Diverging Banking Sector: New Facts and Macro Implications

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Savings Deposit Rates: 04/2024 (BankRate)

Financial institution	APY	Minimum opening balance
Marcus by Goldman Sachs	4.50%	$0
Citi Bank	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

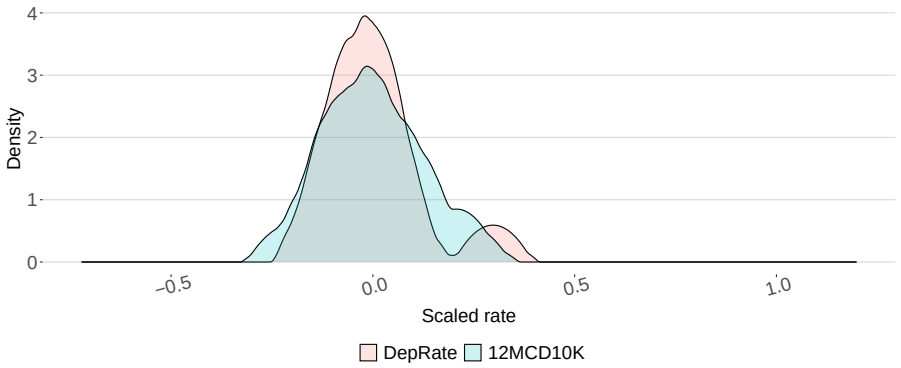
1. Two types: **high rate** and **low rate**
2. Large spread: 4.5%
3. Applies more broadly than savings accounts

Singapore Banks

First $100,000 savings:

Financial institution	APY
OCBD	7.65%
Citi	7.51%
UOB	5.00%
Standard Chartered	3.45%
DBS	0.05%
HSBC	0.05%

Heterogeneity is *NEW*: Deposit Rates, Top 25 Banks in 2007 ▸ All Banks



- Rate is scaled by Fed Funds rate and demeaned
- Federal fund rate = 5.25% and mean of DepRate (CD rate) is 3.3% (4.1%)

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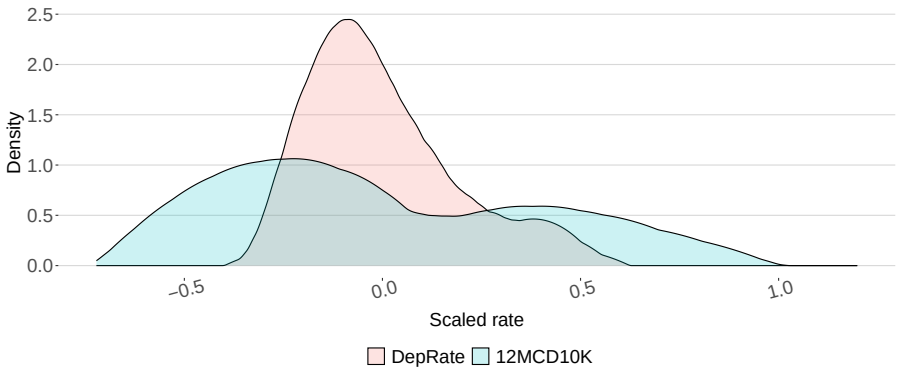

- Federal funds rate= 5.25% and mean of DepRate (CD rate) is 1.7% (1.5%)

Emergence of Two Business Models in Banking

1. **Growing Divergence within Banking Sector (Among Large Banks)**

High Rate Banks (Citi, GS)

- Fewer # of branches
- Shorter-maturity loans
- Higher lending spread and risk-taking

Low Rate Banks (BOA, Chase)

- Higher # of branches
- Longer-maturity securities
- Lower lending spread and safer assets

$\Longrightarrow$ ***High rate banks take credit risk, low rate do maturity transformation***

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2. **Macro Implications:** (1) Monetary policy transmission; (2) Banking sector's risk-maturity profile
3. **Explanation:** Emergence of e-banking services allows banks to provide services without branches $\Rightarrow$ impacts asset-liability management

Contribution to Literature

1. Variation in deposit distribution affects transmission of monetary policy
   - Monetary policy transmission through banking sector: e.g., Bernanke and Blinder, 1988; Kashyap and Stein 1994; Bolton and Freixas 2000; Van den Heuvel et al., 2002; Drechsler, Savov and Schnabl 2017, ...
   - Through FinTechs: Erel, Liebersohn, Yannelis, and Earnest 2023; Koont, Santos and Zingales 2023, ...
2. Distribution of deposit rates *across* banks
   - Deposit rates within and across banks: e.g., Radecki 1998; Granja and Paixao 2021; d'Avernas, Eisfeldt, Huang, Stanton and Wallace 2023; Iyer, Kundu and Paltalidis 2023
3. Impact of digitization on banks' business models
   - Online banks and deposit rates e.g., Jiang, Yu, and Zhang 2022; Koont 2023
4. Stability of banks in recent era
   - Fragility of banks: e.g., Drechsler, Savov and Schnabl 2021; Haddad, Hartman-Glaser and Muir 2023, ...

Outline

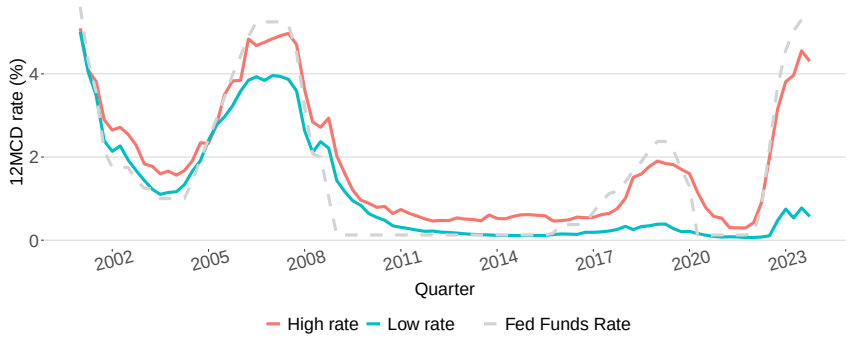
Facts: Diverging Banking Sector

Generalized Classification of High and Low Rate Banks

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

▸ Top 25 ▸ Top 100

Fact #1: Divergence in Deposit Rate-Setting Behavior



- Deposit rates diverge in the last two rate hiking cycles
- Low rate become very insensitive to Fed funds, gap now widens when FF ↑

▸ Top 100

Summary Statistics: How else do these banks differ?

High vs. Low rate Banks Comparison

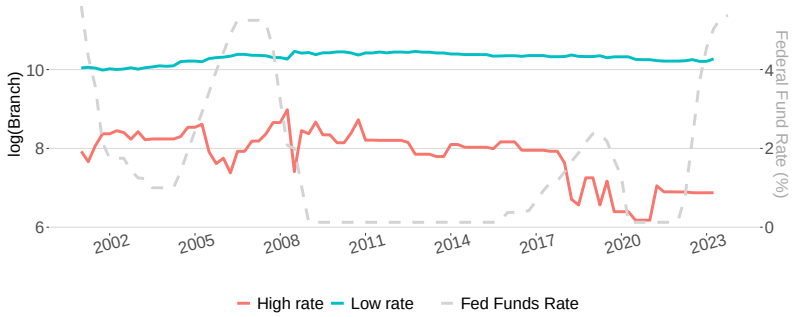
	2001-2008			2017-2023		
	High	Low	Diff	High	Low	Diff
CD (%)	3.28	2.70	0.58***	1.46	0.26	1.20***
# of Branches	870	2,459	-1,589***	415	3,293	-2,879***
NIM rate (%)	2.99	2.92	0.07	3.08	2.35	0.73***
Charge-off Rate (%)	0.86	0.67	0.19	0.86	0.24	0.61***
Maturity (Years)	4.07	5.63	-1.55***	4.29	6.94	-2.66***

- # Branches and Branch-deposit ratio during 2001-2008 predict bank type
- Low rate banks hold safer but longer-maturity assets (e.g., MBSs)

Diverging Branches

Fact #2: 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



- 63% decline in the number of high rate bank branches ▸ 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)
Controls + 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

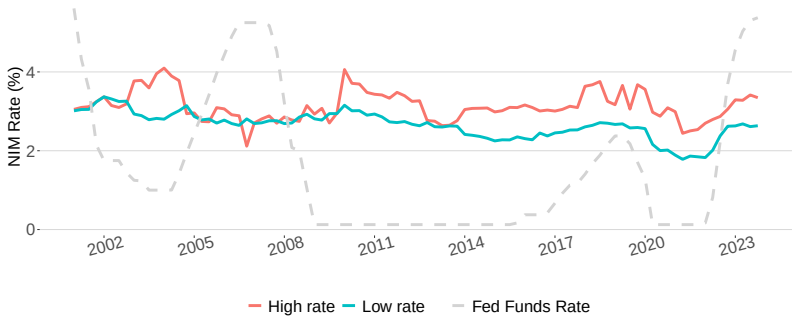
- 37% decline in branches-deposits ratio for high rate banks in post period

▸ Top 100 Banks

Diverging Asset Management: NIM

Fact #3: Divergence in NIM ▸ NIM (Top 100)

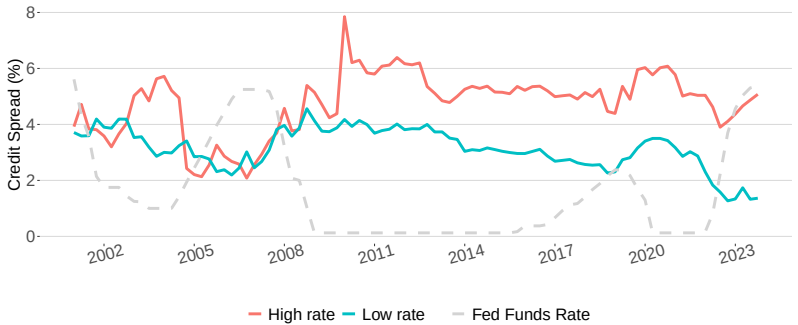
- High deposit rate hurts NIM... but high rate banks' NIM rates even slightly increase – they maintain a roughly 50 basis-point advantage!
- Strategies to achieve higher interest income: More credit or liquidity risk? or More maturity risk?



