Hedging Securities and Silicon Valley Bank Idiosyncrasies

Raymond Kim

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NORTHERN ARIZONA UNIVERSITY
The W. A. Franke College of Business

Silicon Valley Bank's Zero Hedge Strategy

- In a rising interest rate environment. . .

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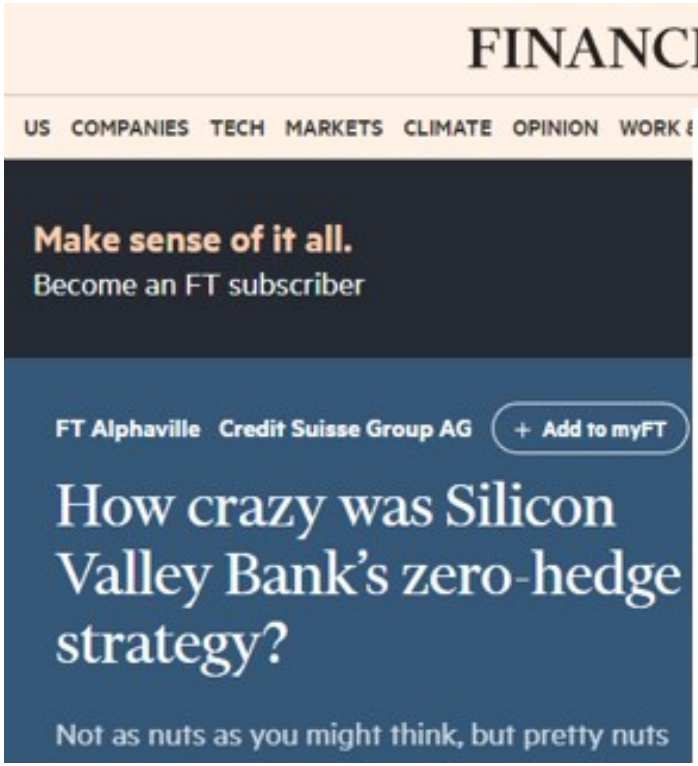

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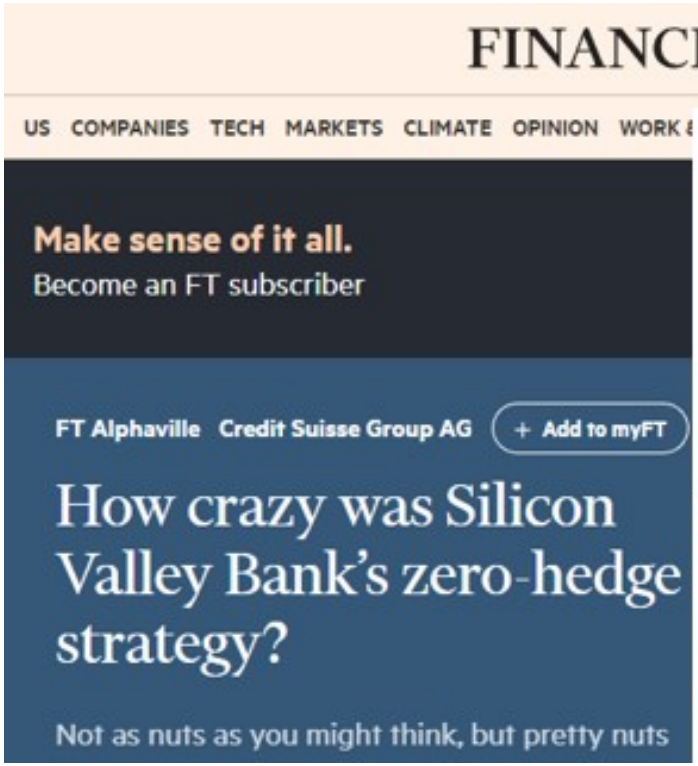

