Diverging Banking Sector: New Facts and Macro Implications

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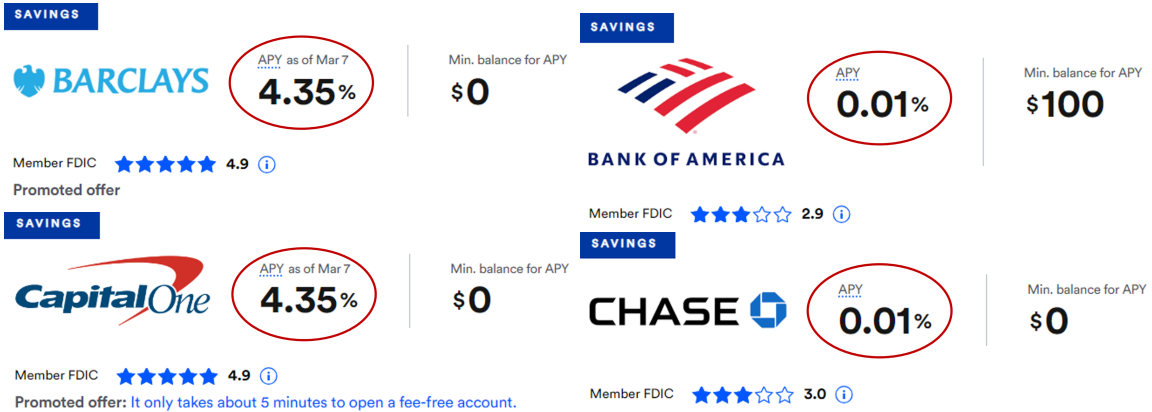
Financial Stability and Regulation Conference

Deposit Rates: 04/2024

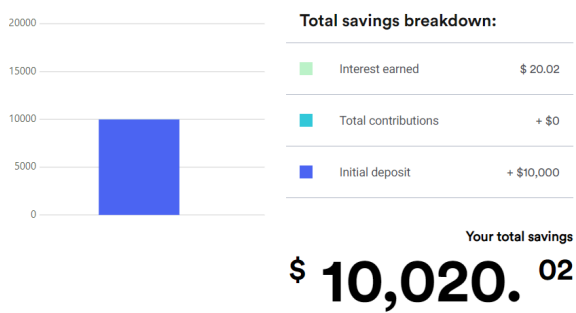


- Similar for CDs

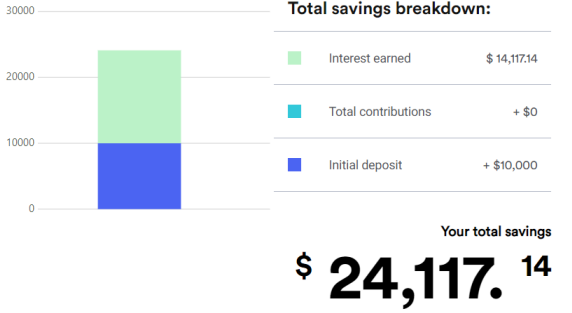
Source: BankRate (accessed on 3/14/2024)

Simple Savings Calculator

If you saved $10,000 in Bank of America and Marcus by Goldman today...



(a) BoA: 0.01%



(b) Marcus: 4.5%

...the difference would be **241**% in 20 years!

Deposit Rate Divergence: Rates More Varied Today

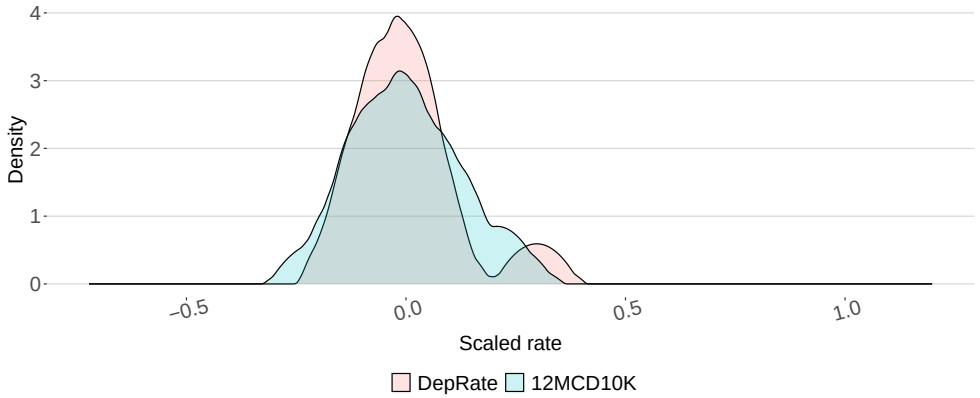
Financial institution	APY	Minimum opening balance
Marcus by Goldman Sachs	4.50%	$0
Citibank	4.45%	$0
Ally Bank	4.35%	$0
Capital One	4.35%	$0
Discover Bank	4.30%	$0
TD Bank	0.02%	$0
Chase	0.01%	$0
U.S. Bank	0.01%	$25
Wells Fargo	0.01%	$25
Bank of America	0.01%	$100

Note: Annual percentage yields (APYs) as of March 28, 2024 (BankRate)

Growing Dispersion of Deposit Rates

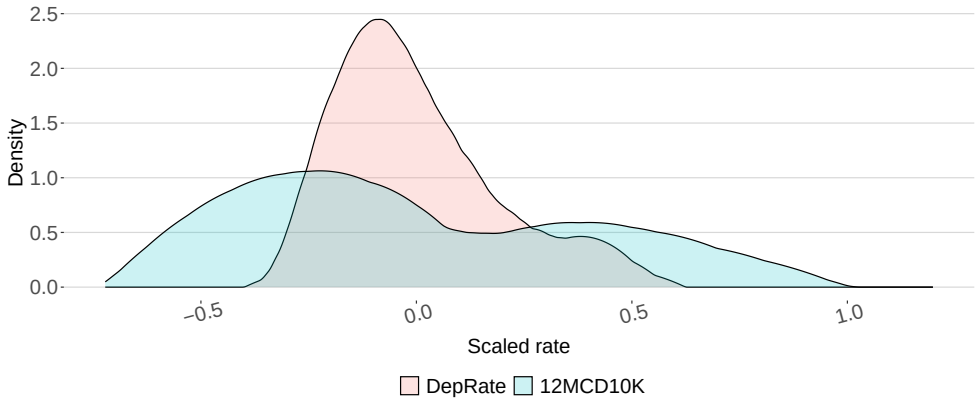
Heterogeneity in Deposit Rates Among Top 25 Banks: 2007Q3

All Banks



- Rate is scaled by Fed Funds rate and demeaned

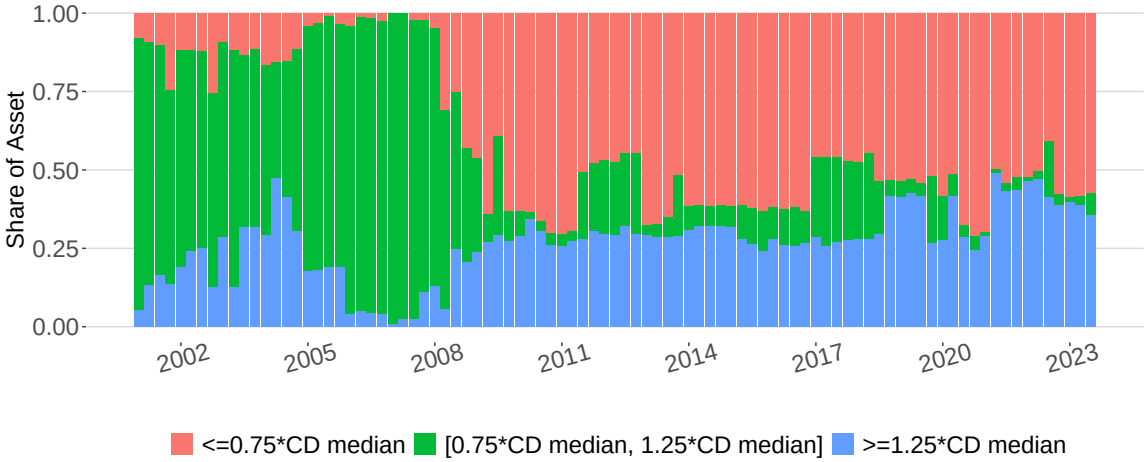
Heterogeneity in Deposit Rates Among Top 25 Banks: 2023Q1



- Federal funds rate= 4.5% and mean of DepRate (12MCD10K) is 1.7% (1.5%)

Divergence in Deposit Rates

Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



Call Reports | 12MCD10K All | Call Reports All

The Emergence of Two Business Banking Models

1. **Growing Divergence within Banking Sector**

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   High Rate Banks **Low Rate Banks**

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- Fewer # of branches

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- Higher # of branches

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2. **Macro Implications:** (1) Monetary policy transmission; (2) Banking sector's risk-maturity profile (3) Regulatory design

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2. **Macro Implications:** (1) Monetary policy transmission; (2) Banking sector's risk-maturity profile (3) Regulatory design
3. **Theoretical Framework:** Emergence of e-banking services allows banks to access services without branches $\Rightarrow$ impacts asset-liability management for high/low rate banks

Outline

Diverging Banking Sector

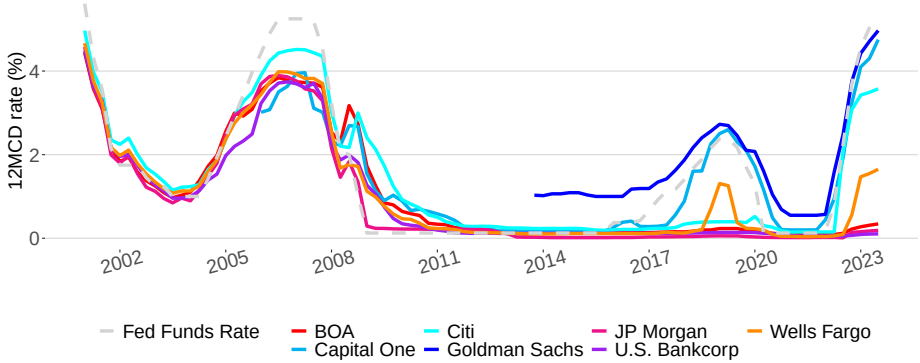
Classification of High and Low Rate Banks

1. Identify 25 largest banks quarterly, based on total assets at previous quarter end
2. Calculate one-year rolling average of 12MCD and deposit rate from Call Reports
3. Rank banks quarterly, separately using 12MCD and deposit rate
4. Standardize ranks to fall between 0 and 1, based on number of observations each quarter
5. Average standardized ranks
6. Top quantile is "high rate" banks, and the remaining is "low rate" banks

▸ Top 25 ▸ Top 100

Diverging Rate-Setting Behaviors

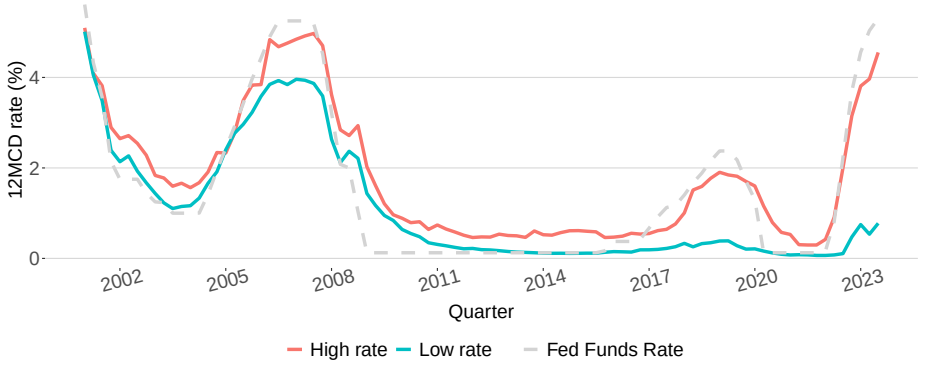
Fact #1A: Diverging Deposit Rates by Bank



- **High rate banks:** Citi, Goldman Sachs, and Capital One
- **Low rate banks:** JP Morgan Chase, Wells Fargo, Bank of America, US Bankcorp

▸ Sample ▸ Changes

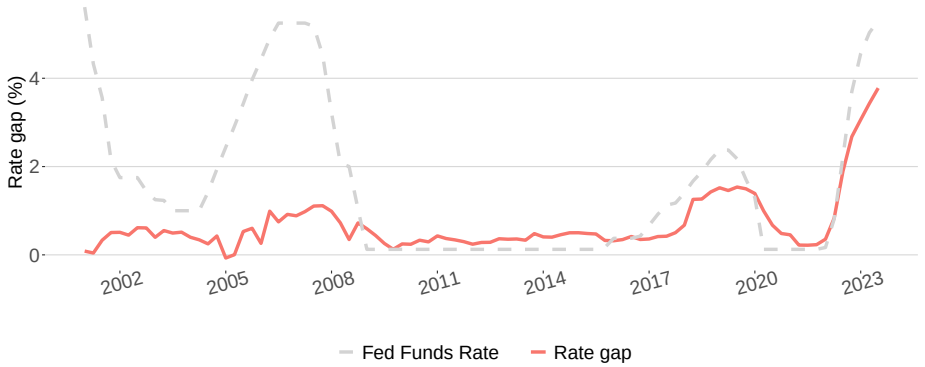
Fact #1B: Divergence in Deposit Rate-Setting Behavior



- Validation of our classification
- Deposit rates diverge in the last two rate hiking cycles