Diverging Asset Management: Credit Risk

Fact #4A: Divergence in Credit Spreads

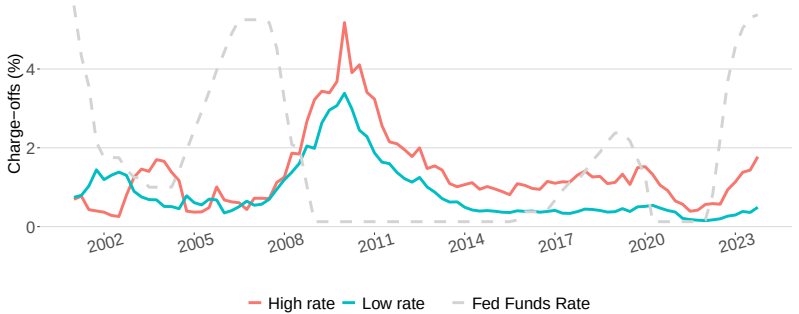
- Credit spread = Lending rate - Maturity-matched treasury yield



- High rate banks earn a spread from riskier lending – by the end of our sample, high rate banks charge loan spread of 5% compared to 1.5% 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 #4C: What Kind of Risky Loans?

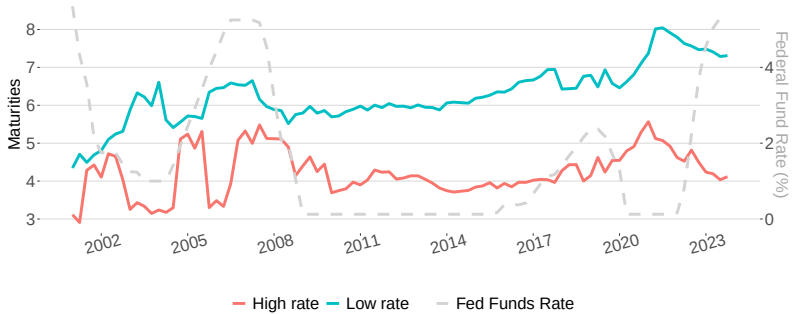
	Charge-offs Rate (%)			
	Real Estate Loans	C&I Loans	Personal Loans	Other Loans
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)$\times$Post	0.224**	0.209**	0.614***	0.062
	(0.089)	(0.086)	(0.185)	(0.067)
$\mathbb{1}$(High Rate)	0.049	0.049	0.570***	-0.050
	(0.050)	(0.067)	(0.168)	(0.058)
Controls + Quarter FE	✓	✓	✓	✓
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 assume higher credit risk in real estate loans, C&I loans, and personal loans

Diverging Asset Management: Maturity

Fact #5A: Divergence in Asset Maturity

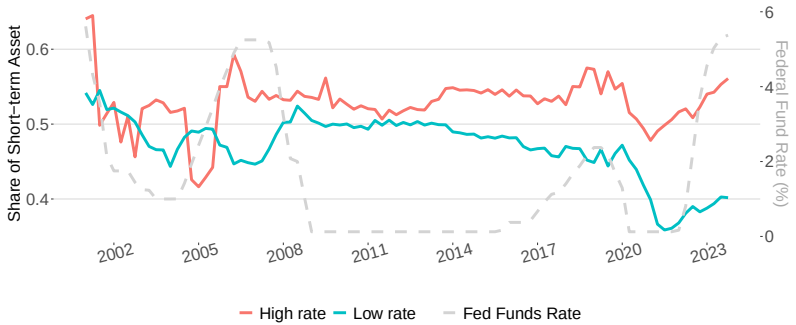
- High rate banks hold shorter-maturity assets, potentially hedge against interest rate risk



- Avg maturity of assets in low rate banks is 7.5 years compared to 4 years for high rate in 2023 ▸ 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 in 2023 ▸ Top 100

How to Achieve Diverged Credit Risk and Maturities?

	Share of Each Asset Class					
	Personal Loans	C&I loans	Real Estate	Other Loans	MBS	Other Securities
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}$(High Rate)×Post	7.449***	3.122**	-12.560***	3.244***	-3.083***	1.829
	(1.840)	(1.283)	(3.058)	(0.836)	(1.129)	(1.350)
$\mathbb{1}$(High Rate)	3.861**	-2.533*	3.274	-0.641	-7.121***	3.161**
	(1.695)	(1.284)	(3.124)	(0.813)	(1.112)	(1.242)
Controls + Quarter FE	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.234	0.032	0.076	0.042	0.160	0.052
Observations	2269	2269	2269	2269	2269	2269
Mean of Dep. Variable	13.395	15.118	29.950	11.445	16.888	13.204

- High rate banks: Personal, C&I and other loans (short-term but risky)
- Low rate banks: MBS and real estate (long-term but safe)

What Explains the Divergence?

- Technology allows banks to offer services w/o branches (Jiang, Yu, Zhang 2023)
  - Divergence in IT expenditure, operating branches, customer age

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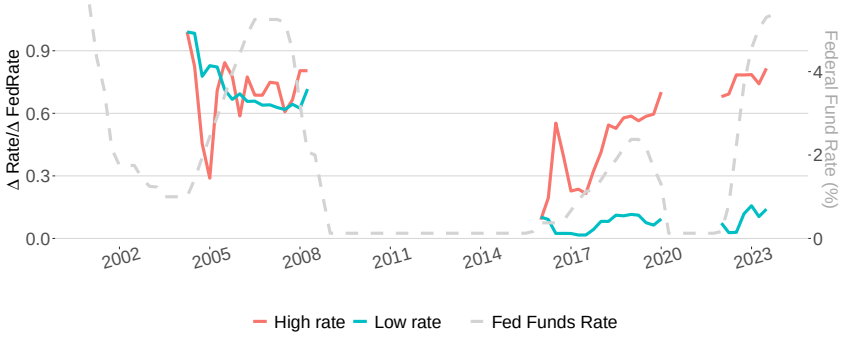
- Technology allows banks to offer services w/o branches (Jiang, Yu, Zhang 2023)
  - Divergence in IT expenditure, operating branches, customer age
- Regulation: Basel III and the Dodd-Frank Act imposed stricter capital requirements for large banks, especially for banks with more than $250 billion asset
  - Focus only on largest banks
  - No divergence in Tier 1/2 ratios
- QE purchase government backed securities from banks
  - No divergence in reserve holding ratio
- Banks shift to focus retail versus business customers
  - No divergence in insured deposit ratio
  - No divergence in non-interest rate expense, non-interest rate income