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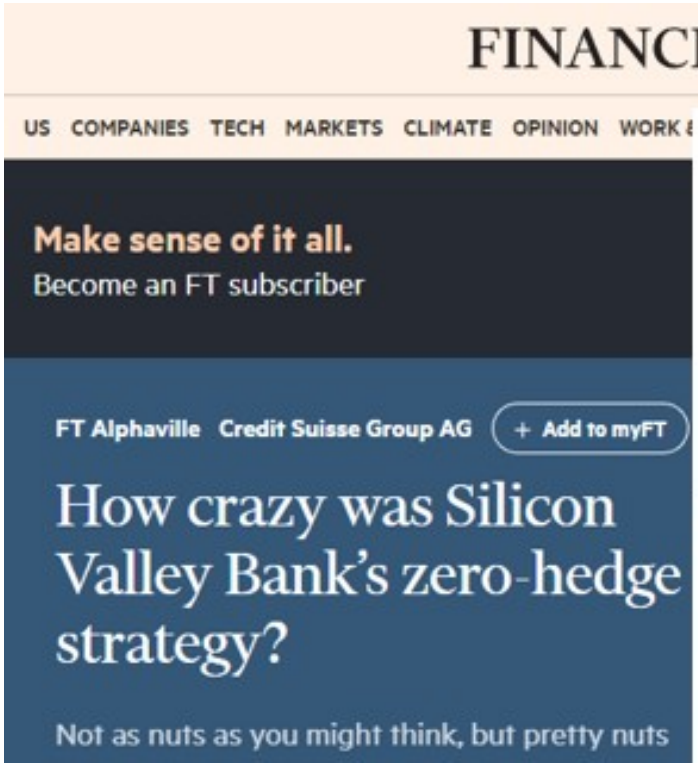
  - By the end of March 9, SVB stock tanked 60% and uninsured depositors rushed to withdraw funds



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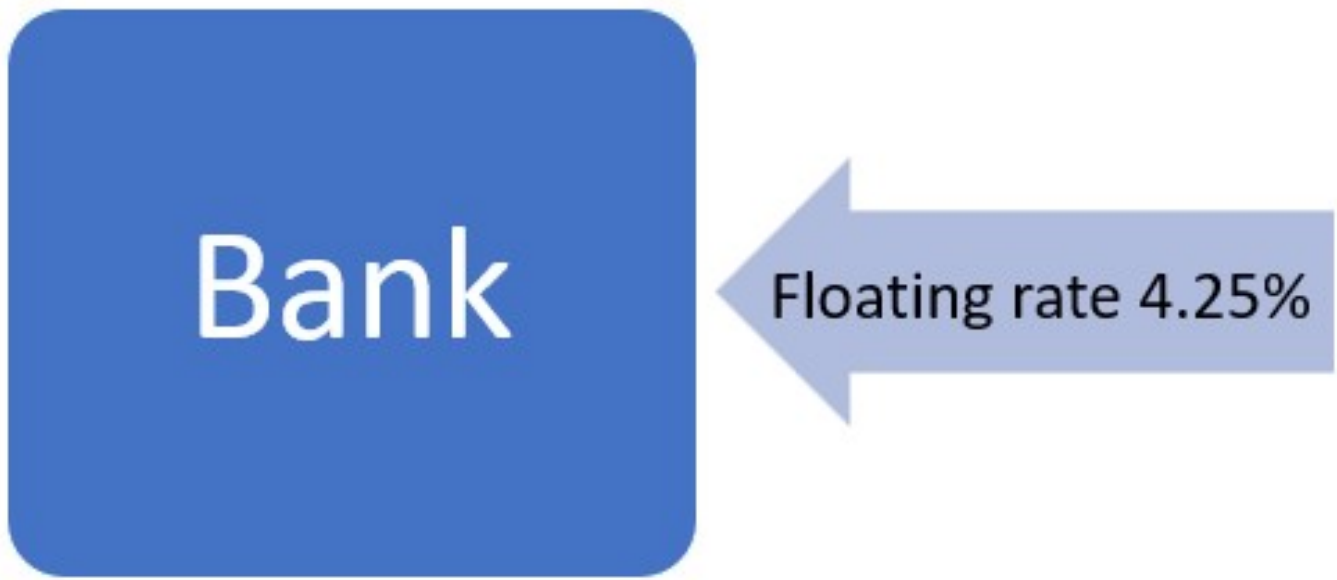
- Did other banks hedge their security losses in their HTM/AFS portfolios?

How Do Banks Hedge Interest Rate Risk?