Top 100

Fact #1C: Deposit Rate Gap Emerges from 2015Q2



- Before 2009, consistent and narrow rate differential between the two groups.
- From second rate hiking cycle, high rate banks actively raise rates in response to rising interest rates, while low rate banks remain largely stagnant

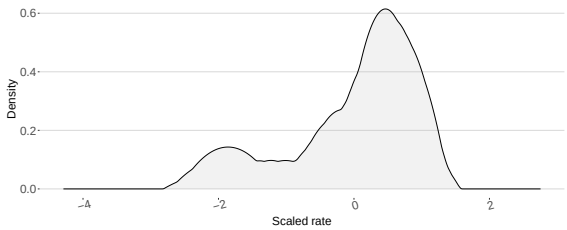
Top 100

Diverging Branches

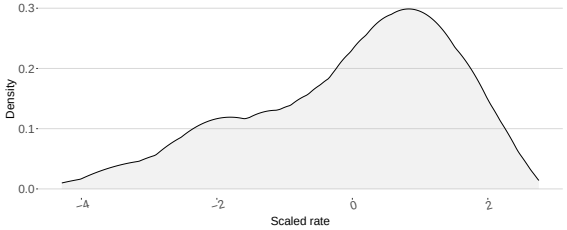
Fact #2A: Dispersion of the Branch-to-Deposits Ratio

Hypothesis:

1. Low rate banks prioritize branch networks (e.g., JP Morgan Chase, Bank of America, Wells Fargo)
2. High rate banks shift to e-banking services (e.g., Ally Bank, Marcus by Goldman)



(a) 2007Q3

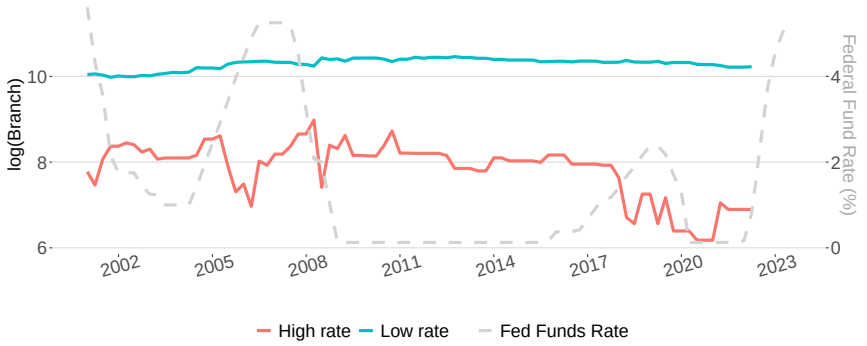


(b) 2022Q2

- ↑ branch-to-deposits ratio ⇒ broader physical presence and higher operating costs
- Widening gap in branch utilization across banks ⇒ banks are increasingly divergent in their branch strategies

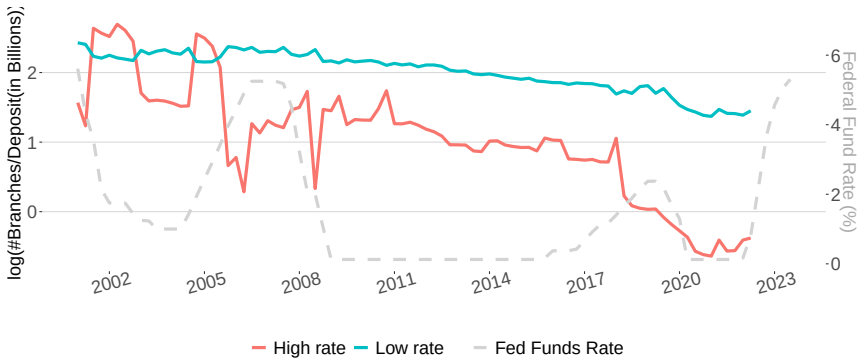
Fact #2B: Divergence in Number of Branches Operated (log #Branches)

Widening gap in deposit rates is linked to divergence in branch networks between high rate and low rate banks



- 86% decline in the number of high rate bank branches ▸ Top 100

Fact #2C: Divergence in Ratio of Branches to Deposits (log $\frac{\#Branches}{RealDeposits}$)



- Branch-deposit ratio has declined markedly for high rate banks by over 90% ▸ Top 100

Fact #2: Regression Results for Bank Branches

▸ Age ▸ Education ▸ Income ▸ IT Exp.

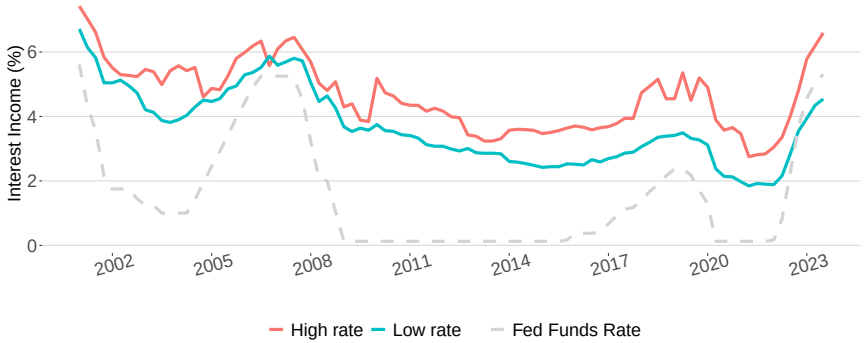
	log(# Branches)		log(Branches/Deposit)		Customer Age	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}$(High Rate)×Post	-1.072***	-1.049***	-0.477**	-0.547**	-0.568***	-0.567***
	(0.298)	(0.303)	(0.229)	(0.238)	(0.215)	(0.214)
$\mathbb{1}$(High Rate)	-0.785***	-0.861***	-1.120***	-1.151***	-0.470**	-0.557***
	(0.218)	(0.208)	(0.192)	(0.194)	(0.197)	(0.185)
Post	0.443***		-0.779***		1.820***	
	(0.126)		(0.121)		(0.213)	
$ROA_{i,q-1}$	-0.059	-0.008	-0.086	0.009	-0.026	-0.373***
	(0.070)	(0.103)	(0.064)	(0.080)	(0.128)	(0.068)
Tier $1_{i,q-1}$	0.585***	0.568***	0.099**	0.014	-0.290***	-0.155***
	(0.089)	(0.083)	(0.045)	(0.035)	(0.087)	(0.058)
Quarter FE		✓		✓		✓
Adjusted R^2	0.152	0.156	0.152	0.125	0.322	0.162
Observations	2,112	2,112	2,112	2,112	1,647	1,647
Mean of Dep. Variable	7.088	7.088	0.852	0.852	38.657	38.657

- High rate banks report a 65% to 66% additional reduction in the number of branches, a 38% to 42% additional decline in the branch deposit ratio, and a 1.47% additional decline in the average age after 2009, in comparison to low rate banks ▸ Top 100

Diverging Asset Management: NIM

Fact #3A: Divergence in Interest Income

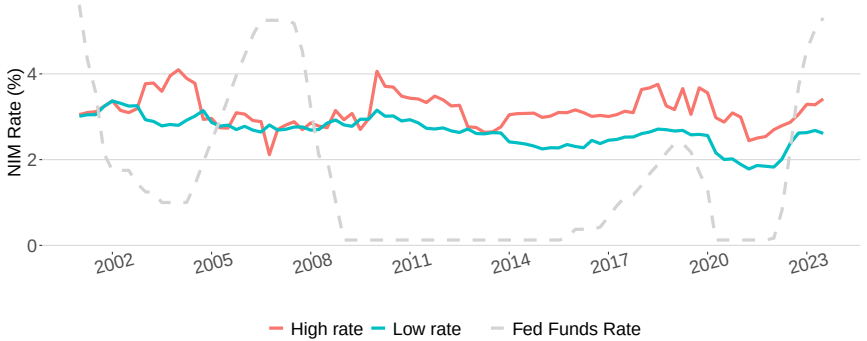
- Prior to 2009, both types of banks generate comparable levels of interest income
- A significant divergence emerges after 2009



Fact #3B: Divergence in NIM

NIM (Top 100)

- ...But high rate banks maintain a roughly 50 bps advantage!
- Two strategies to achieve higher interest income: (1) More credit risk; (2) More maturity risk

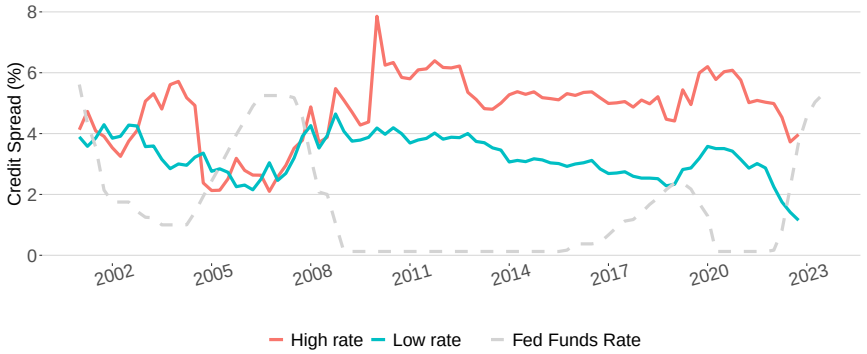


	2001-2008			2017-2023		
	High rate	Low rate	Diff	High rate	Low rate	Diff
NIM rate (%)	2.54	2.33	0.21	2.52	1.78	0.74***

Diverging Asset Management: Credit Risk

Fact #4A: Divergence in Lending Spreads

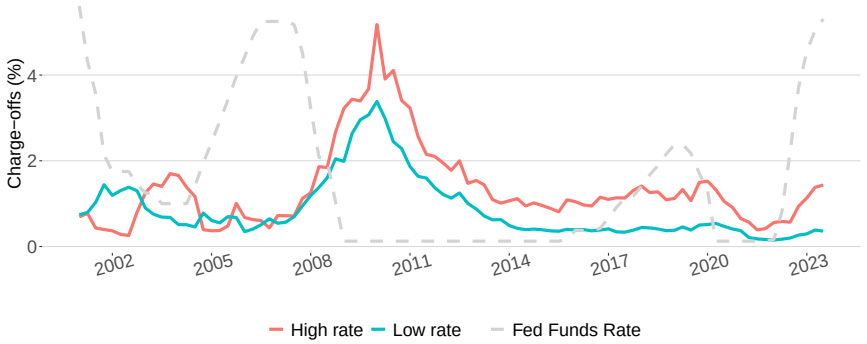
- Lending spread = Lending rate - Maturity-matched treasury yield



- Differential in the credit spread widens to over 200 bps; high rate banks report loan spread of 400 bps compared to 150 bps for low rate banks Top 100

Fact #4B: Divergence in Charge-off Rate

High rate banks earn a spread from riskier lending, rather than a term premium



- High rate banks report a 2x higher charge-off rate than low rate banks Top 100

Fact #4: Regression Results for Credit Risk

Top 100

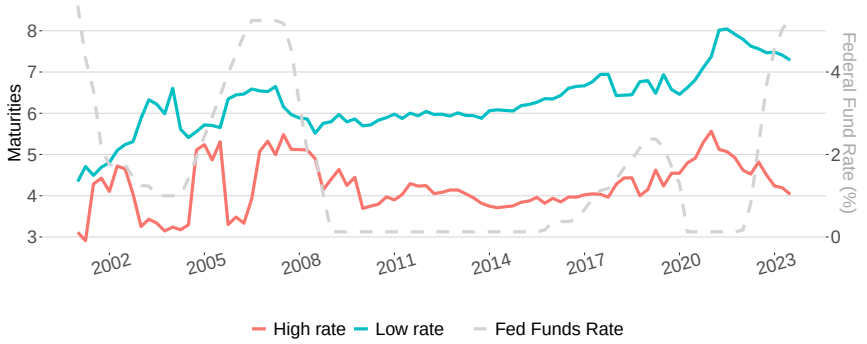
	Loan Rate	Credit Spread	Charge-offs
	(1)	(2)	(3)
$\mathbb{1}$(High Rate)×Post	1.385***	1.194***	0.440***
	(0.212)	(0.278)	(0.136)
$\mathbb{1}$(High Rate)	0.703***	1.011***	0.251**
	(0.189)	(0.269)	(0.124)
Quarter FE + Controls	✓	✓	✓
Adjusted R^2	0.327	0.346	0.166
Observations	2,269	2,103	2,269
Mean of Dep. Variable	5.172	3.411	0.859

- After 2009, high rate lending is associated with 40% higher loan rates, 65% higher credit spread, and 80% higher charge-off rate, than the sample average

Diverging Asset Management: Maturity Risk

Fact #5A: Divergence in Asset Maturity

- To hedge against interest rate risk, high rate banks hold shorter-maturity assets

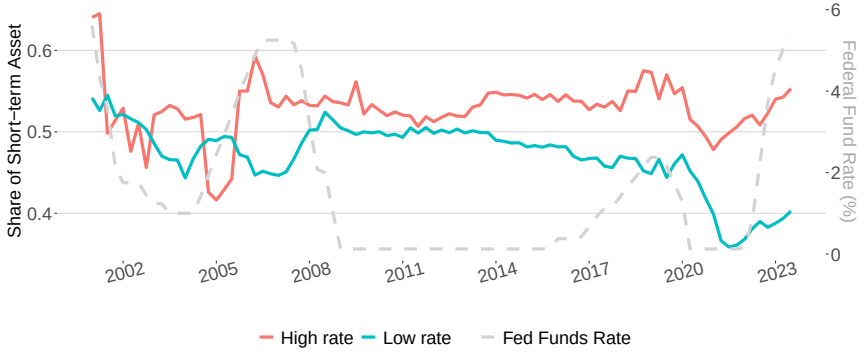


- Avg maturity of assets in low rate banks is 8 years compared to 4 years for high rate

▸ Top 100

Fact #5B: Divergence in the Share of Short-term Assets

- Short-term assets: maturity less than one year



- Short-term asset share is 55% for high rate banks and 35-40% for low rate banks Top 100

Fact #5: Regression Results for Maturity Risk

Top 100

	Maturity (years)	Short-term share (%)
	(1)	(2)
$\mathbb{1}$(High Rate)×Post	-0.710**	3.012*
	(0.332)	(1.582)
$\mathbb{1}$(High Rate)	-1.793***	6.140***
	(0.327)	(1.142)
Quarter FE + Controls	✓	✓
Adjusted R^2	0.227	0.129
Observations	2178	2178
Mean of Dep. Variable	5.934	47.872

- After 2009, high rate banks hold loans and securities with 42% lower average maturity and 19% higher share of short-term assets than the sample average

Decomposition of Maturity and Credit Risks

How do Banks Adjust Asset Maturity?