Macro Implications

Divergence in Deposit Rate Sensitivity to Fed Funds

- Deposit sensitivity diverges in the last two rate hiking cycles



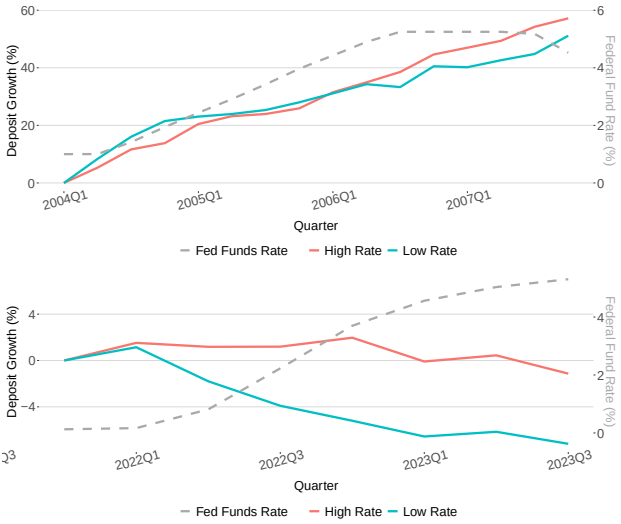
▸ Savings ▸ Call Reports

- After 2009: sensitivity of low rate banks: 0.14; high rate banks: 0.62

Divergence in Deposit Flows

- High rate banks attract more deposits after 2009

Divergence in Deposit Flows



- High rate banks attract more deposits after 2009

Macro Implication #1: Monetary Policy Transmission

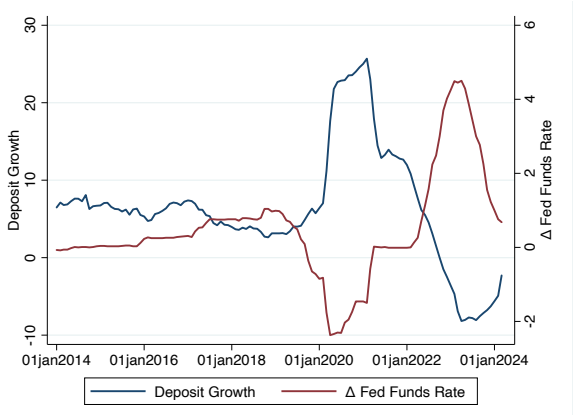
Top 100

	ΔPersonal Loan$_{i,y}$		ΔC&I Loan$_{i,y}$		ΔRE Loan$_{i,y}$	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔFed Funds$_y$ × 𝟙(High Rate) × Post	4.636*	5.379*	5.301**	3.470	0.079	0.626
	(2.727)	(2.829)	(2.587)	(2.612)	(2.548)	(2.841)
ΔFed Funds$_y$ × 𝟙(High Rate)	-3.468*	-3.996*	-3.464**	-1.657	-0.340	-0.769
	(2.024)	(2.156)	(1.652)	(1.812)	(1.421)	(1.414)
ΔFed Funds$_y$ × Post	-0.799		-1.992		-2.717	
	(1.102)		(2.094)		(1.947)	
ΔFed Funds$_y$	0.819		1.868		2.522**	
	(0.872)		(1.901)		(0.990)	
Controls	✓	✓	✓	✓	✓	✓
Quarter FE		✓		✓		✓
Mean of Dep. Variable	6.442	6.442	5.780	5.780	5.629	5.629

- After 2009, when Fed Funds rate increase by 100 bps
  - High rate banks: 1.2% ↑ personal loans, 1.7% ↑ C&I loans

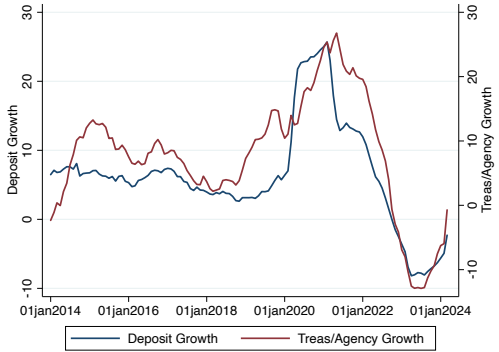
Explain the Absence of a Large Credit Crunch for Recent Rate Hikes

- Staring 2022, banks experience annual deposit outflows of over 8%, the largest in percentage terms since data began in 1973

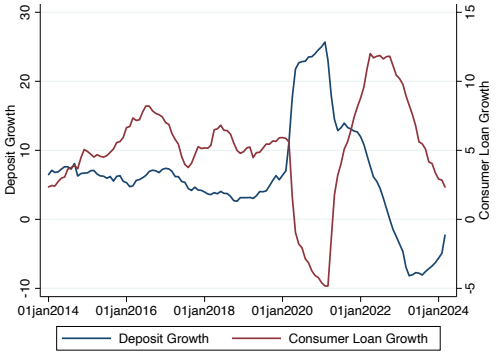


Explain the Absence of a Large Credit Crunch for Recent Rate Hikes

- However, we do not see a large credit crunch
- Because deposits flow out from low rate banks, which hold more securities



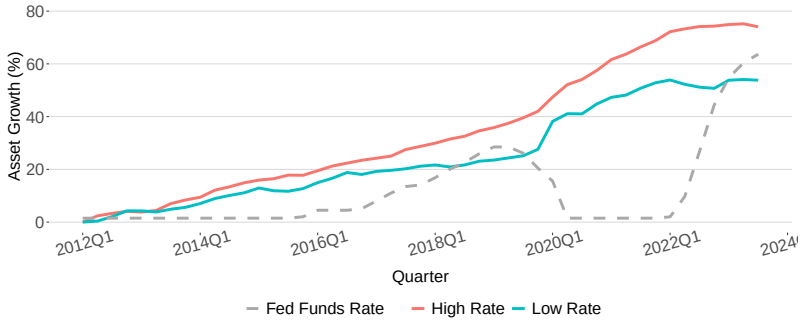
(a) Treasuries and MBS



(b) Consumber Loans

Macro Implication #2: Banking Sector's Origination Capacity

Top 100



- 10% deposits shift $\Rightarrow$ banking sector originates assets with 6% more shorter maturity but assumes about 20% higher credit risk

Simple Framework with e-banking

A Simple Framework—Before e-banking

- Salop model: two banks, continuum of identical depositors uniformly distributed on circle

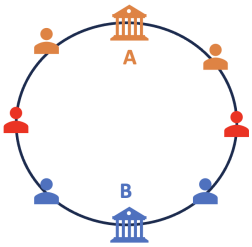
$$U_i(j) = \underbrace{r_j}_{\text{Dep. rate}} + \underbrace{\eta}_{\text{Utility from Branch}} \times \underbrace{(1/2 - d_{i,j})}_{\text{Distance to branch}} \mathbb{1}(Branch) \quad \forall j \in \{A, B\}$$

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

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

  - 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 gives bank local market power
- $r_A = r_B = f + \alpha - \eta$
- $l_A = l_B = \alpha - \frac{\eta}{2}$
- $prof_A = prof_B = \frac{\eta^2}{8} - \kappa$
- Homogeneous banking sector

A Simple Framework—with e-Banking Option

Assumptions:

1. e-Banking services do not rely on branches
2. Depositors like e-Banking

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

- Banks decide: 1) e-banking, 2) branch location, 3) deposit rate, 4) loan risk

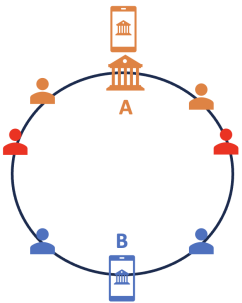
What is new market structure?

Nash Equilibrium

When cost of branch relatively large, new banking structure emerges endogenously

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

Divergent Banking Sector



- Both banks offer e-banking services
- High rate bank close branches
- $r_A < r_B$
- Deposits flow from Bank A to Bank B
- $l_A < l_B$: High rate banks take more credit risk
- If adding interest rate management, high rate banks hold shorter maturity

- Intuition on risk: deposit spread bank earns is almost risk free. When spread large, banks less inclined to make risky loans which expose them to default

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
   - **High rate banks do "real" banking businesses, while low rate banks are bond funds with interest rate risk**
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

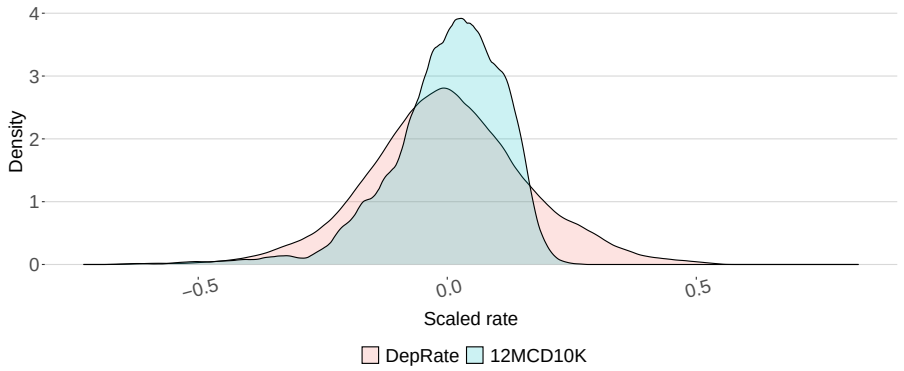


Figure 1: 2007Q3

Heterogeneity in Deposit Rates Among All Banks: 2019Q1

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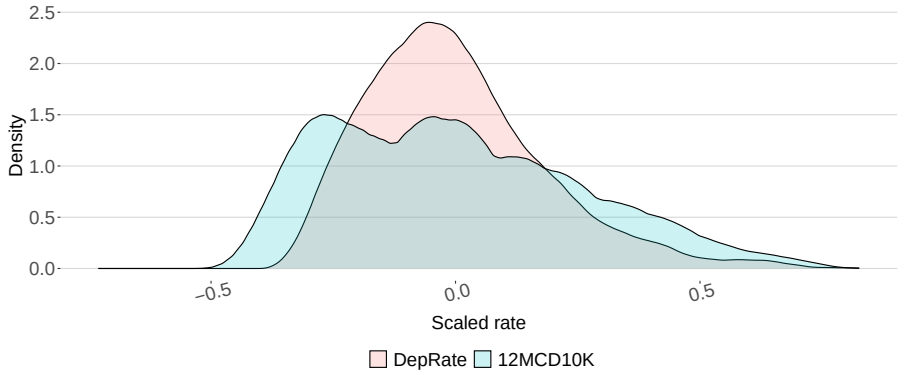