- Bank enters receive floating swap, Fed Funds/SOFR + 400 bps



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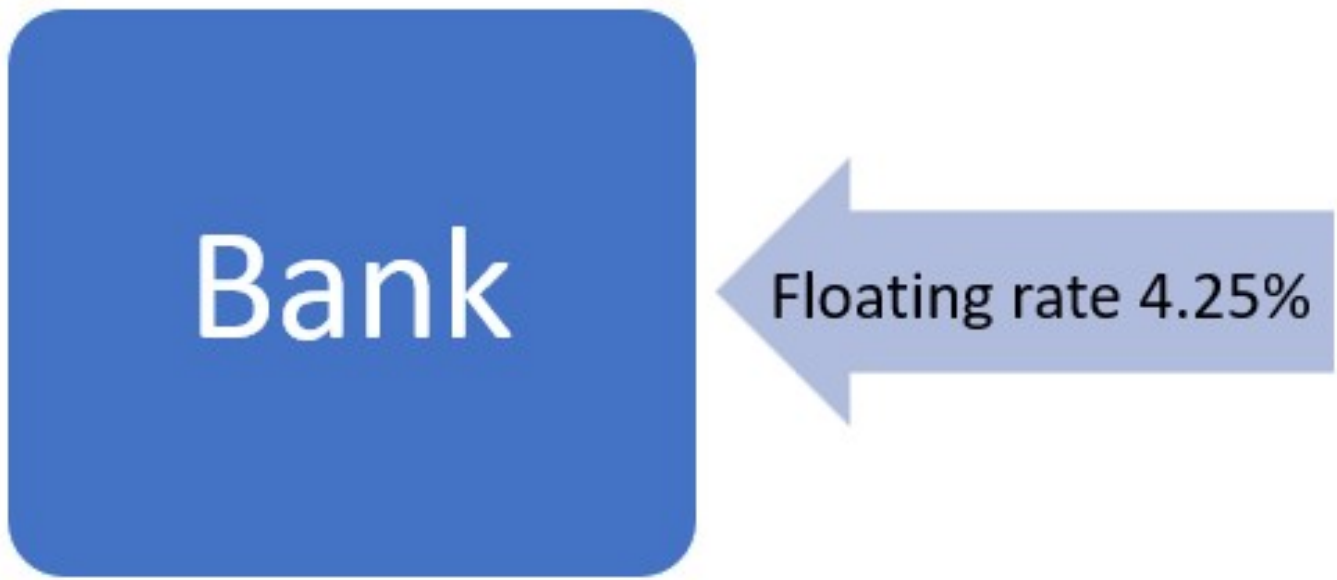
  - Let's say SOFR is 25 bps



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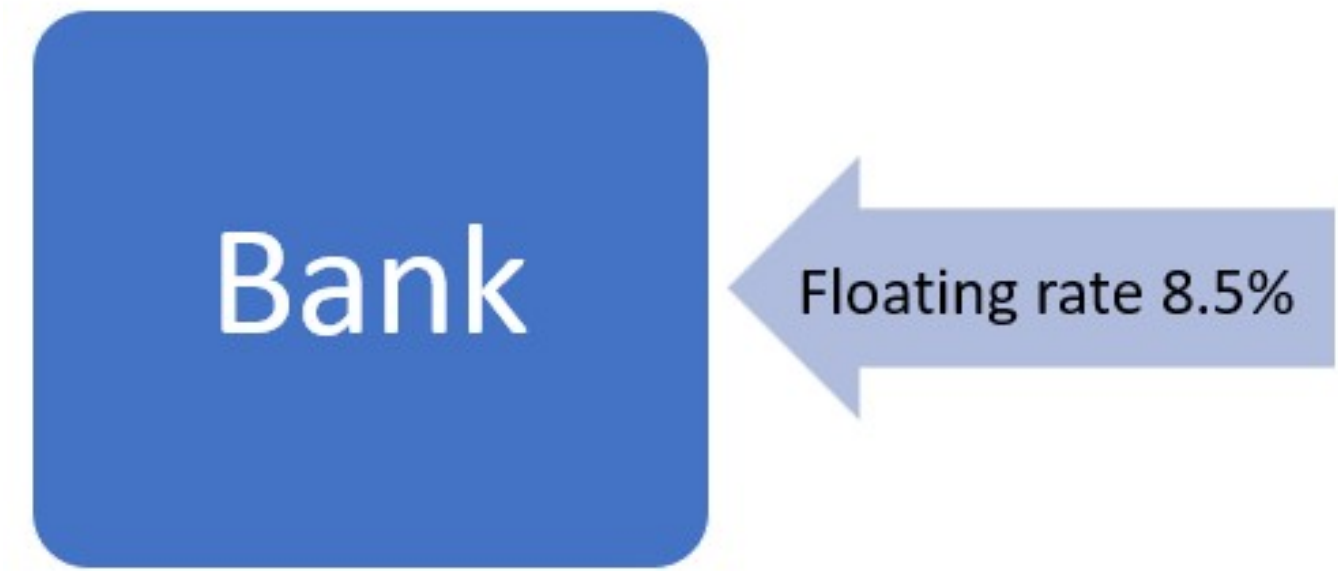