The average maturity of banks' loans and securities is determined by two factors:

1. Banks' composition of different asset classes ▸ Figure
2. Maturity associated with each asset class ▸ Figure

High rate banks

- Reallocate loans to non-real estate loans (including personal, C&I loans etc), which have shorter maturity ▸ Table
- Hold shorter-maturity MBSs and Treasuries after 2009 ▸ Table

How do Banks Adjust Risk Taking? Top 100

High rate banks' preference for shorter maturities comes at the cost of increased credit risk

	Real Estate Loans	C&I Loans	Personal Loans	Other Loans
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	0.224**	0.209**	0.614***	0.062
	(0.089)	(0.086)	(0.185)	(0.067)
$\mathbb{1}$(High Rate)	0.049	0.049	0.570***	-0.050
	(0.050)	(0.067)	(0.168)	(0.058)
Quarter FE + Controls	✓	✓	✓	✓
Adjusted R^2	0.079	0.027	0.092	0.001
Observations	2239	2214	2264	2243
Mean of Dep. Variable	0.445	0.594	2.328	0.226

- High rate banks typically assume a significant amount of credit risk in personal lending relative to low rate banks
- After 2009, high rate banks experiencing increased charge-off rates across various asset classes

Alternative Hypotheses

- Post-financial crisis regulation explains the effects
  - No divergence in Tier 1/2 ratios

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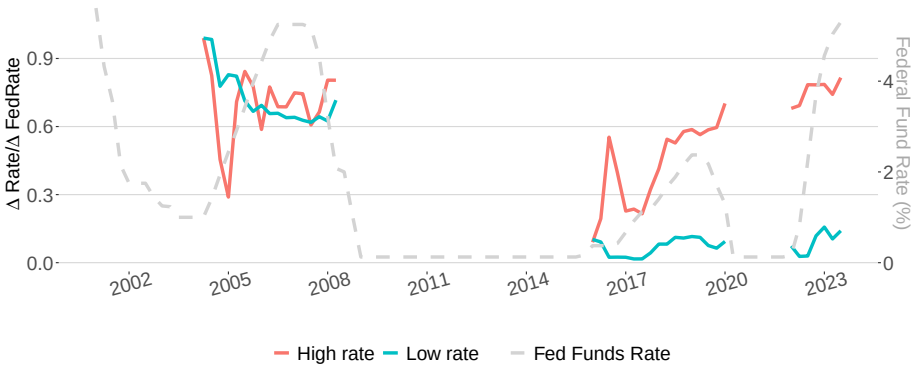
- Quantitative easing explains the effects
  - No divergence in reserve ratio
- Clientele Effects
  - No divergence in insured deposit ratio
  - No divergence in non-interest rate expense, non-interest rate income

Macro Implications

Divergence in Deposit Beta

- Deposit betas diverge in the last two rate hiking cycles



Savings | Call Reports

- Before 2009: β of low rate banks: 0.599; β of high rate banks: 0.533
- After 2009: β of low rate banks: 0.144; β of high rate banks: 0.623

Macro Implication #1: Regression Results for Flow Beta

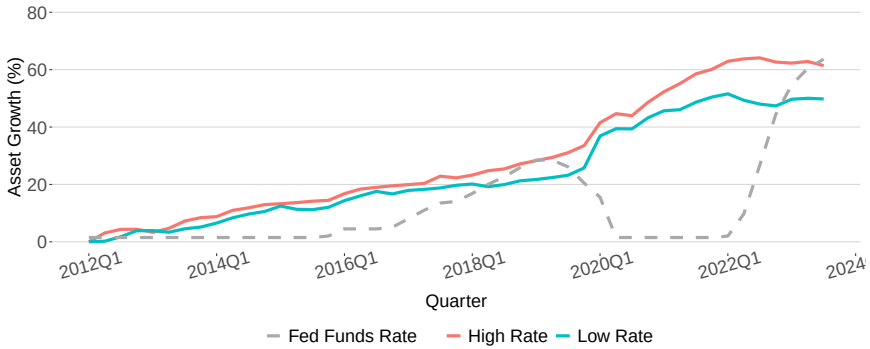
Top 100

	ΔDeposit$_{i,y}$		ΔPersonal Loan$_{i,y}$		ΔC&I Loan$_{i,y}$		ΔReal Estate Loan$_{i,y}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFFTar$_y \times \mathbb{1}$(High Rate)×Post	3.365**	2.931**	4.742*	5.427*	5.484**	3.705	0.053	0.419
	(1.404)	(1.471)	(2.695)	(2.805)	(2.528)	(2.583)	(2.533)	(2.814)
ΔFFTar$_y \times \mathbb{1}$(High Rate)	-0.658	-0.544	-3.575*	-4.035*	-3.559**	-1.784	-0.302	-0.566
	(0.942)	(0.935)	(2.026)	(2.146)	(1.591)	(1.737)	(1.438)	(1.413)
ΔFFTar$_y$×Post	-5.299***		-0.858		-2.131		-2.732	
	(1.194)		(1.112)		(2.063)		(1.927)	
ΔFFTar$_y$	0.712		0.815		1.877		2.530***	
	(0.679)		(0.875)		(1.866)		(0.971)	
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Quarter FE		✓		✓		✓		✓
Adjusted R^2	0.227	0.047	0.031	0.008	0.029	0.015	0.109	0.026
Observations	2,269	2,269	2,257	2,257	2,201	2,201	2,232	2,232
Mean of Dep. Variable	8.231	8.231	6.444	6.444	5.819	5.819	5.724	5.724

- After 2009, when Fed Funds rate increases by 100 bps
  - **Low rate banks**: deposits ↓ 4.6%; C&I loans ↓ 0.3%; real estate loans ↓ 0.2%
  - **High rate banks:** deposits ↓ 1.9%; personal loans ↑ 1.1%; C&I loans ↑ 1.67%

Macro Implication #2: Banking Sector's Origination Capacity

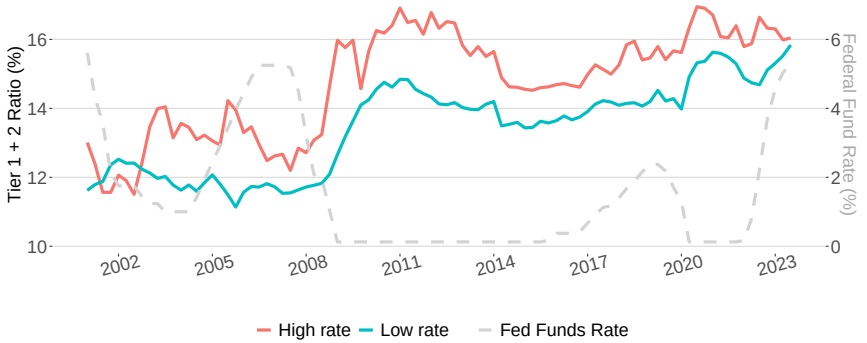
Top 100



- Fed Funds ↑ 500 bps ⇒ 18% more deposits flow into high rate banks
- Banking sector originates 13% shorter maturity loans
- Banking sector holds approximately 11% more credit risk

Macro Implication #3: Regulatory Design

▸ Tier 1 ▸ Tier 2



- Regulatory framework has implications for assessing systemic risk
- Lack of divergence in capital ratios between bank types $\Rightarrow$ current regulation may not capture risk divergence within the banking sector

Theoretical Framework

A Simple Framework—Before e-banking

- A Salop model with two banks and a continuum of identical depositors, uniformly distributed on the circle

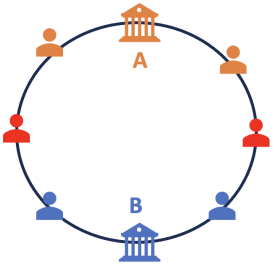
$$U_i(j) = \underbrace{r_j}_{\text{Deposit rate}} + \underbrace{\eta}_{\text{Utility from Branch}} \times \underbrace{(1/2 - d_{i,j})}_{\text{Distance to branch}} \mathbb{1}(Branch) \quad \forall j \in \{A, B\}$$

- Banks decide: 1) location of branch, 2) deposit rate, 3) riskiness of loans (Allen & Gale, 2004)

$$\max_{r_j, r_j} \underbrace{D_j}_{\text{Deposit demand}} \times \Big(\underbrace{f + l_j}_{\text{Loan rate}} - \underbrace{r_j}_{\text{Deposit rate}} \Big) \times \underbrace{p(l_j)}_{\text{Prob. of survival}} - \underbrace{\kappa}_{\text{MC per branch}} \times \mathbb{1}(Branch)$$

  - Assume $p(l_j) = \alpha - l_j$, where l_j measures riskiness of loans
  - Cost of branch is paid ex-ante, such as rents

A Simple Framework—Before e-banking



- Branch endows banks with local market power
- $r_A = r_B = f + \alpha - \eta$
- $l_A = l_B = \alpha - \frac{\eta}{2}$
- $prof_A = prof_B = \frac{\eta^2}{8} - \kappa.$

A Simple Framework—with e-Banking Option

e-Banking services do not rely on branches

- Depositors derive utility also from e-Banking services

$$U_i^r(j) = r_j + \eta(1/2 - d_{i,j})\mathbb{1}(\text{Branch}_j) + \underbrace{\gamma}_{\text{Utility from e-Banking}} \mathbb{1}(\text{e-Banking}_j) \quad \forall j \in \{A, B\}$$

- Banks decide: 1) e-banking, 2) location of branch, 3) deposit rate, 4) riskiness of loans

A Simple Framework—with e-Banking Option

e-Banking services do not rely on branches

- Depositors derive utility also from e-Banking services

$$U_i^r(j) = r_j + \eta(1/2 - d_{i,j})\mathbb{1}(\text{Branch}_j) + \underbrace{\gamma}_{\text{Utility from e-Banking}} \mathbb{1}(\text{e-Banking}_j) \quad \forall j \in \{A, B\}$$

- Banks decide: 1) e-banking, 2) location of branch, 3) deposit rate, 4) riskiness of loans

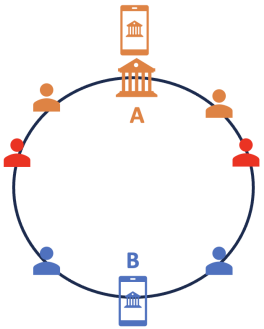
Question: what is the new market structure?

Nash Equilibrium

When cost of branch is relative large, new banking structure emerges endogenously

- {A: e-banking only, B: e-banking only}
- {A: Branch + e-banking, B: Branch + e-banking}
- {A: Branch only, B: Branch + e-banking}
- {A: Branch only, B: e-banking only}
- {A: Branch + e-banking, B: e-banking only}

The Structure Closest to Reality



- $r_A < r_B$ (Fact 1)
- High rate bank close branches (Fact 2)
- Both banks offer e-banking services
- Deposits flow from Bank A to Bank B (Monetary policy transmission)
- $l_A < l_B$: High rate banks take more credit risk (Fact 4)
- If adding interest rate management, high rate banks hold shorter maturity (Fact 3)

- Intuition: deposit spread earned from depositors is risk free. When spread is large, banks are less inclined to pursue risky projects which expose them to default risk
- **High rate banks do "real" banking businesses, while low rate banks are money-market like but with interest rate risk**

Conclusion

Conclusion

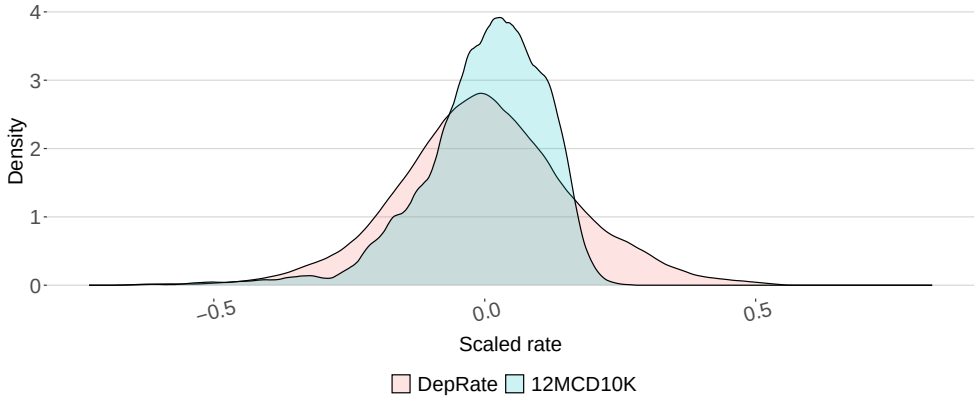
1. **Emergence of high and low rate banks**
   - High rate banks: fewer branches, shorter-term assets, spread from credit risk
   - Low rate banks: more branches, longer-term, and safer assets
2. **$\uparrow$ Interest rates $\rightarrow$ deposits flow to high rate banks**
   - Banking sector maturity transformation $\downarrow$ credit risk $\uparrow$