Figure 2: 2019Q1

Heterogeneity in Deposit Rates Among All Banks: 2023Q1

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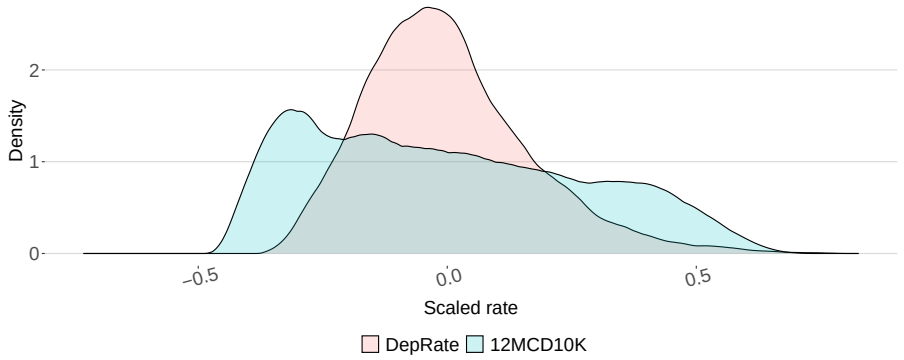
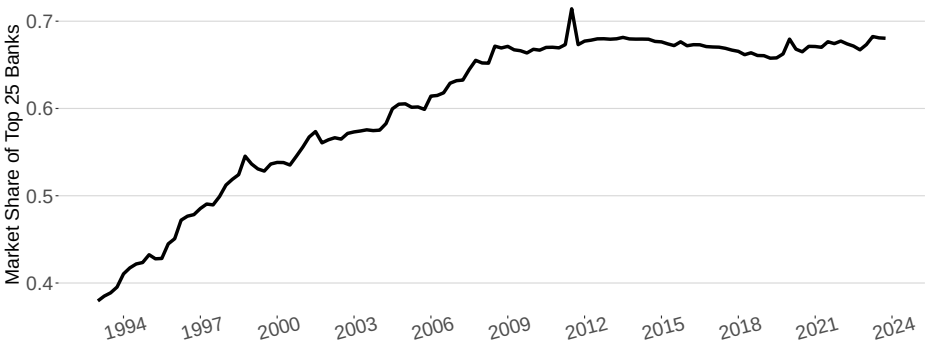


Figure 3: 2022Q4

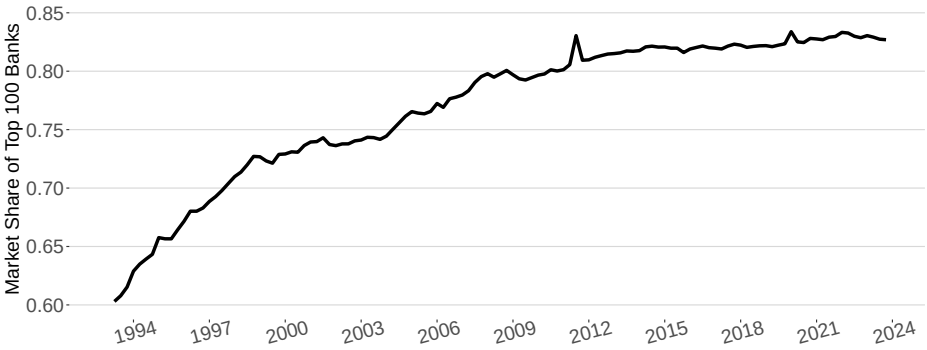
Market Share of Top 25 Banks

Back



Market Share of Top 100 Banks

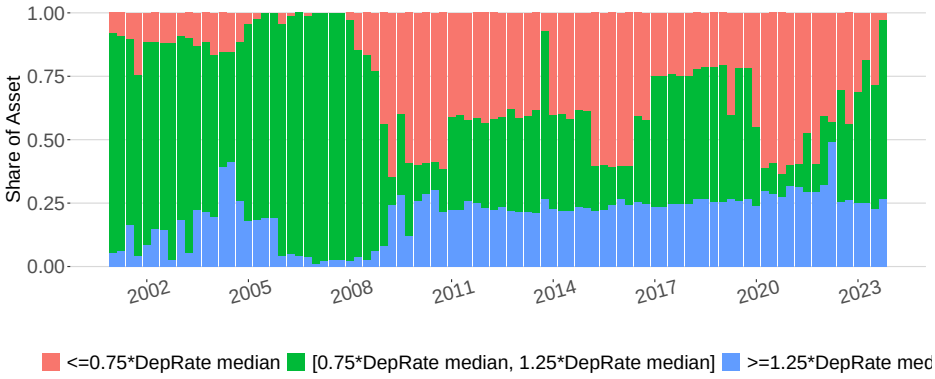
Back



Divergence in Deposit Rates: Call Reports Deposit Rate

Back

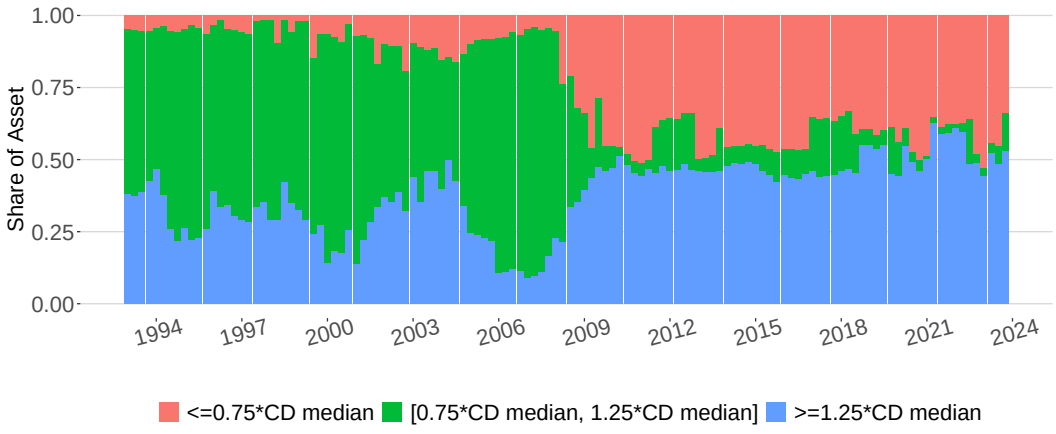
Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



Divergence in Deposit Rates: 12MCD10K (All Banks)

Back

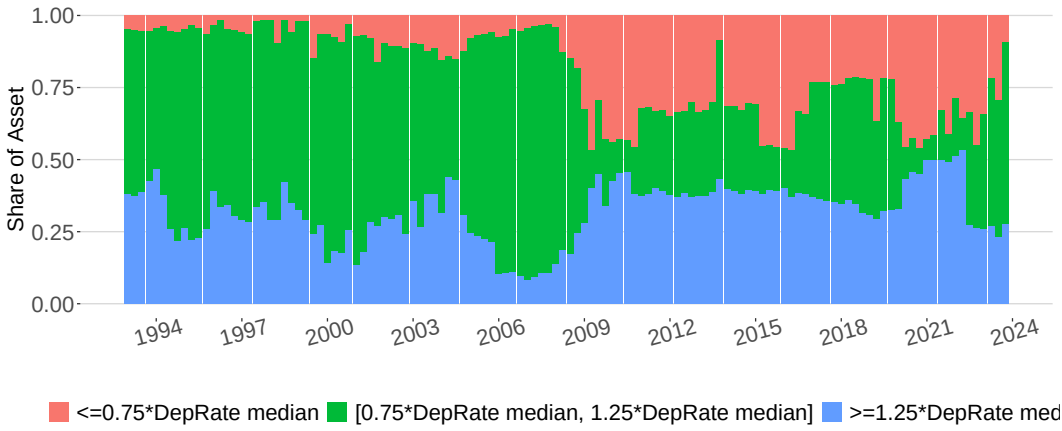
Banking sector exhibits significant secular divergence in deposit rates, weighted by bank assets



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

Back

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



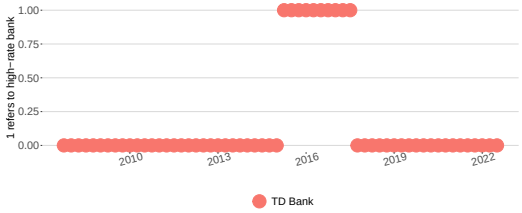
Classification of Banks

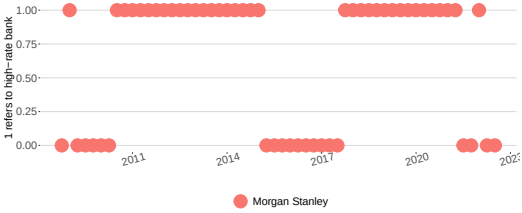
Back

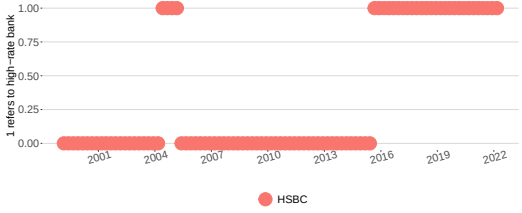
High rate banks	American Express, Ally Financial
Low rate banks	Charles Schwab, SVB, M&T Bank, JP Morgan, KeyBank, Huntington, PNC, Fifth Third Bank, BOA, State Street Bank, U.S. Bankcorp, Wells Fargo, Citizens Bank, Northern Trust, Bank of Montreal, Regions Financial, Bank of New York, First Republic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

