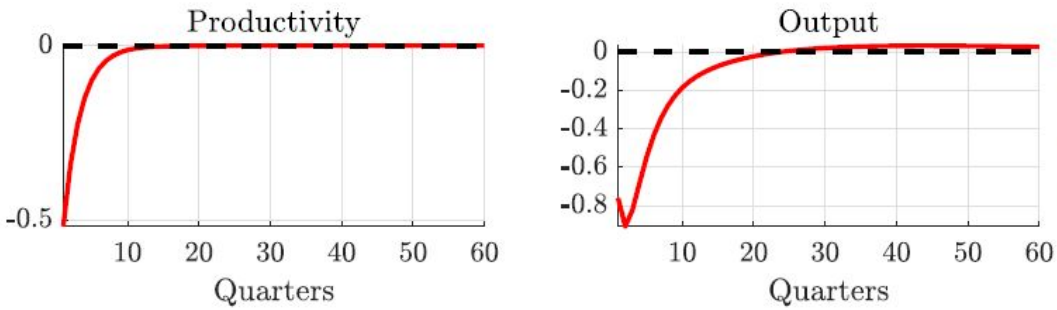
(1) → Default threshold

$$\bar{\omega}^b_{t+1} = \frac{R^d_{t+1} d_t}{R^f_{t+1} b_t} = \frac{(1-\phi) R^d_{t+1}}{R^f_{t+1}} \quad (2)$$

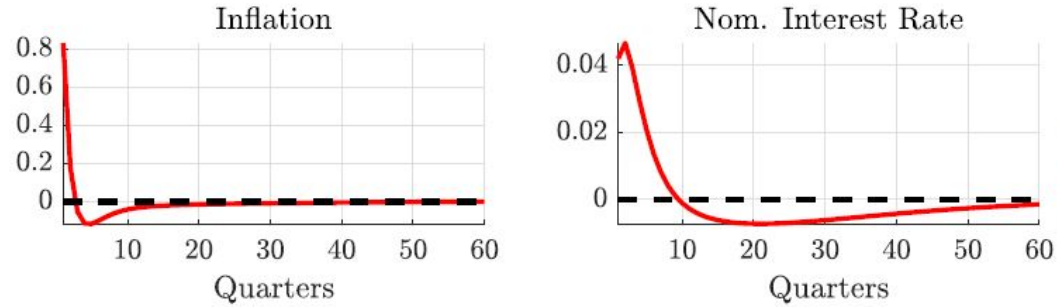
- An ↑ in policy rate → deposit rate ↑ > loan rate ↑ → default threshold ↑ from A to B → probability of default ↑

Simulate a Moderate Crisis Caused by a Productivity Shock

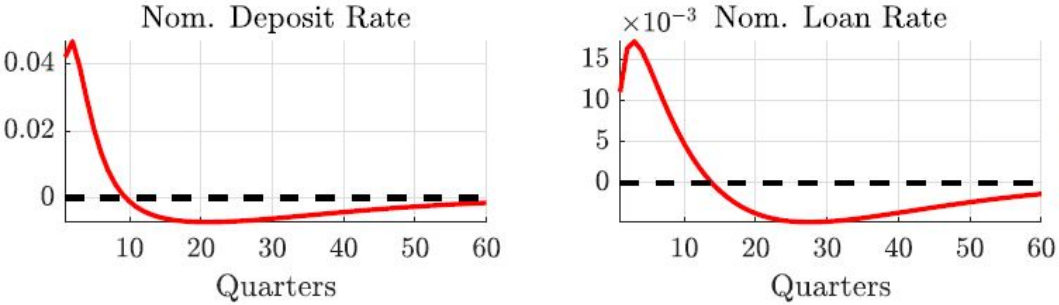
Supply-chain disruption → a moderate recession in the US



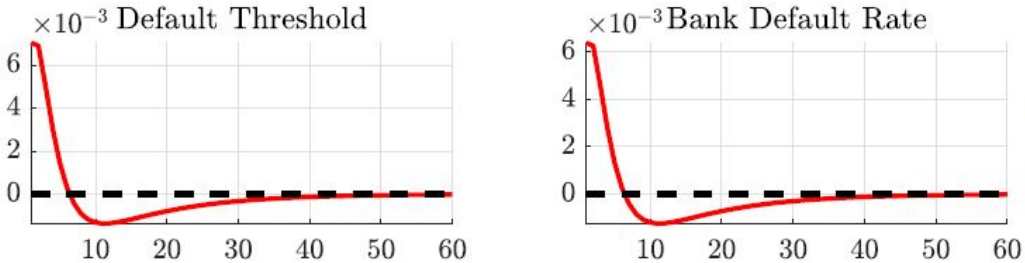
1. A productivity shock →
2. ↓ in output →
3. Shortage of goods →