APPENDIX

Heterogeneity in Deposit Rates Among All Banks: 2007Q3

Back

Heterogeneity in deposit rates across banks has increased substantially over the past 20 years

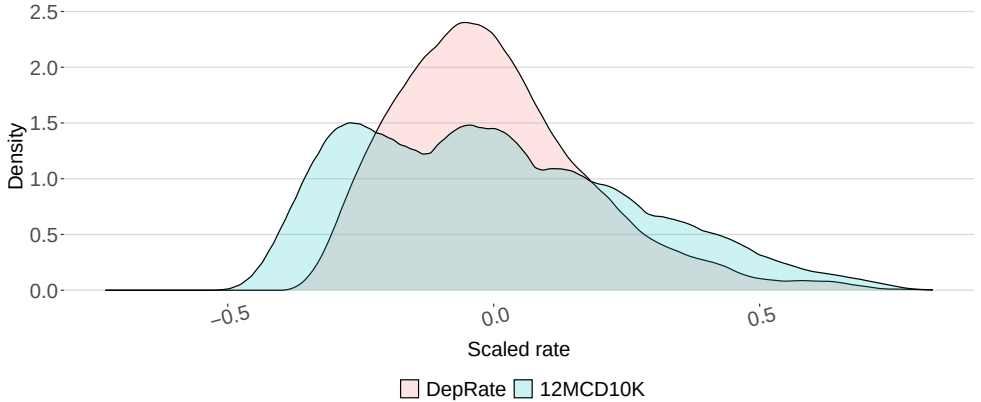


2007Q3

Heterogeneity in Deposit Rates Among All Banks: 2019Q1

Back

Heterogeneity in deposit rates across banks has increased substantially over the past 20 years

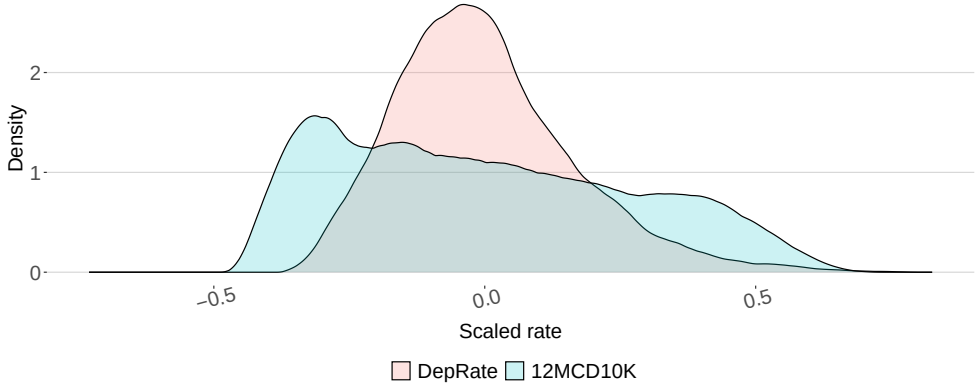


2019Q1

Heterogeneity in Deposit Rates Among All Banks: 2023Q1

Back

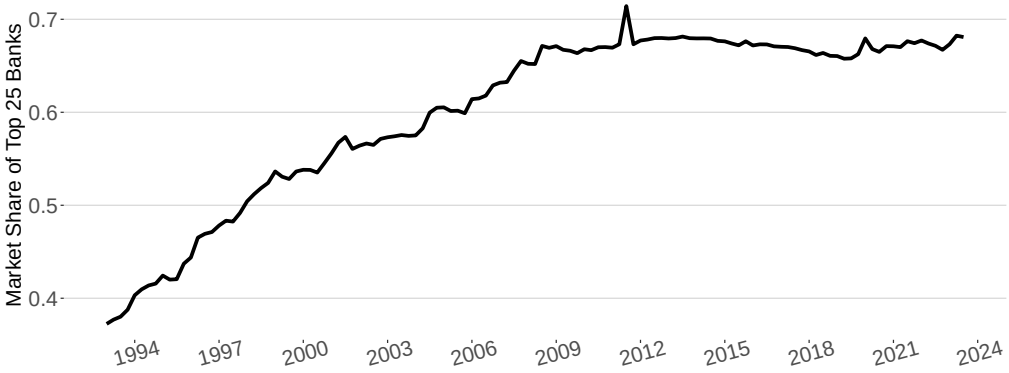
Heterogeneity in deposit rates across banks has increased substantially over the past 20 years



2022Q4

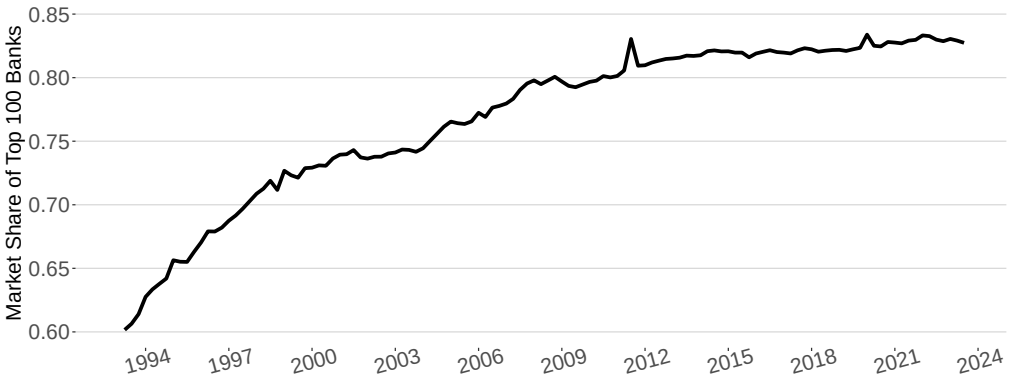
Market Share of Top 25 Banks

Back



Market Share of Top 100 Banks

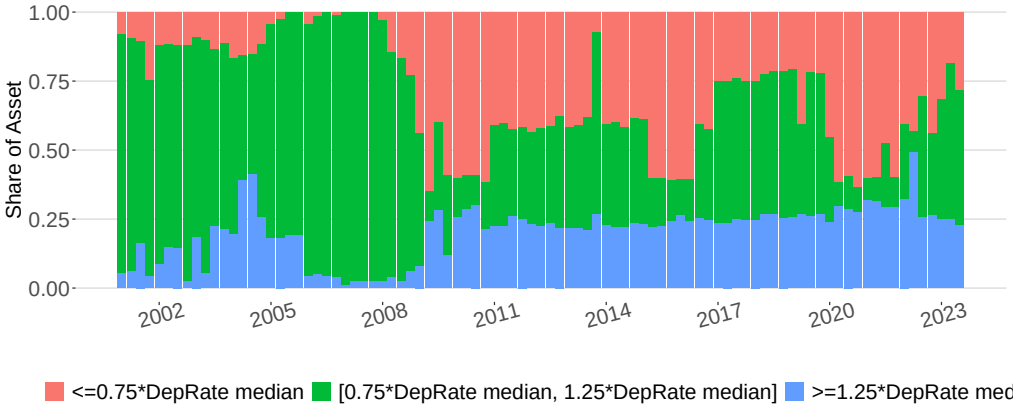
Back



Divergence in Deposit Rates: Call Reports Deposit Rate

Back

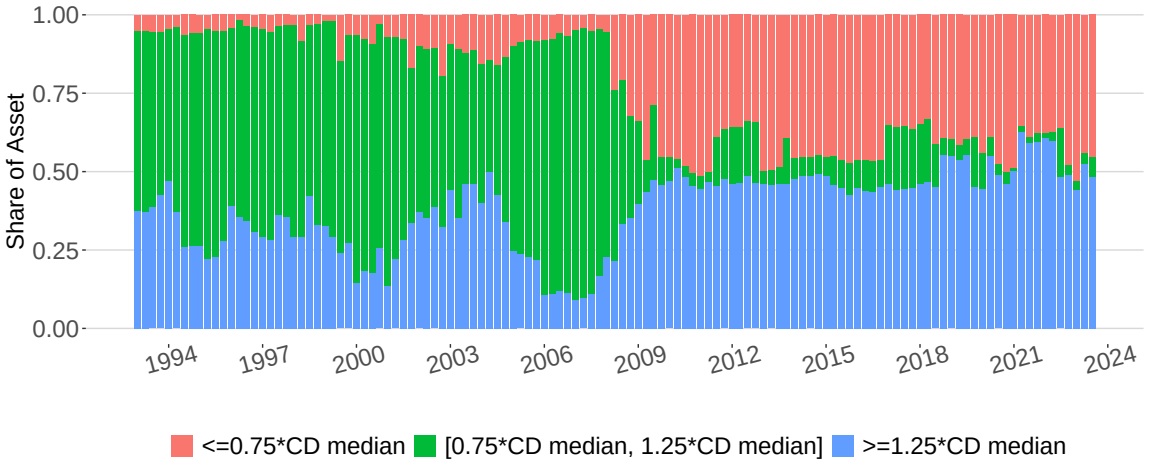
Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



Divergence in Deposit Rates: 12MCD10K (All Banks)

Back

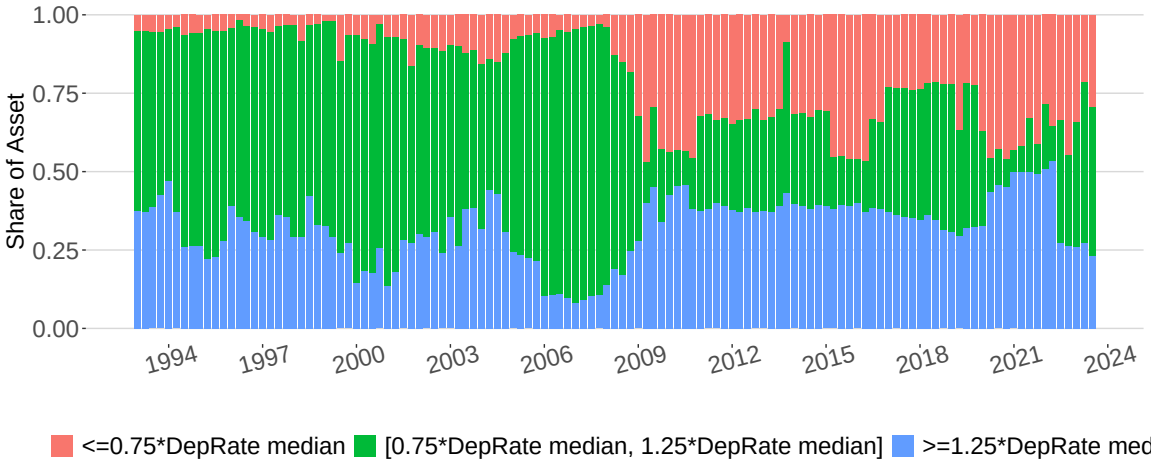
Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



Divergence in Deposit Rates: Call Reports Deposit Rate (All Banks)

Back

Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



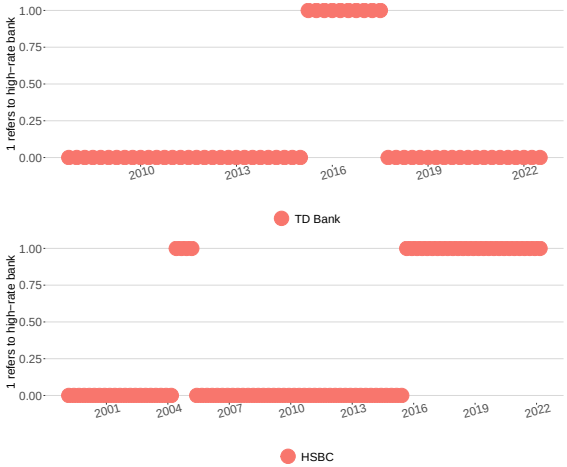
Classification of Banks

Back

High rate banks	American Express, Ally Financial
Low rate banks	Charles Schwab, SVB, M&T Bank, JP Morgan, KeyBank, Huntington, PNC, Fifth Third Bank, BOA, State Street Bank, U.S. Bankcorp, Wells Fargo, Citizens Bank, Northern Trust, Bank of Montreal, Regions Financial, Bank of New York, First Republic Bank