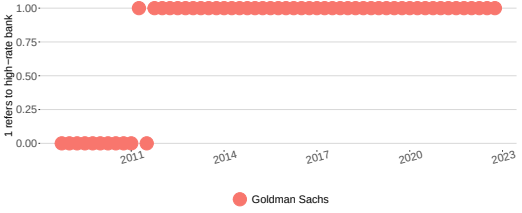
Shifts in Bank Classification: 1/2

Back



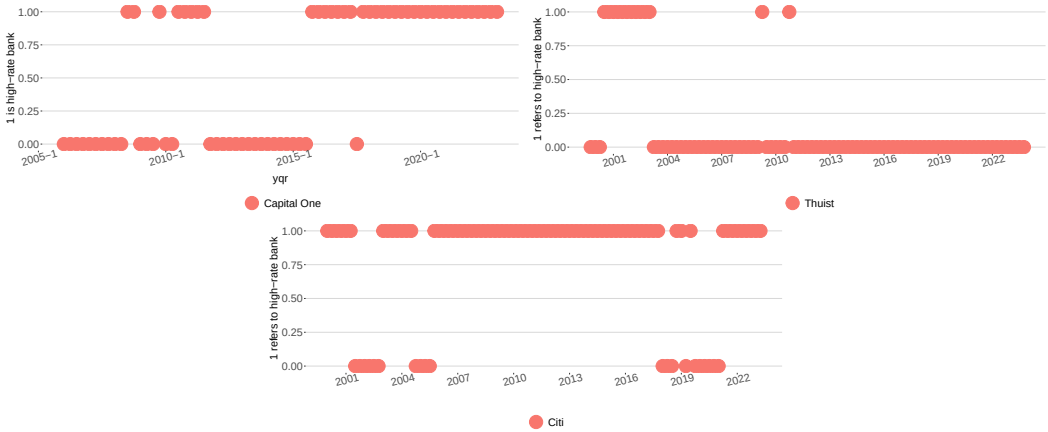






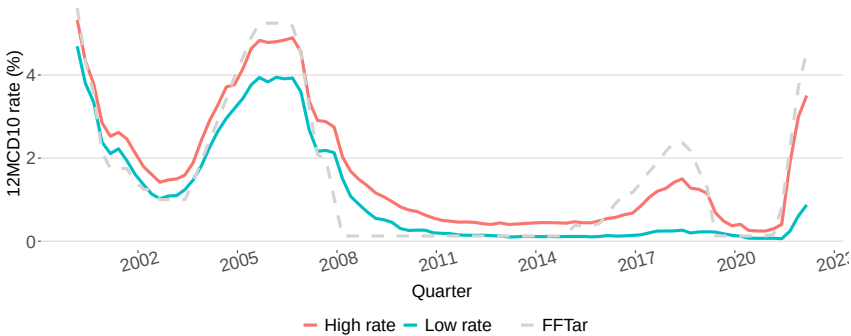
Shifts in Bank Classification: 2/2

Back



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

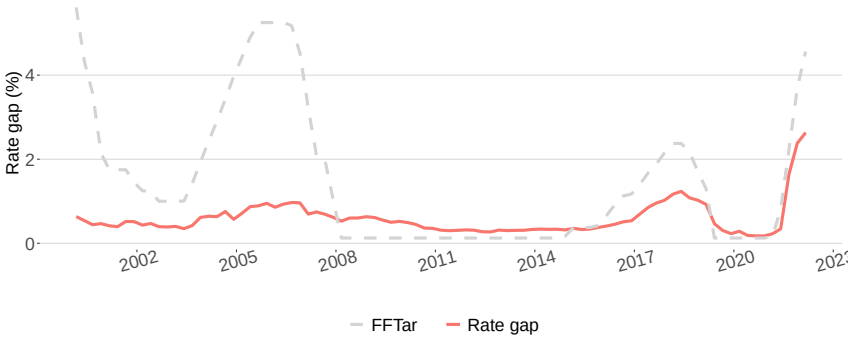
High rate banks have raised deposit rates aggressively in response to rising interest rates, from 2015Q2



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

Back

Rate gap has increased from 2015Q2



More Summary Statistics

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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

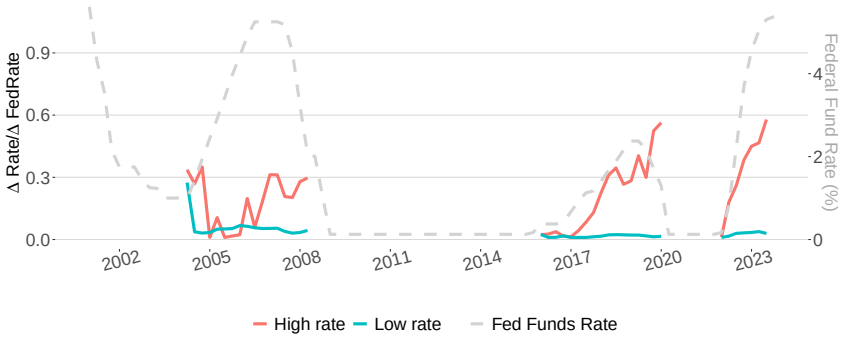
Variation in Branch Deposit Rates across Largest Banks and BHCs

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

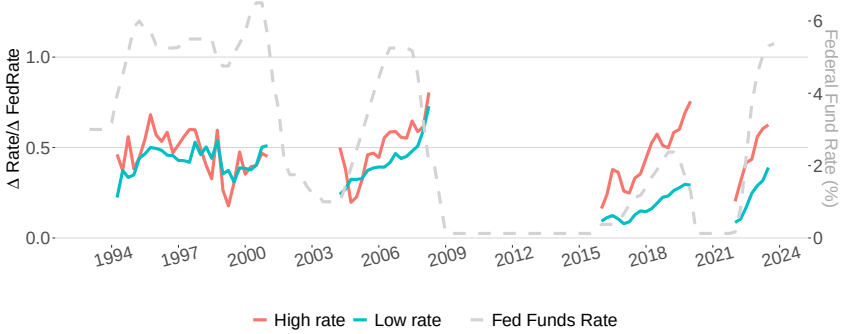
Deposit Beta for High and Low Rate Banks: Savings Rate

Back



Deposit Beta for High and Low Rate Banks: Call Reports

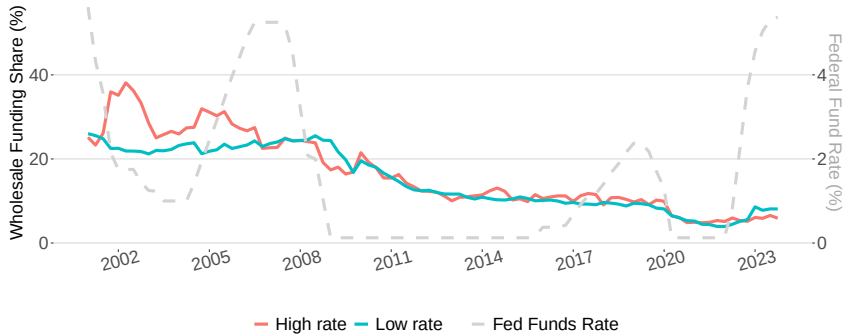
Back



Wholesale Funding Share

Back

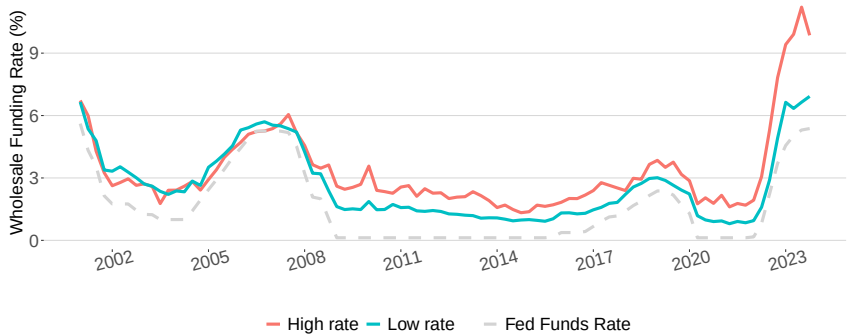
No difference in wholesale funding share



Wholesale Funding Share

Back

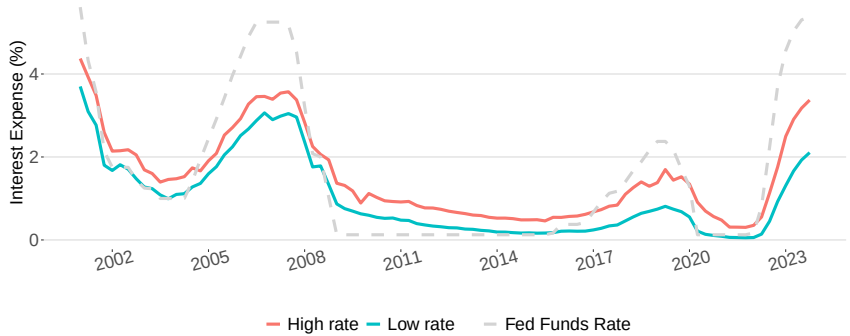
No difference in wholesale funding rate



Interest Expense for High and Low Rate Banks

Back

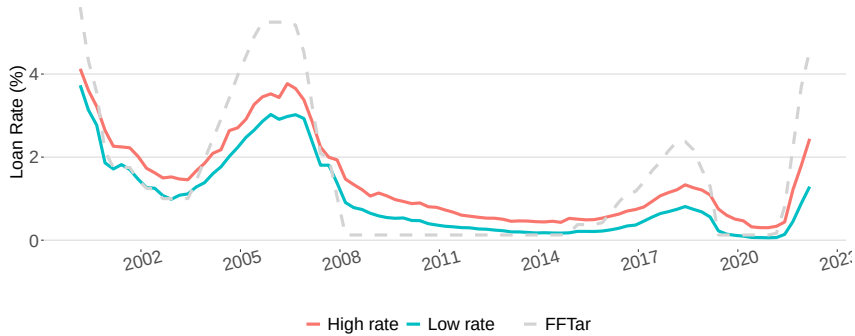
Interest expense diverges in last two rate hiking cycles