4. ↑ in inflation →
5. Central bank ↑ policy rate to tame inflation →



6. ↑ in deposit rate
7. ↑ in loan rate lower →



8. Default threshold ↑→
9. Probability of default ↑

Sensitivity Analysis wrt $\rho \in [0, 0.9]$

interest rate inflation output

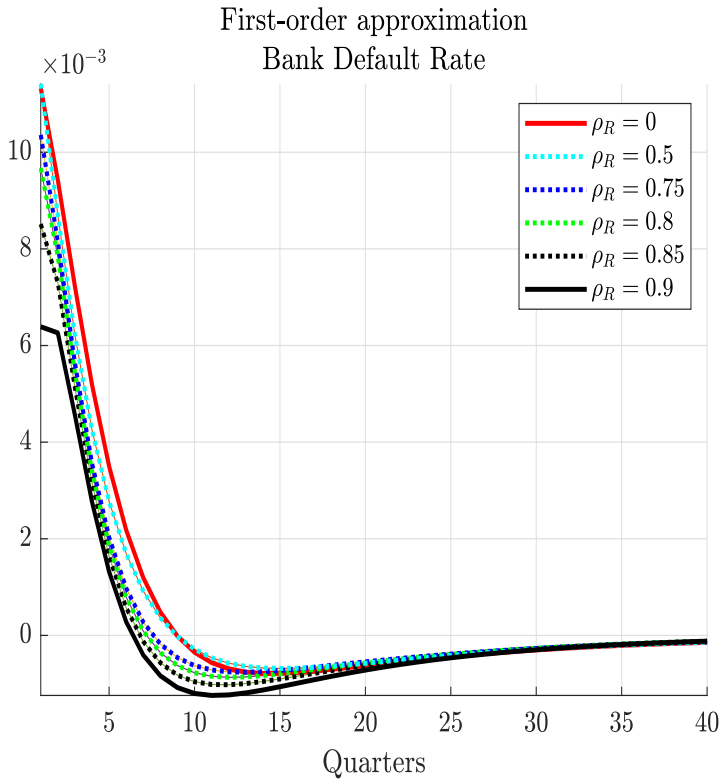
$$\overbrace{i_t} = \underbrace{\rho} i_{t-1} + (1-\rho)(\kappa_\pi \overbrace{\hat{\pi}_t} + \kappa_y \overbrace{\hat{y}_t}) + \underbrace{\varepsilon_t}$$

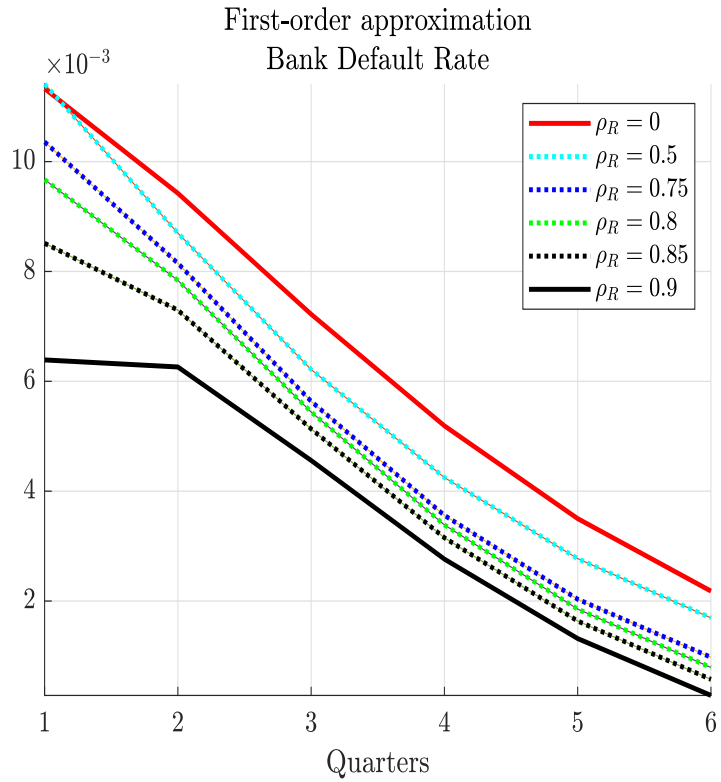
smoothing shock

- $\rho = 0 =$ no interest-rate smoothing

Finding 1. High interest-rate smoothing fosters financial stability since fewer banks default

Response to a -0.5% TFP shock (-0.9% in real GDP)





- Bank default rate = bank failures / total number of commercial banks (annualized and in percentage points deviation from the steady-state)
- $\rho = 0$ = no interest-rate smoothing

Alternative Scenario: Set a Predetermined Deposit Rate

- Baseline setup: interest rates are adjusted simultaneously

$$\omega^b_{t+1} \underbrace{R^f_{t+1}}_{\text{loan rate}} b_t = \underbrace{R^d_{t+1}}_{\text{deposit rate}} d_t \tag{3}$$