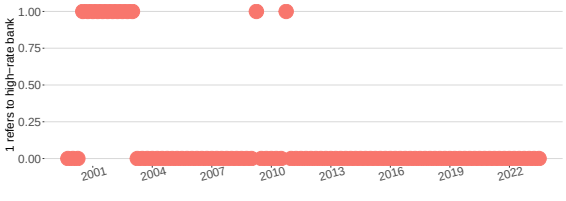
Shifts in Bank Classification: 1/2

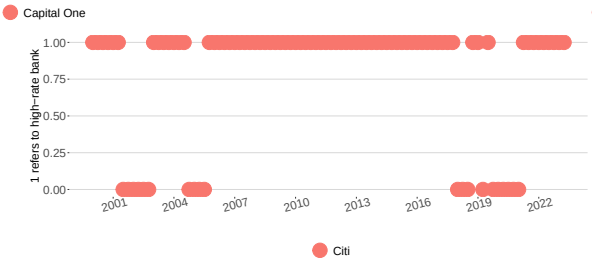
Back



Shifts in Bank Classification: 2/2

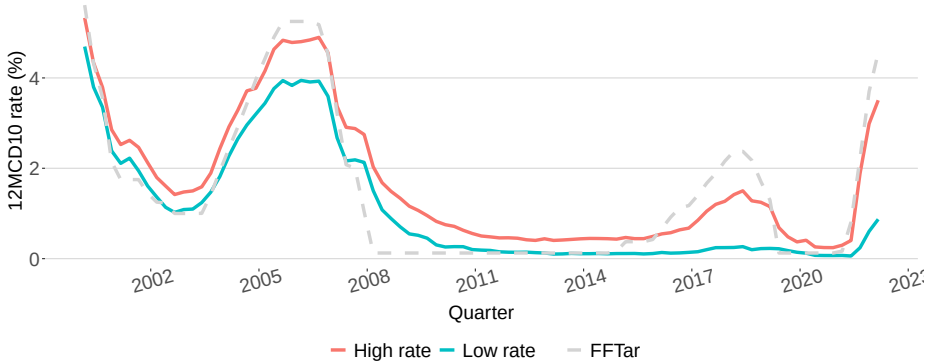
Back





Deposit Rates for High and Low Rate Banks (Top 100) Back

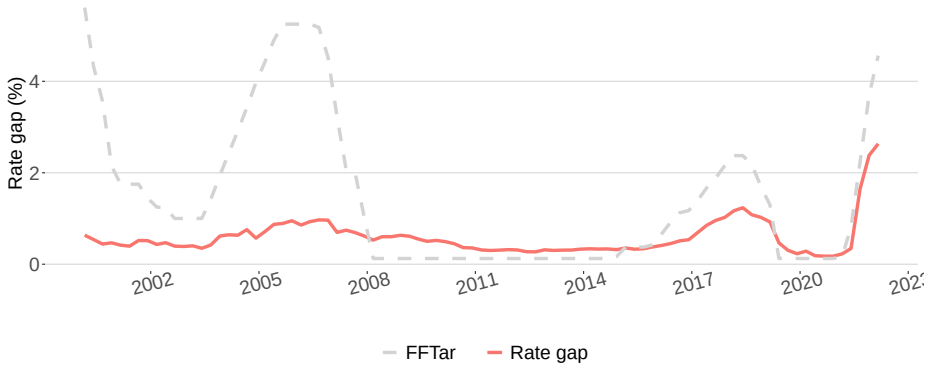
High rate banks have raised deposit rates aggressively in response to rising interest rates, from 2015Q2



Deposit Rate Gap Between High and Low Rate Banks (Top 100)

Back

Rate gap has increased from 2015Q2



More Summary Statistics

Back

Panel A: High vs. Low rate Banks Comparison

	2009-2016		
MCD (%)	0.20	0.05	0.16***
DepRate (%)	0.15	0.02	0.13***
Insured Deposits Share	0.40	0.51	-0.11***
#Branches	873	4017	-3144***
$\log(\frac{\#\text{ Branches}}{\text{Deposits}})$	-0.06	0.86	-0.92***
ΔDeposits (%)	0.99	0.95	0.04
NIM rate (%)	2.58	2.09	0.48***
Maturity (Years)	33.35	5.44	-2.10***
Charge-off Rate (%)	1.52	0.70	0.82***

Panel B: Correlation Matrix of Rates

	DepRate	SAV	CD	MM
DepRate	1.000	0.687	0.922	0.843
SAV	0.687	1.000	0.694	0.766
MCD	0.922	0.694	1.000	0.856
MM25	0.843	0.766	0.856	1.000

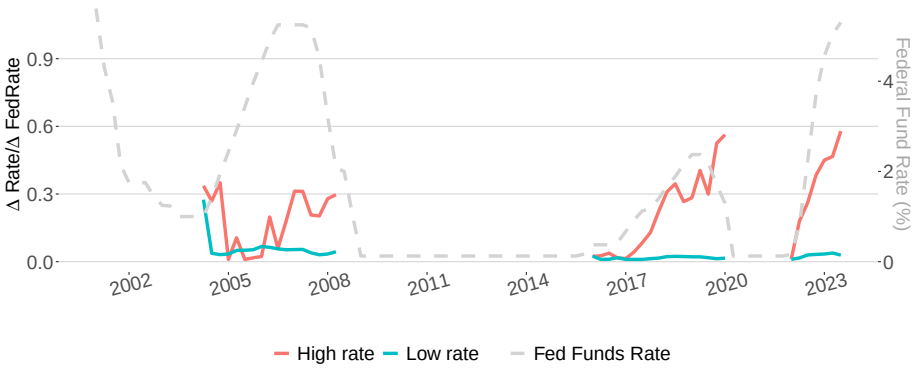
Variation in Branch Deposit Rates across Largest Banks and BHCs

Back

	(1) Time FE	(2) RSSD FE	(3) BHC FE	(4) RSSD+Time FE	(5) BHC+Time FE	(6) RSSD × Time FE	(7) BHC × Time FE
R^2	0.9056	0.0657	0.0674	0.9320	0.9423	0.9423	0.9636
adj. R^2	0.9056	0.0588	0.0669	0.9315	0.9422	0.9363	0.9626
N	916,859	910,276	57,545	910,276	57,545	513,270	57,401

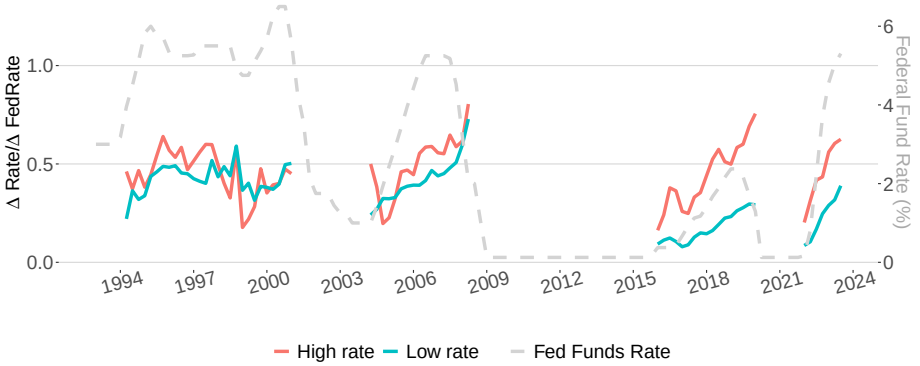
Deposit Beta for High and Low Rate Banks: Savings Rate

Back



Deposit Beta for High and Low Rate Banks: Call Reports

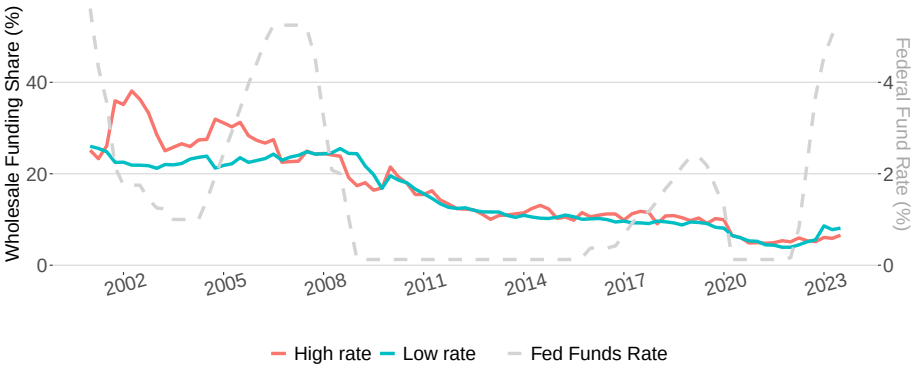
Back



Wholesale Funding Share

Back

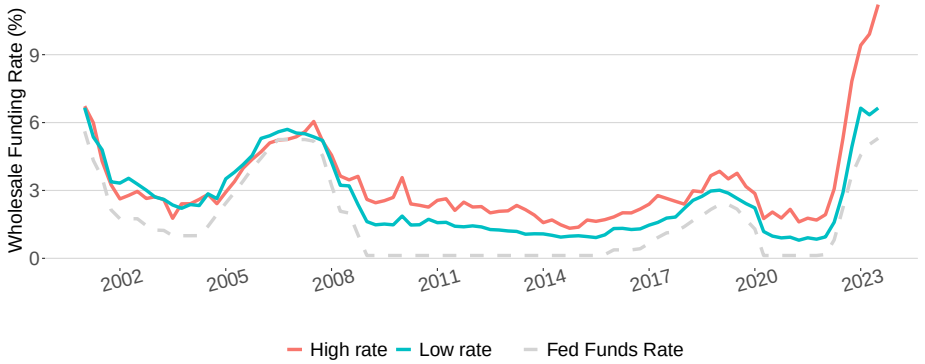
No difference in wholesale funding share



Wholesale Funding Share

Back

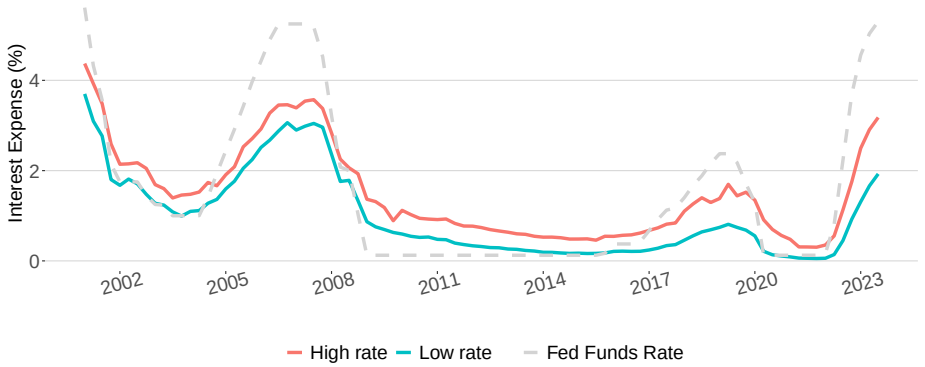
No difference in wholesale funding rate



Interest Expense for High and Low Rate Banks

Back

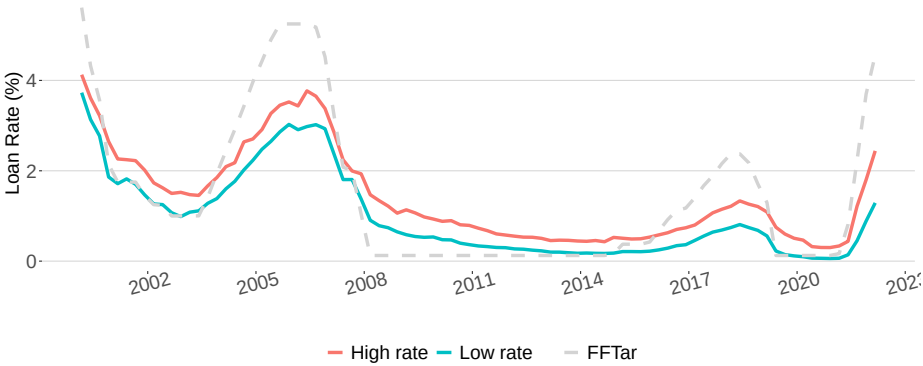
Interest expense diverges in last two rate hiking cycles



Interest Expense for High and Low Rate Banks (Top 100)

Back

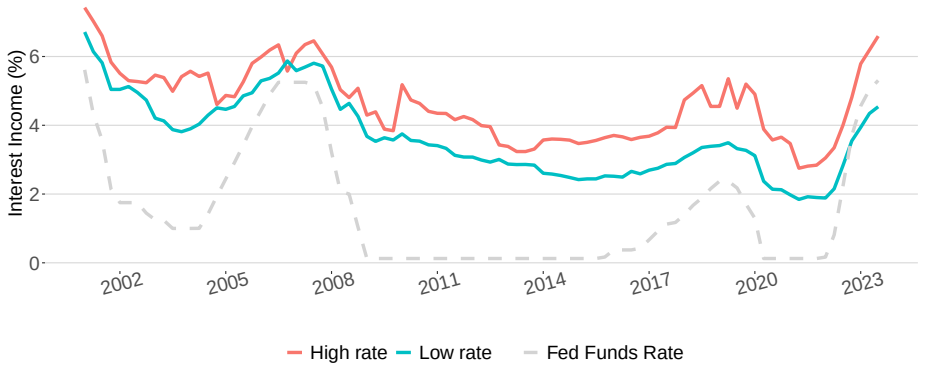
Interest expense diverges in last two rate hiking cycles



Interest Income for High and Low Rate Banks

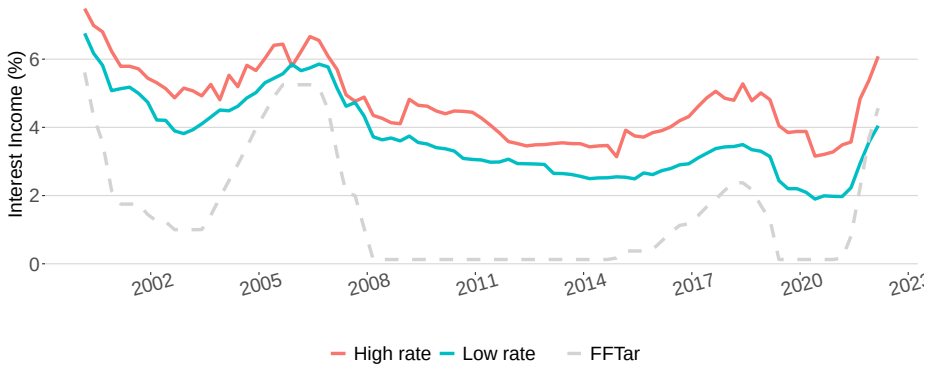
Back

Interest income diverges in last two rate hiking cycles



Interest Income for High and Low Rate Banks (Top 100) ▸ Back

Interest income diverges in last two rate hiking cycles



Net Interest Margin for High and Low Rate Banks (Top 100)