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

Back

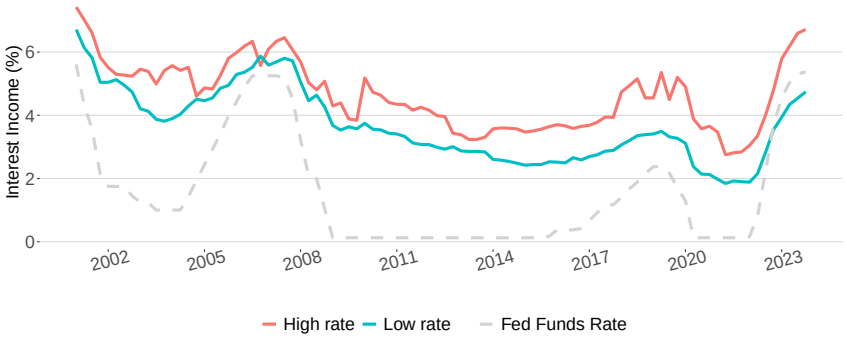
Interest expense diverges in last two rate hiking cycles



Interest Income for High and Low Rate Banks

Back

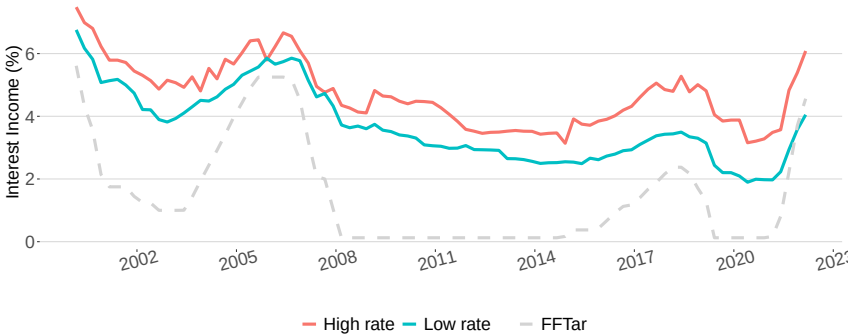
Interest income diverges in last two rate hiking cycles



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

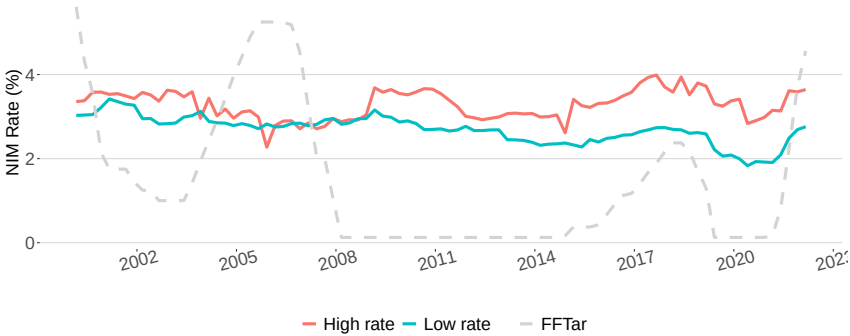
Back

Interest income diverges in last two rate hiking cycles



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

Back

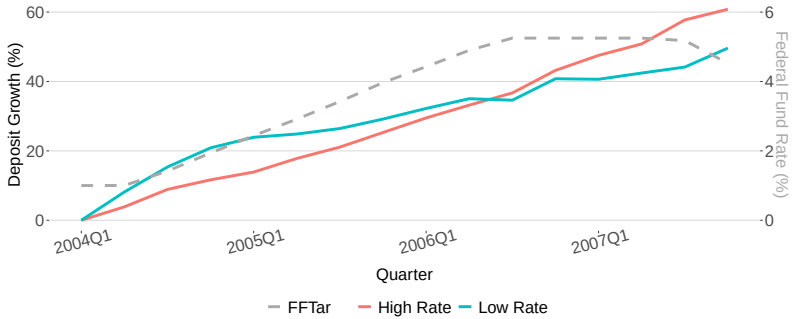


Monetary Policy Transmission for High and Low Rate Banks (Top 100)

Back

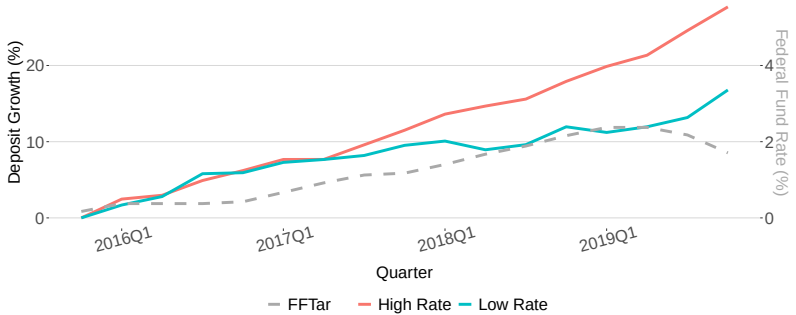
	ΔDep. Rate	ΔInterest Expense	ΔInterest Income	ΔNIM
	(1)	(2)	(3)	(4)
ΔFFTar×1(High Rate)×Post	0.476***	0.196***	0.077	-0.081**
	(0.092)	(0.055)	(0.057)	(0.038)
ΔFFTar×1(High Rate)	-0.017	-0.064	-0.038	0.010
	(0.066)	(0.041)	(0.054)	(0.032)
ΔFFTar	0.597***	0.472***	0.418***	-0.034
	(0.053)	(0.032)	(0.046)	(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



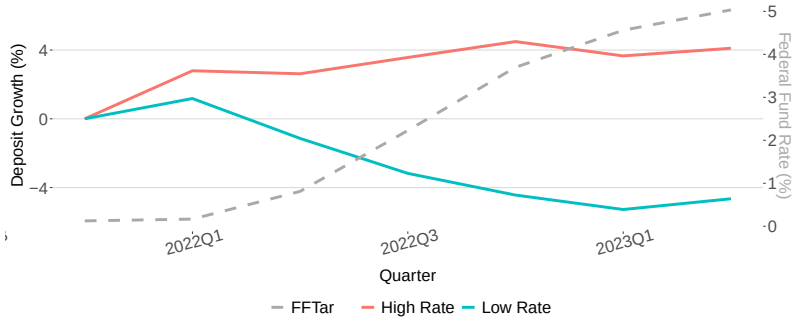
- Deposit growth between high and low rate banks exhibit similar growth rates

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



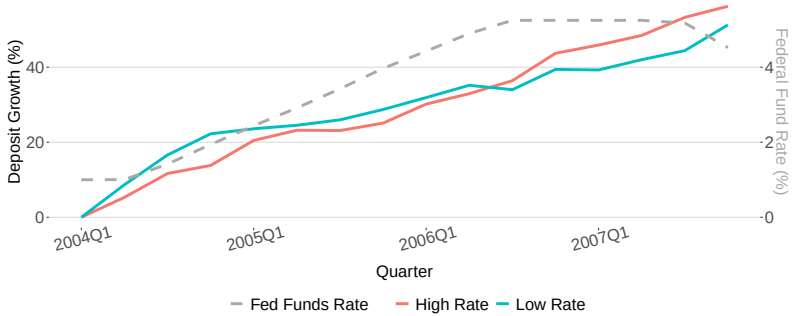
- Deposit growth between high and low rate banks exhibits divergence from 2018Q1

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



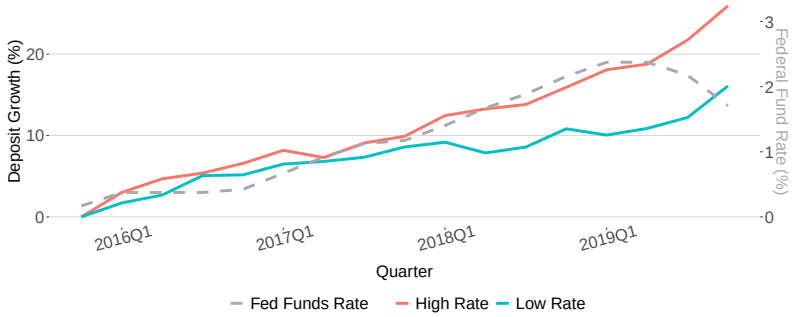
- Deposit growth between high and low rate banks exhibits divergence from 2022Q1