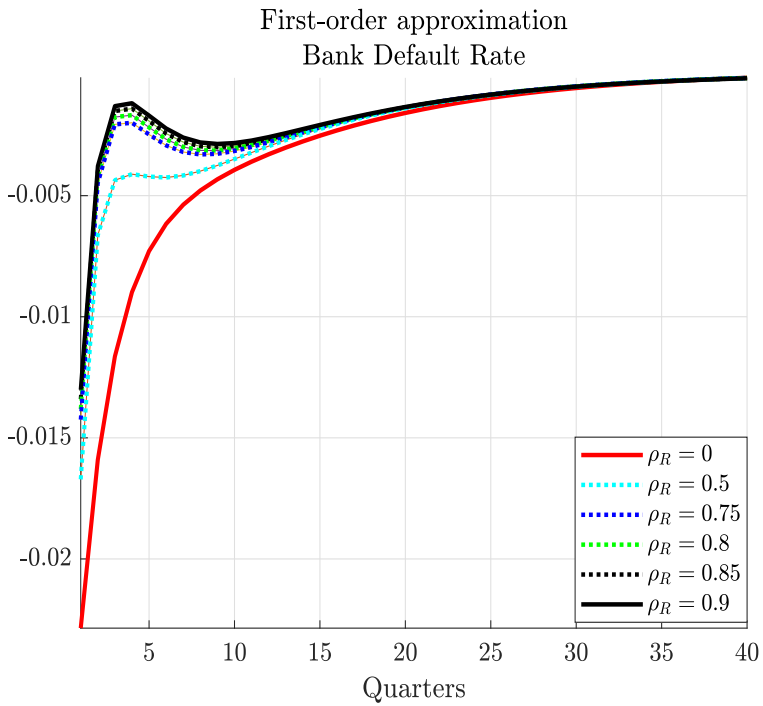
- Alternative setup:

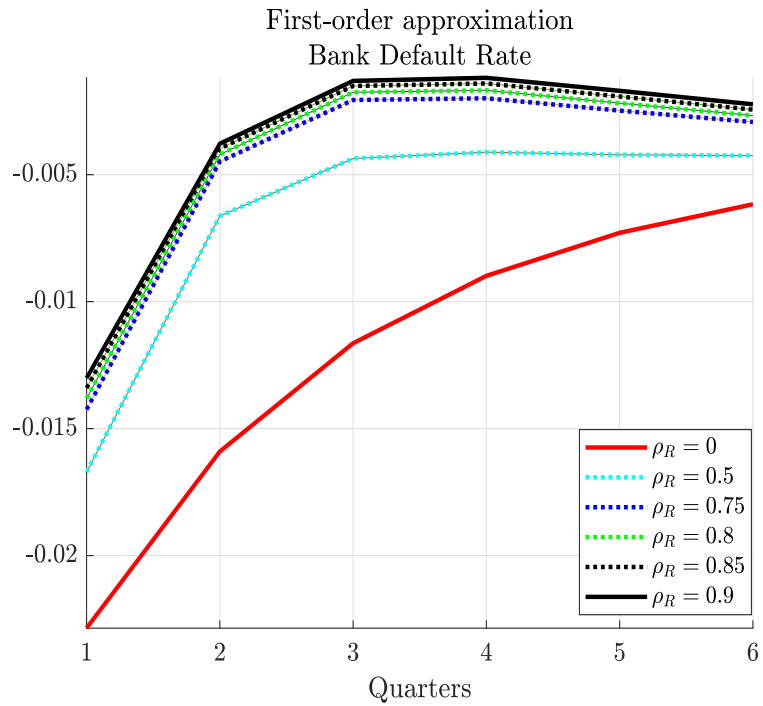
$$\omega^b_{t+1} R^f_{t+1} b_t = R^d_t d_t \tag{4}$$

The deposit rate is predetermined $\rightarrow$ changes with a lag

Opposite Result → interest-rate smoothing effect is sensitive to the structure of bank balance sheets

Response to a -0.5% TFP shock (-0.9% in real GDP)





- annualized and in percentage points deviation from the steady-state
- $\rho = 0$ = no interest-rate smoothing

Conclusion

- 1. Higher interest-rate smoothing fosters financial stability since fewer banks default [expected, proved]
- 2. The interest-rate smoothing effect is sensitive to the structure of interest rates in bank balance sheets [new]
- 3. The impact of monetary policy on the bank default is nonlinear and increases as the economic shock intensifies [new]

$\rightarrow$ **The financial stability implications of monetary tightening may be worse than expected during the crisis**

$\rightarrow$ **Faster monetary tightening can rattle the financial system**

Thank you for your attention!