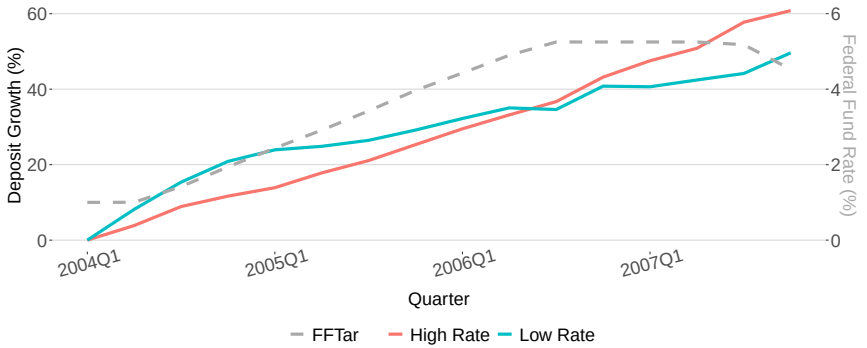
Back

Monetary Policy Transmission for High and Low Rate Banks (Top 100)

Back

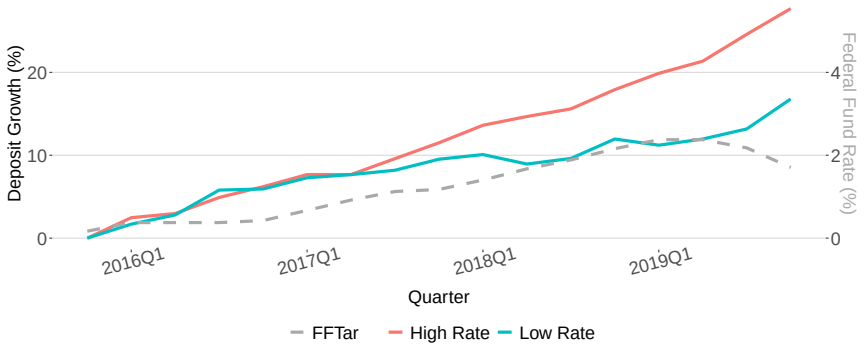
	ΔDep. Rate	ΔInterest Expense	ΔInterest Income	ΔNIM
	(1)	(2)	(3)	(4)
ΔFFTar×1(High Rate)×Post	0.476***	0.196***	0.077	-0.081**
	(0.092)	(0.055)	(0.057)	(0.038)
ΔFFTar×1(High Rate)	-0.017	-0.064	-0.038	0.010
	(0.066)	(0.041)	(0.054)	(0.032)
ΔFFTar	0.597***	0.472***	0.418***	-0.034
	(0.053)	(0.032)	(0.046)	(0.030)
ΔFFTar×Post	-0.453***	-0.180***	0.086	0.241***
	(0.098)	(0.043)	(0.056)	(0.038)
1(High Rate)×Post	-0.009	-0.007	0.030	0.041
	(0.032)	(0.022)	(0.033)	(0.025)
1(High Rate)	-0.012	-0.004	-0.037	-0.038
	(0.028)	(0.021)	(0.032)	(0.024)
Post	-0.061	-0.011	-0.020	-0.014
	(0.050)	(0.024)	(0.032)	(0.017)
$ROA_{i,q-1}$	0.028**	0.012**	-0.000	-0.010
	(0.014)	(0.006)	(0.010)	(0.008)
$Tier1_{i,q-1}$	-0.022**	-0.009	-0.023*	-0.011
	(0.011)	(0.007)	(0.014)	(0.010)
Constant	0.019	-0.011	-0.005	0.005
	(0.045)	(0.023)	(0.030)	(0.017)
Adjusted R^2	0.562	0.548	0.294	0.073
Observations	6455	8436	8436	8436
Mean of Dep. Variable	-0.024	-0.011	-0.021	-0.011

Deposit Growth: 2004Q1-2007Q4 (Top 100) Back



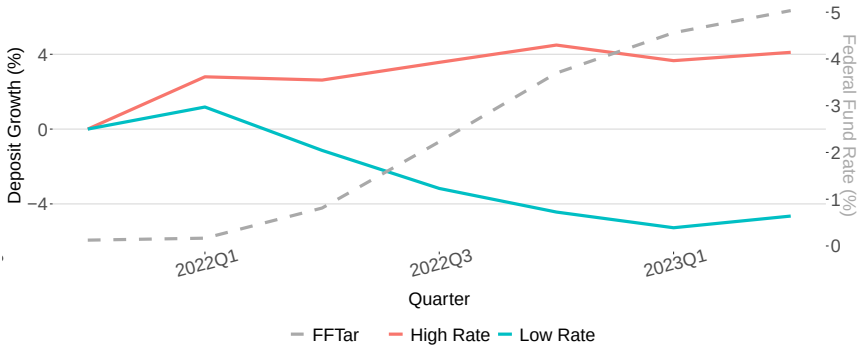
- Deposit growth between high and low rate banks exhibit similar growth rates

Deposit Growth: 2015Q4-2019Q4 (Top 100) Back



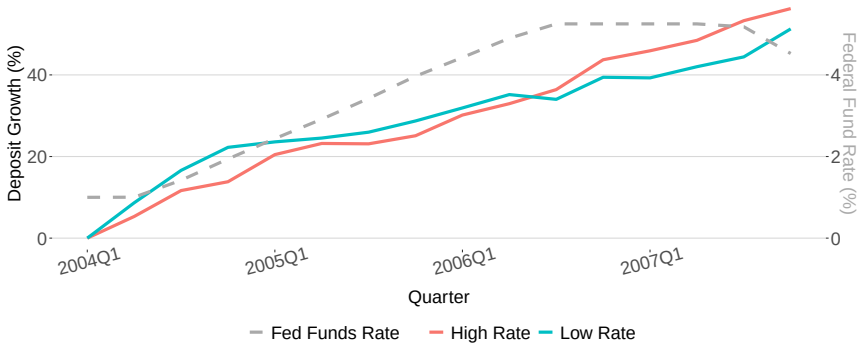
- Deposit growth between high and low rate banks exhibits divergence from 2018Q1

Deposit Growth: 2021Q4-2023Q2 (Top 100) Back



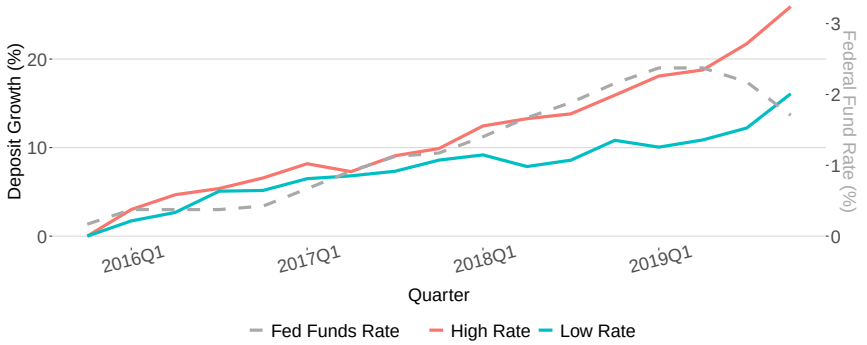
- Deposit growth between high and low rate banks exhibits divergence from 2022Q1

Deposit Growth: 2004Q1-2007Q4



- Deposit growth between high and low rate banks exhibit similar growth rates

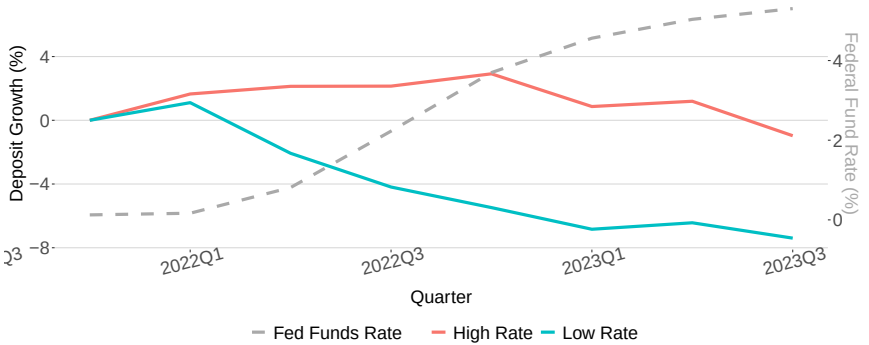
Deposit Growth: 2015Q4-2019Q4



- Deposit growth between high and low rate banks exhibits divergence from 2018Q1

Deposit Growth: 2021Q4-2023Q2

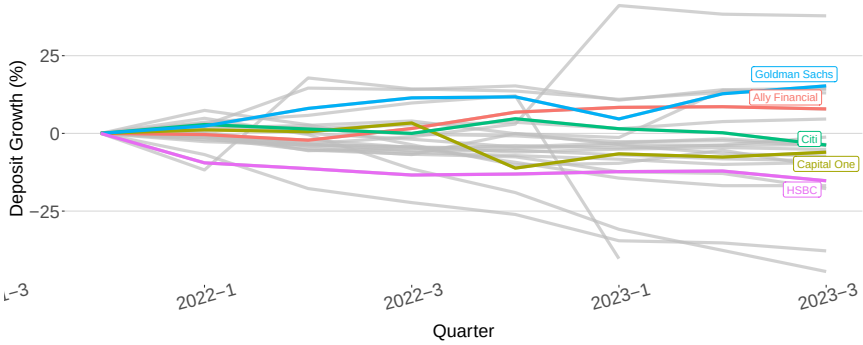
Back



- Deposit growth between high and low rate banks exhibits divergence from 2022Q1

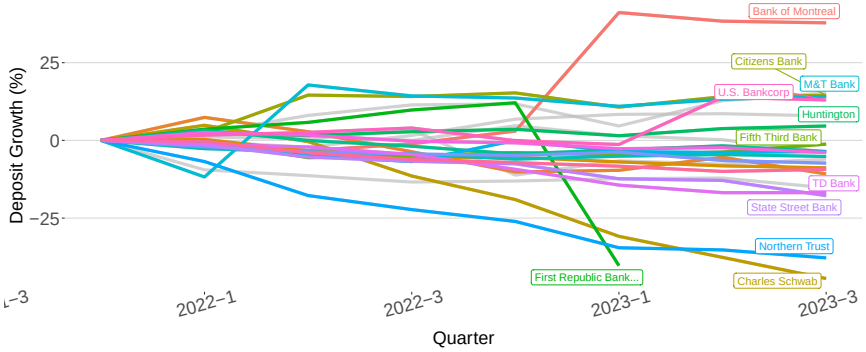
Deposit Growth for High Rate Banks: 2021Q4-2023Q2

Back



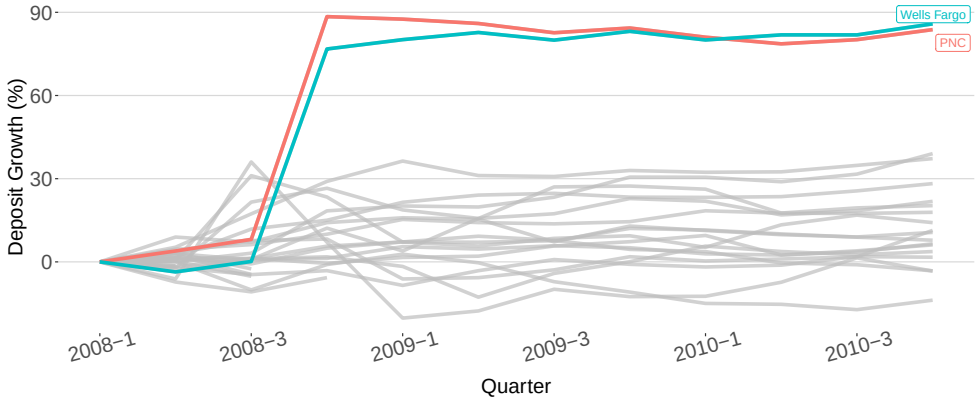
Deposit Growth for Low Rate Banks: 2021Q4-2023Q2

Back



Deposit Growth Before 2010: 2008Q1-2010Q4

Back



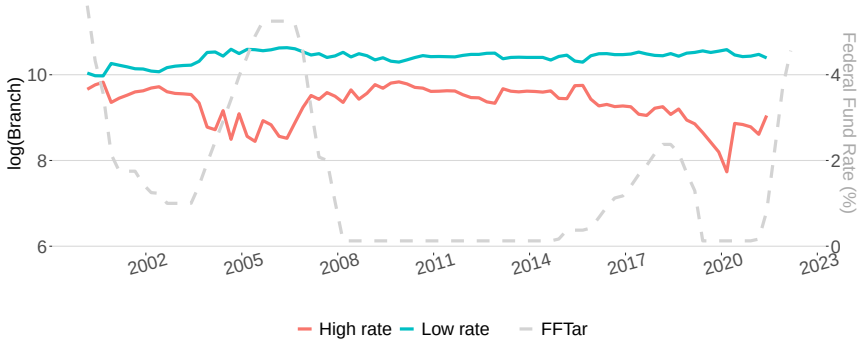
Two major jumps in deposit growth are due to M&A: Wells Fargo acquired Wachovia on October 3, 2008, and PNC acquired National City Bank on October 24, 2008.