Deposit Growth: 2004Q1-2007Q4



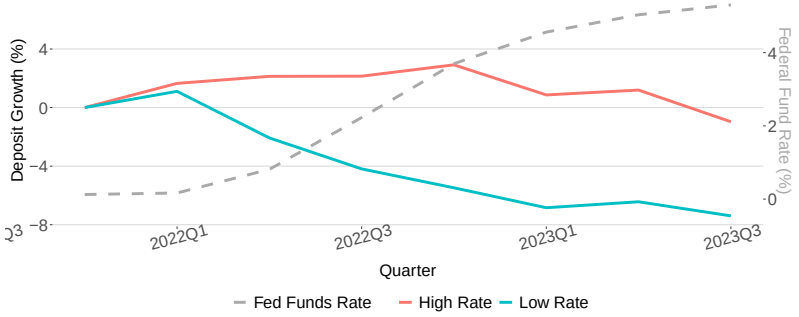
- Deposit growth between high and low rate banks exhibit similar growth rates

Deposit Growth: 2015Q4-2019Q4



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

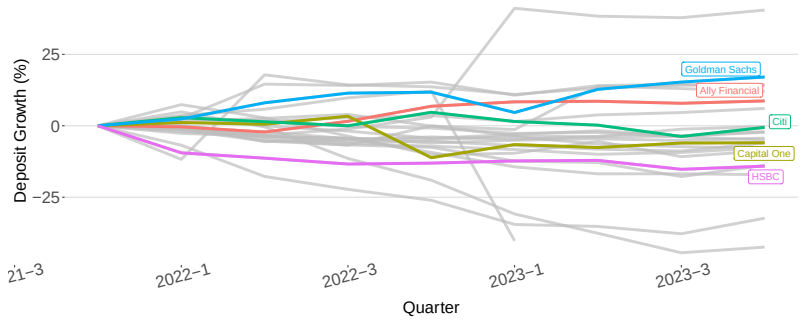
Deposit Growth: 2021Q4-2023Q2 Back



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

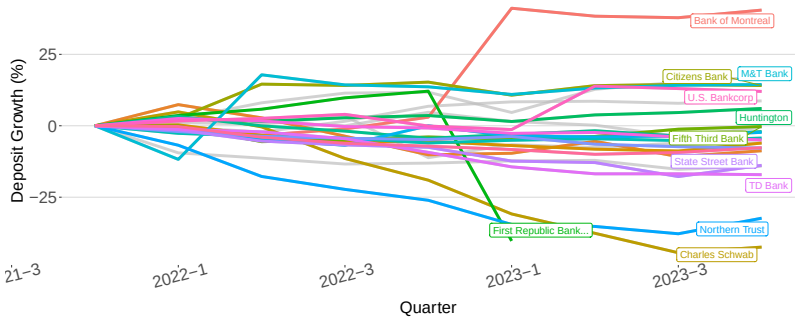
Deposit Growth for High Rate Banks: 2021Q4-2023Q2

Back

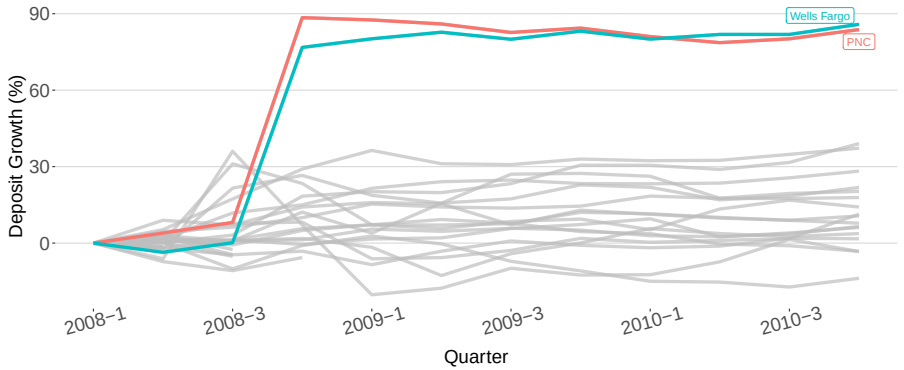


Deposit Growth for Low Rate Banks: 2021Q4-2023Q2

Back



Deposit Growth Before 2010: 2008Q1-2010Q4 ‣ Back



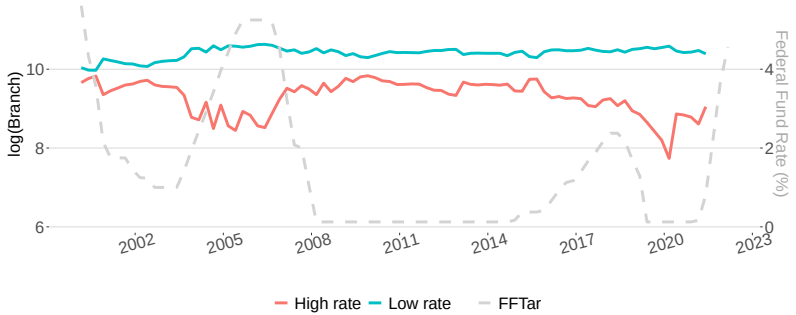
Two major jumps in deposit growth are due to M&A: Wells Fargo acquired Wachovia on October 3, 2008, and PNC acquired National City Bank on October 24, 2008.

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

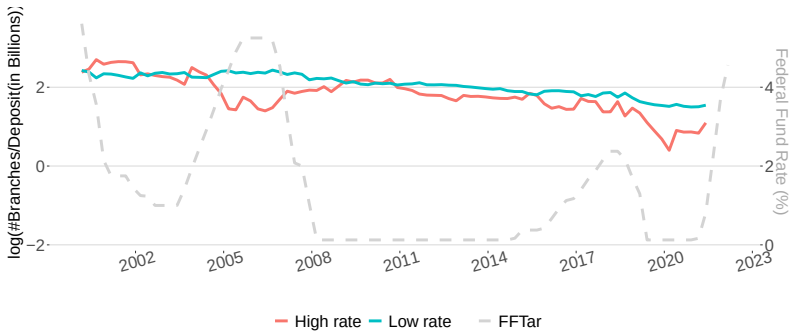
High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors



- High rate banks report decline in the number of branches

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

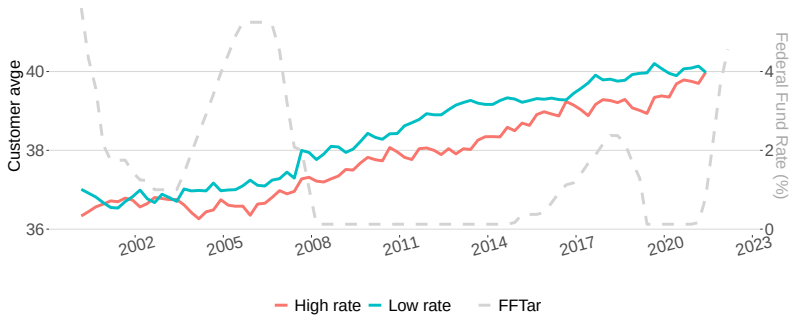
High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors



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

Branch-weighted County Median Age (Top 100) ▸ Back

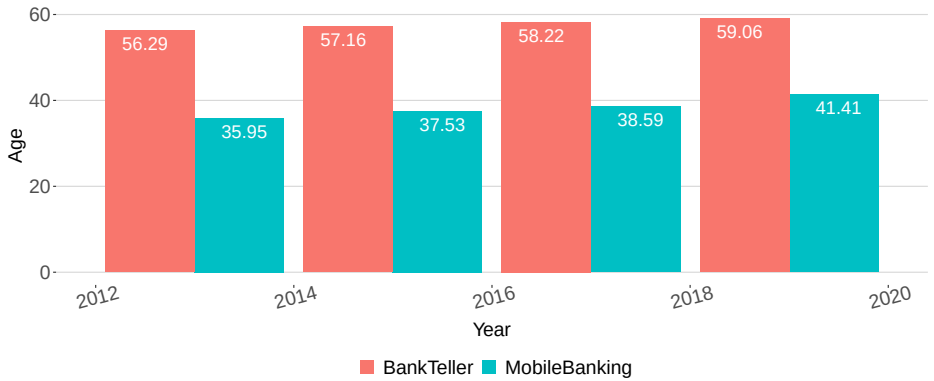
High rate banks offer higher deposit rates by reducing costs and providing fewer services to depositors