Growth in Deposits and Loans (Top 100) Back

	ΔDeposit$_{i,y}$		ΔPersonal Loan$_{i,y}$		ΔC&I Loan$_{i,y}$		ΔReal Estate Loan$_{i,y}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFFTar$_y \times \mathbb{1}$(High Rate)$\times$Post	6.080***	6.287***	9.022**	9.747**	3.014	2.819	2.848	4.191
	(2.028)	(2.335)	(3.840)	(4.185)	(2.751)	(3.010)	(2.675)	(3.511)
ΔFFTar$_y \times \mathbb{1}$(High Rate)	-3.193**	-2.999*	-7.483**	-7.767**	-0.372	0.446	-2.214	-2.299
	(1.496)	(1.589)	(3.364)	(3.569)	(1.524)	(1.626)	(1.430)	(1.530)
ΔFFTar$_y \times$Post	-7.069***		-2.638		-3.865		-5.514**	0.000
	(1.497)		(1.854)		(2.782)		(2.344)	
$\mathbb{1}$(High Rate)$\times$Post	-9.714**	-10.064**	30.919***	30.443***	-4.768	-8.132**	-11.715**	-11.970**
	(4.180)	(4.120)	(6.705)	(7.013)	(3.588)	(3.744)	(4.698)	(4.915)
$\mathbb{1}$(High Rate)	9.767***	10.953***	-25.312***	-25.053***	5.864**	8.852***	15.217***	16.139***
	(3.771)	(3.726)	(6.455)	(6.794)	(2.719)	(2.778)	(3.158)	(3.301)
Post	-8.383***		-23.133***		-10.767		-24.435***	0.000
	(2.888)		(3.761)		(6.932)		(3.508)	
ROA$_{i,q-1}$	-0.217	0.895	-0.013	1.723	0.883	2.111**	1.634	4.735***
	(1.061)	(1.361)	(0.809)	(1.318)	(1.363)	(0.862)	(1.087)	(1.474)
Tier1$_{i,q-1}$	-0.008	-0.004	0.003	-0.004	-0.038**	-0.036**	0.022	0.017
	(0.013)	(0.010)	(0.015)	(0.014)	(0.017)	(0.015)	(0.027)	(0.023)
ΔFFTar$_y \times \mathbb{1}$(High Rate)$\times$Crisis	4.494***	34.720***	35.649***	49.032***	31.821***	36.805***	42.690***	67.609***
	(1.577)	(1.489)	(3.476)	(4.023)	(4.123)	(2.139)	(1.976)	(1.982)
Quarter FE		✓		✓		✓		✓
Adjusted R^2	0.079	0.016	0.036	0.019	0.027	0.011	0.090	0.016
Observations	8876	8876	8700	8700	8412	8412	8619	8619
Mean of Dep. Variable	20.019	20.019	13.254	13.254	13.906	13.906	14.334	14.334

Growth of Branches (Top 100) Back

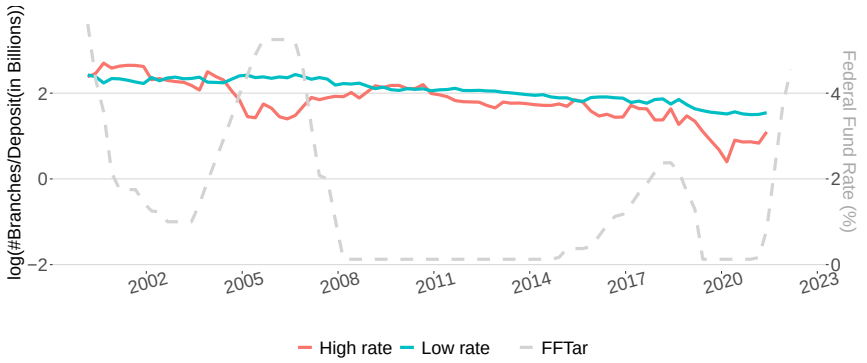
High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors



- High rate banks report decline in the number of branches

Ratio of Branches to Deposits: $\log \frac{\#Branches}{Deposits}$ (Top 100) Back

High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors



- Branch-deposit ratio has declined markedly for high rate banks

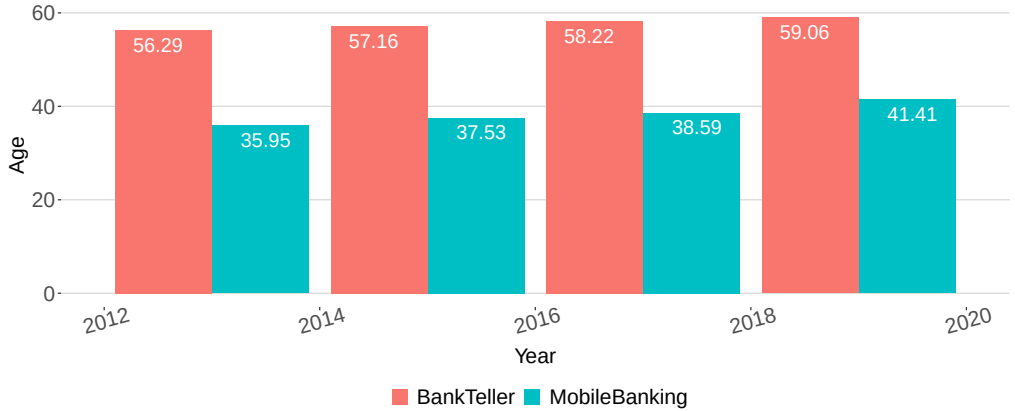
Branch-weighted County Median Age (Top 100) Back

High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors

- Average depositor age at high rate banks is strictly lower than the average depositor age at low rate banks

Age of Households Using Branches vs. Mobile Banking

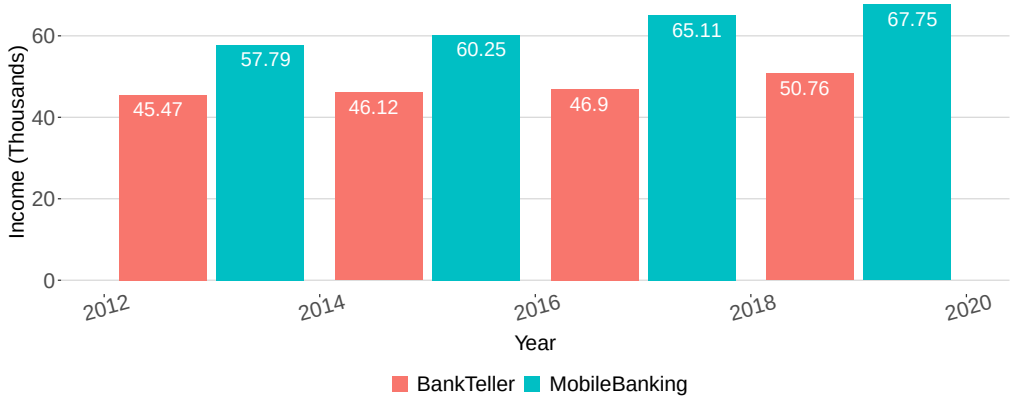
Back



Households using mobile banking are younger

Income of Households Using Branches vs. Mobile Banking

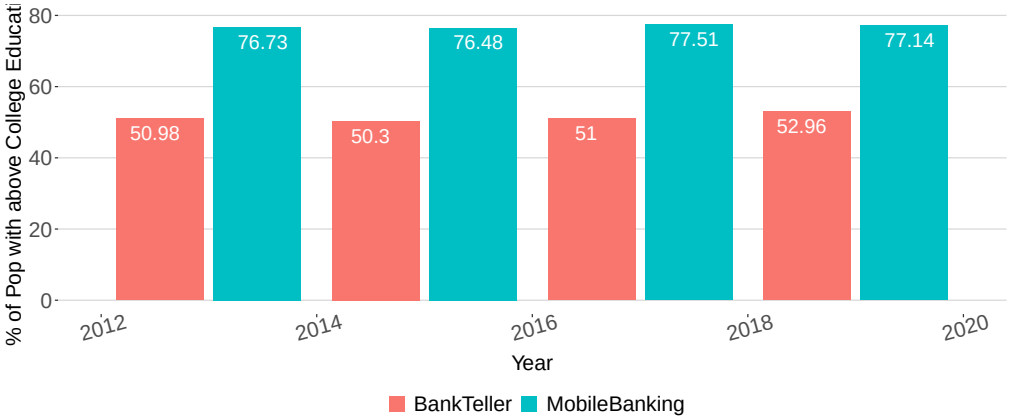
Back



Households using mobile banking have higher income

Education of Households Using Branches vs. Mobile Banking

Back

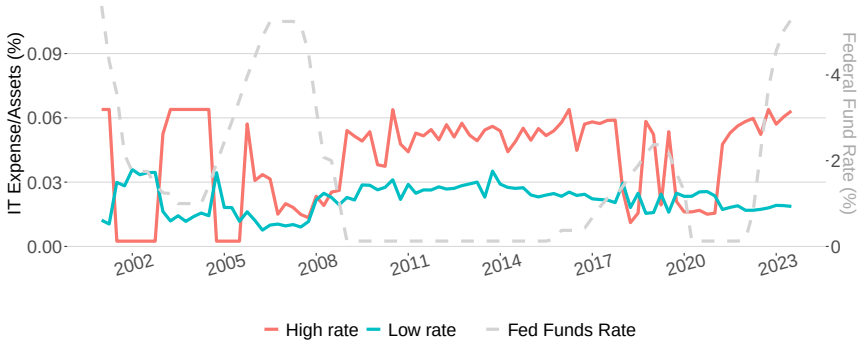


Households using mobile banking are better educated

High (Low) Rate Banks Spend More (Less) on IT

Back

High rate banks report higher data processing and telecom expenses than low rate banks



- High rate banks spend more on IT than low rate banks

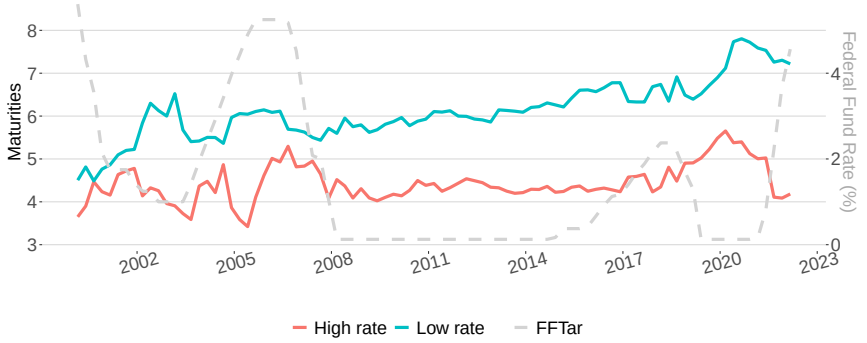
Bank Branches (Top 100) Back

	log(# Branches)		log(Branches/Deposit)		Customer Age	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}$(High Rate)×Post	-1.011***	-1.492***	-0.593**	-0.693***	-0.303***	-0.174**
	(0.197)	(0.228)	(0.248)	(0.254)	(0.078)	(0.071)
$\mathbb{1}$(High Rate)	-0.966***	-0.643***	-0.432*	-0.473**	-0.235***	-0.195***
	(0.083)	(0.139)	(0.224)	(0.223)	(0.039)	(0.040)
Post			-0.966***		1.857***	
			(0.122)		(0.214)	
$ROA_{i,q-1}$	-0.266***	-0.256***	-0.235***	-0.203***	-0.011	-0.185***
	(0.043)	(0.053)	(0.049)	(0.055)	(0.092)	(0.043)
$Tier1_{i,q-1}$	0.644***	0.668***	0.040	-0.054	-0.349***	-0.199***
	(0.084)	(0.077)	(0.038)	(0.035)	(0.047)	(0.025)
Constant	7.044***		2.128***		37.443***	
	(0.071)		(0.102)		(0.133)	
Quarter FE	✓	✓		✓		✓
Adjusted R^2	0.208	0.214	0.126	0.075	0.356	0.050
Observations	7292	7292	7292	7292	7292	7292
Mean of Dep. Variable	6.709	6.709	0.934	0.934	38.474	38.474

High (Low) Rate Banks Have Low (High) Duration: Maturity (Top 100)

Back

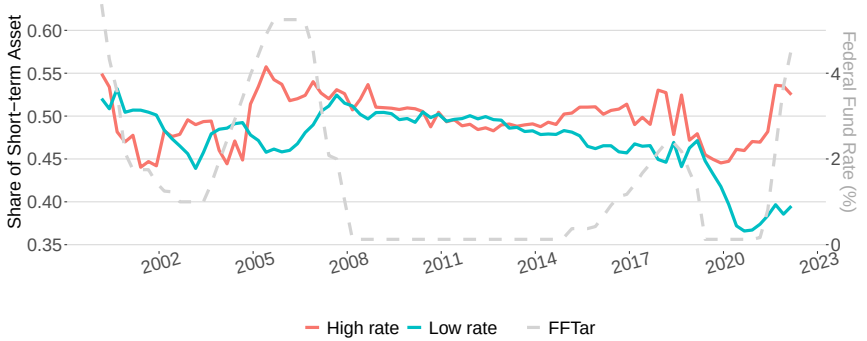
High rate banks attract flighty deposits and are therefore prone to sudden deposit outflows when interest rates increase