- 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

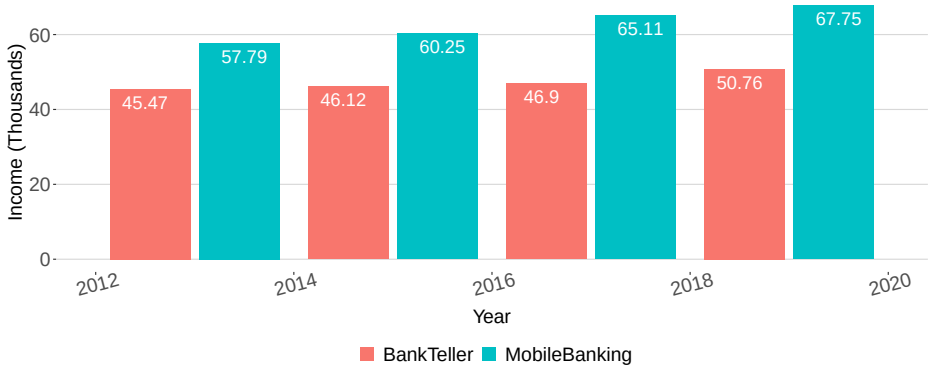
Back



Households using mobile banking are younger

Income of Households Using Branches vs. Mobile Banking

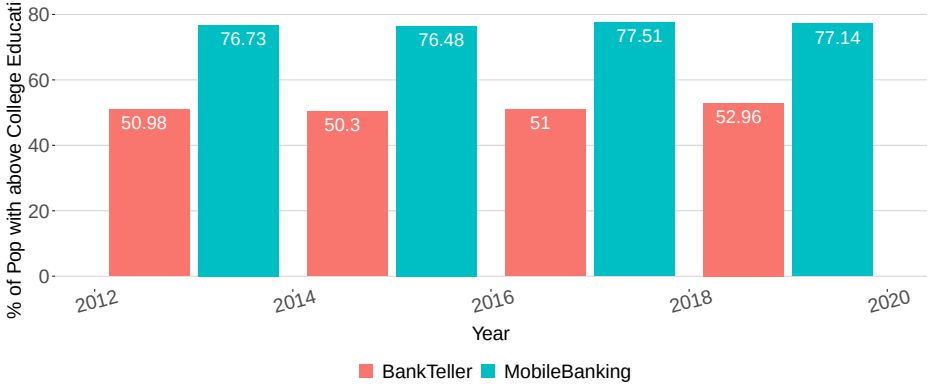
Back



Households using mobile banking have higher income

Education of Households Using Branches vs. Mobile Banking

Back

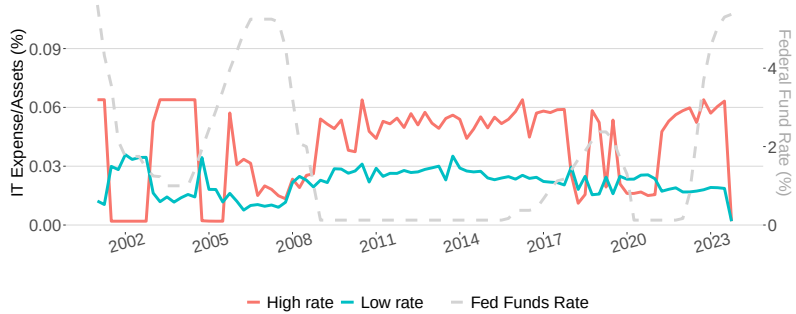


Households using mobile banking are better educated

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

Back

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



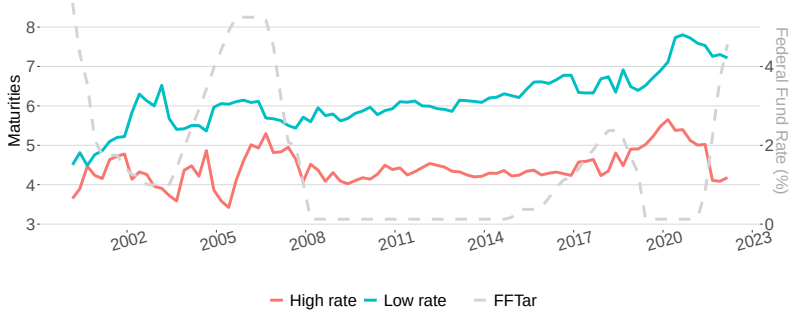
- High rate banks spend more on IT than low rate banks

Bank Branches (Top 100) ▸ Back

	log(# Branches)		log($\frac{\text{Branches}}{\text{Deposit}}$)		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

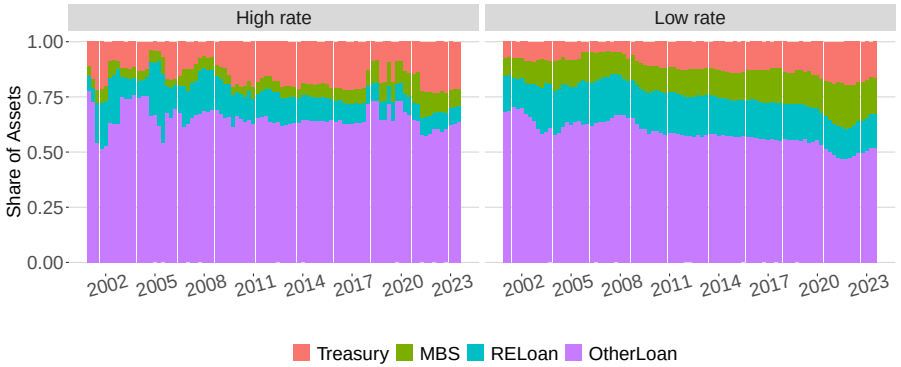
Duration Risk (Top 100) Back

	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

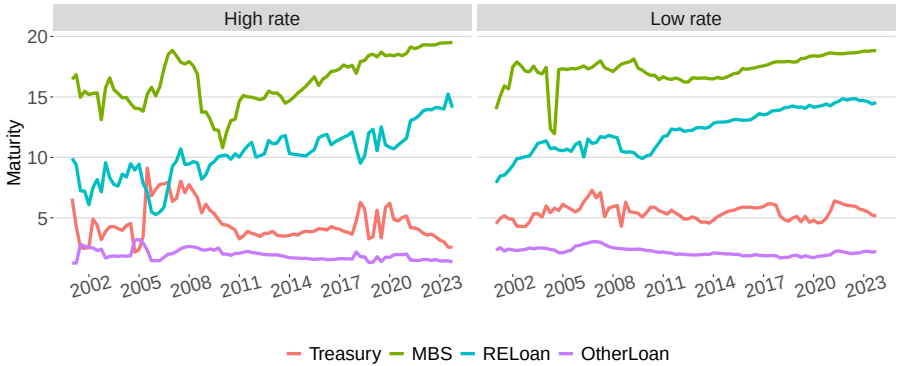


- Low rate banks maintain a significantly larger share of MBSs and real estate loans; high rate banks invest only half as much in these, instead, opting for other loans and treasuries

Other Loans

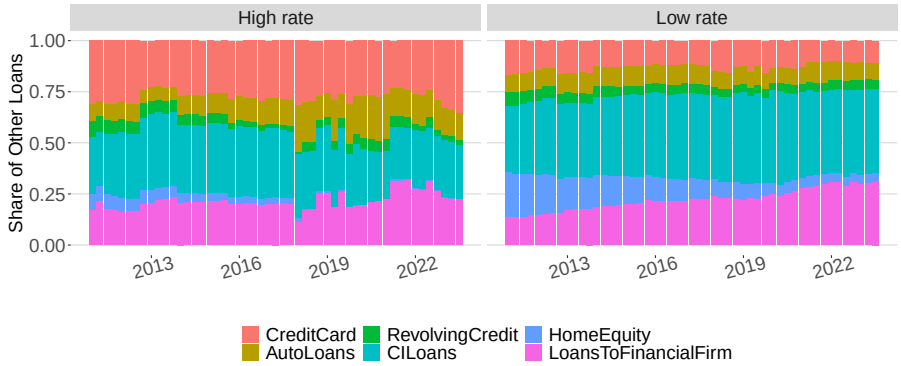
Portfolio Composition: Maturity of Assets

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.

Table 1: 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)$\times$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

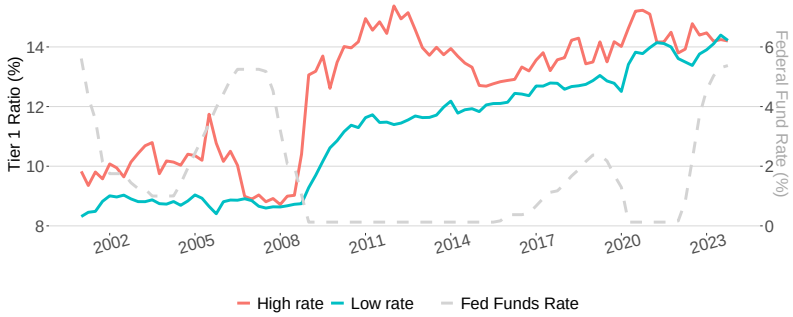
Back

	Real Estate Loans	C&I Loans	Personal Loans	Other Loans
	(1)	(2)	(3)	(4)
$\mathbb{1}$(High Rate)$\times$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

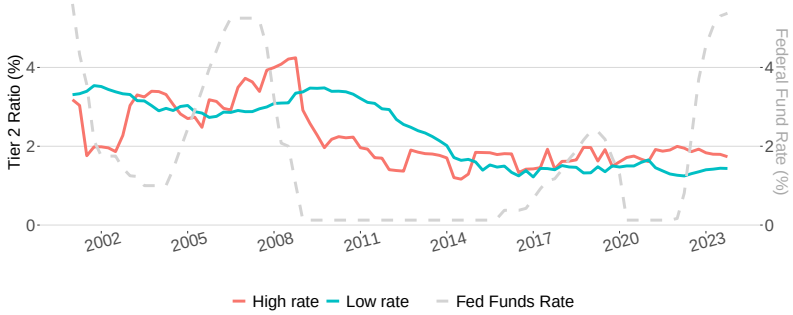
Back



- 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 $\Rightarrow$ current regulation may not capture risk divergence within the banking sector