- High rate banks hold shorter maturity assets to meet withdrawal demands

High (Low) Rate Banks Have Low (High) Duration: Short-Term Assets (Top 100) ▸ Back

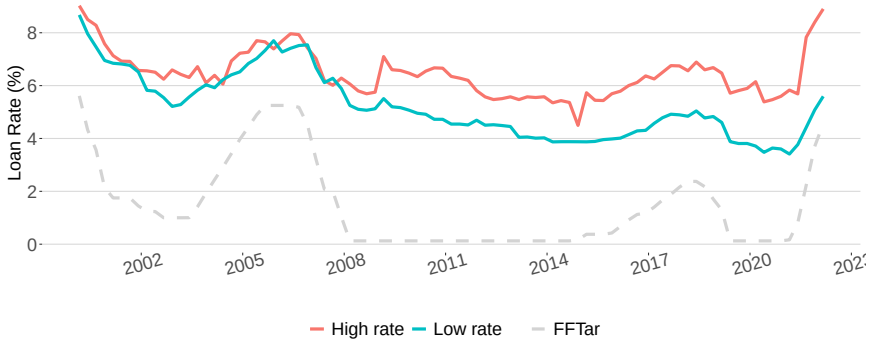
High rate banks attract flighty deposits and are therefore prone to sudden deposit outflows when interest rates increase



- High rate banks hold more short-term assets to meet withdrawal demands

High (Low) Rate Banks Have High (Low) Credit Risk: Loan Rates (Top 100) Back

High rate banks earn a spread from riskier lending, rather than capturing a term premium



- High rate banks earn a spread from riskier lending

High (Low) Rate Banks Have High (Low) Credit Risk: Credit Spread (Top 100) Back

High rate banks earn a spread from riskier lending, rather than capturing a term premium

- High rate banks earn a spread from riskier lending

High (Low) Rate Banks Have High (Low) Credit Risk: Charge-off Rate (Top 100) Back

High rate banks earn a spread from riskier lending, rather than capturing a term premium

- High rate banks earn a spread from riskier lending

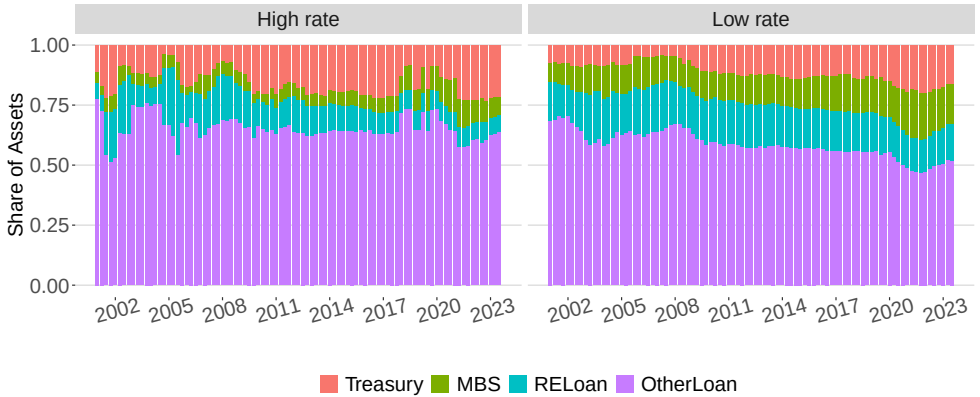
Duration Risk (Top 100) Back

	Maturities (years)	Short-term share (%)
	(1)	(2)
$\mathbb{1}$(High Rate)×Post	-0.723***	2.182
	(0.235)	(1.774)
$\mathbb{1}$(High Rate)	-1.362***	3.026**
	(0.223)	(1.348)
Quarter FE + Controls	✓	✓
Observations	7555	7555
Mean of Dep. Variable	5.740	47.728

- High rate banks hold loans and securities with lower average maturity and higher share of short-term assets after 2009

Portfolio Composition: Share of Assets

Back

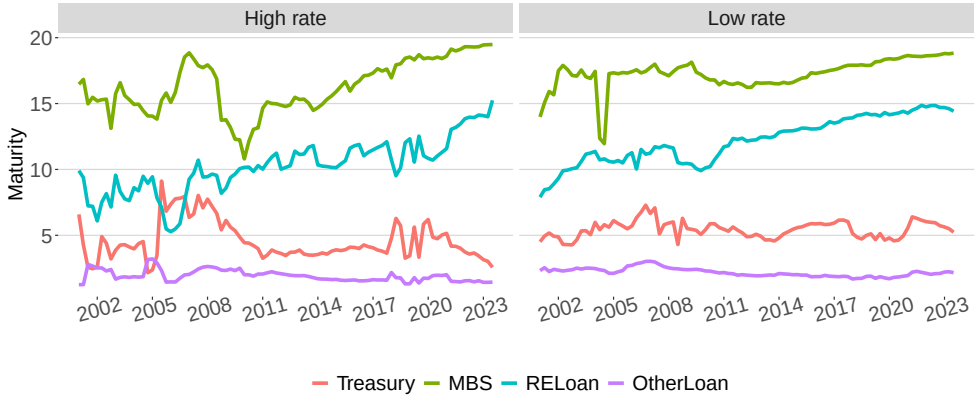


- Low rate banks maintain a significantly larger share of MBSs and real estate loans; high rate banks invest only half as much in these, instead, opting for other loans and treasuries

Other Loans

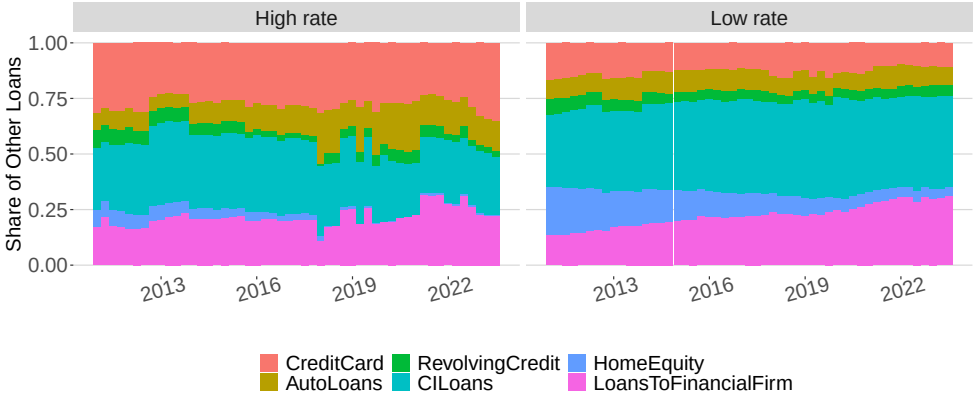
Portfolio Composition: Maturity of Assets

Back



- Generally, high rate banks maintain shorter-maturity real estate loans, other loans, and treasuries

Share of Non-Real Estate Loans (Top 25 Banks) Back



- High rate banks conduct over 2.5 times the volume of credit card lending compared to low rate banks

How do Banks Adjust Asset Maturity? (Top 100)

Back

The average maturity of banks' loans and securities is determined by two factors: maturity associated with each asset class and banks' share by asset class.

Maturity by Asset Class (Top 100)

	Real Estate Loans	Other Loans	MBSs	Treasuries
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	-0.963***	0.230	-1.583***	-0.781
	(0.316)	(0.142)	(0.526)	(0.578)
$\mathbb{1}$(High Rate)	-1.086***	-0.311**	0.483	-0.574
	(0.243)	(0.131)	(0.520)	(0.503)
Quarter FE + Controls	✓	✓	✓	✓
Observations	7189	7505	7349	7350
Mean of Dep. Variable	11.790	2.075	16.519	5.989

- High rate banks shorten the maturities of their assets, particularly their real-estate based loans and securities and treasury securities after 2009

Maturity by Asset Class

Back

	Real Estate Loans	Other Loans	MBSs	Treasuries
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	0.059	0.120	-0.958**	-1.795***
	(0.280)	(0.175)	(0.398)	(0.587)
$\mathbb{1}$(High Rate)	-1.764***	-0.599***	1.464***	-0.119
	(0.236)	(0.163)	(0.315)	(0.546)
Quarter FE + Controls	✓	✓	✓	✓
Adjusted R^2	0.073	0.106	0.095	0.055
Observations	2,074	2,178	2,091	2,139
Mean of Dep. Variable	12.255	1.944	17.161	5.982

- High rate banks hold MBS with an additional 6% shorter maturity and treasuries with 30% shorter maturities after 2009

Share by Asset Class

Back

	Real Estate Loans	Other Loans	MBSs	Treasuries
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	-2.214	4.378**	-1.015	-1.149
	(2.001)	(1.931)	(0.650)	(1.995)
$\mathbb{1}$(High Rate)	-3.385*	5.525***	-6.759***	4.619**
	(1.971)	(1.791)	(0.695)	(1.886)
Quarter FE + Controls	✓	✓	✓	✓
Adjusted R^2	0.111	0.093	0.142	0.032
Observations	2,178	2,178	2,178	2,178
Mean of Dep. Variable	15.092	57.634	12.340	14.933

- Share of other loans held in high rate banks increases by an additional 8% after 2009

Duration Risk by Asset Class: Share by Asset Class (%) (Top 100)

Back

The average maturity of banks' loans and securities is determined by two factors: maturity associated with each asset class and banks' share by asset class.

	Real Estate Loans	Other Loans	MBSs	Treasuries
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	-1.398	5.835***	-1.114	-3.323**
	(1.142)	(1.536)	(0.705)	(1.391)
$\mathbb{1}$(High Rate)	-2.469**	3.220***	-5.280***	4.529***
	(1.079)	(1.216)	(0.631)	(1.172)
Quarter FE + Controls	✓	✓	✓	✓
Observations	7555	7555	7555	7555
Mean of Dep. Variable	15.249	59.270	11.556	13.924

- Difference in the maturity of loans and securities is driven by reallocation of banks' assets across asset classes

Credit Risk: Loans and Securities

Back

	Loan Rate	Credit Spread	Charge-offs
	(1)	(2)	(3)
$\mathbb{1}$(High Rate)×Post	1.027***	1.011***	0.194**
	(0.126)	(0.162)	(0.075)
$\mathbb{1}$(High Rate)	0.581***	0.727***	0.245***
	(0.096)	(0.143)	(0.069)
Quarter FE + Controls	✓	✓	✓
Observations	8440	7505	8440
Mean of Dep. Variable	5.294	3.527	0.855

- High rate lending is associated with higher loan rates, higher credit spread, and higher charge-off rate after 2009

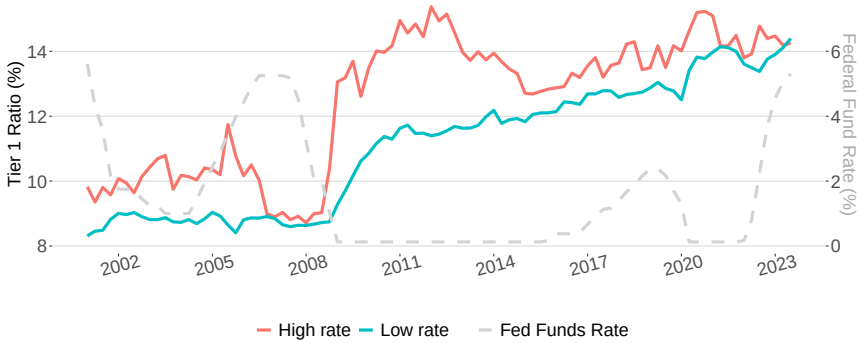
Credit Risk: Charge-off Rates by Asset Class

Back

	Real Estate Loans	C&I Loans	Personal Loans	Other Loans
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)×Post	0.035	0.353***	0.214	0.076
	(0.046)	(0.078)	(0.157)	(0.055)
$\mathbb{1}$(High Rate)	0.089**	-0.034	0.218	-0.051
	(0.035)	(0.065)	(0.135)	(0.039)
Quarter FE + Controls	✓	✓	✓	✓
Adjusted R^2	0.036	0.025	0.023	0.001
Observations	8259	8100	8334	7923
Mean of Dep. Variable	0.439	0.650	2.199	0.251

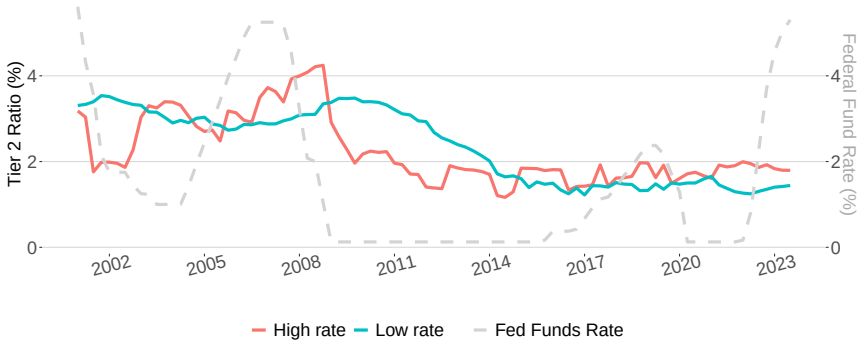
- High rate banks report higher charge-off rate on personal and C&I loans

Macro Implication #3: No Divergence in Tier 1 Back



- Regulatory framework has implications for assessing systemic risk
- Lack of divergence in capital ratios between bank types $\Rightarrow$ current regulation may not capture risk divergence within the banking sector

Macro Implication #3: No Divergence in Tier 2 ▸ Back



- Regulatory framework has implications for assessing systemic risk
- Lack of divergence in capital ratios between bank types ⇒ current regulation may not capture risk divergence within the banking sector