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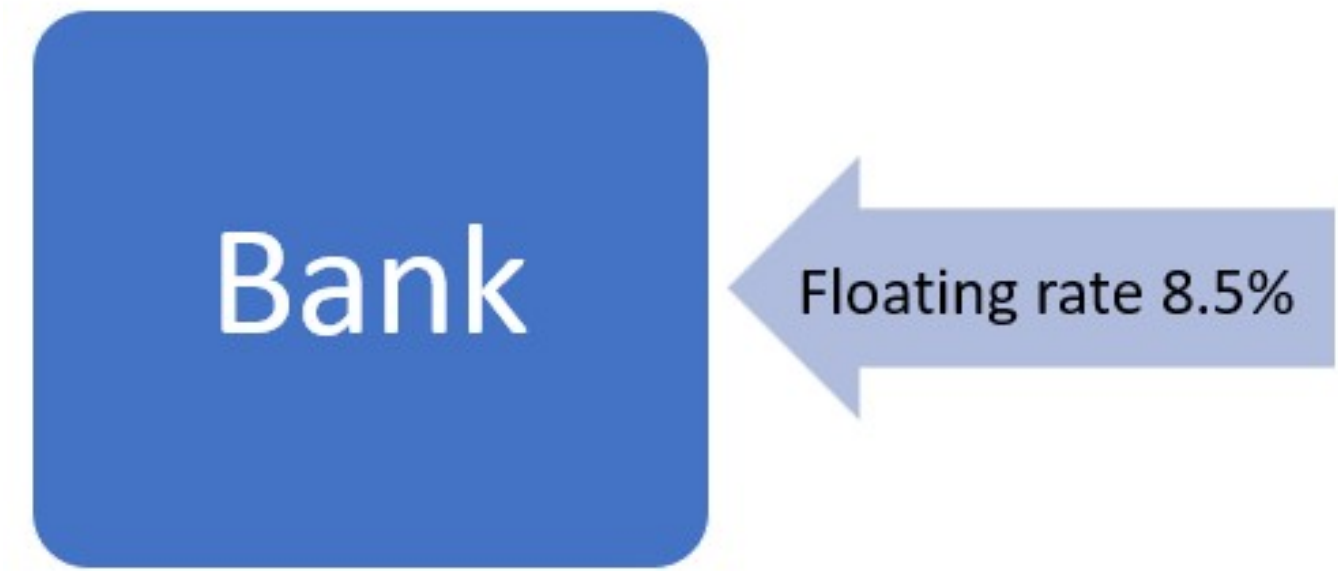

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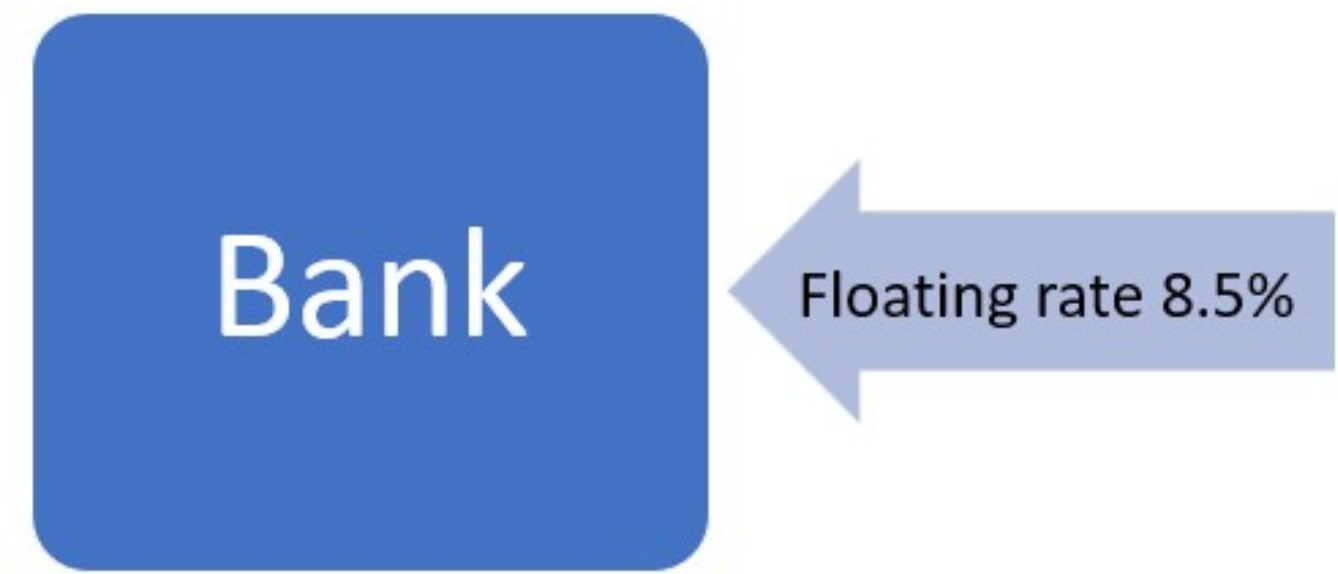

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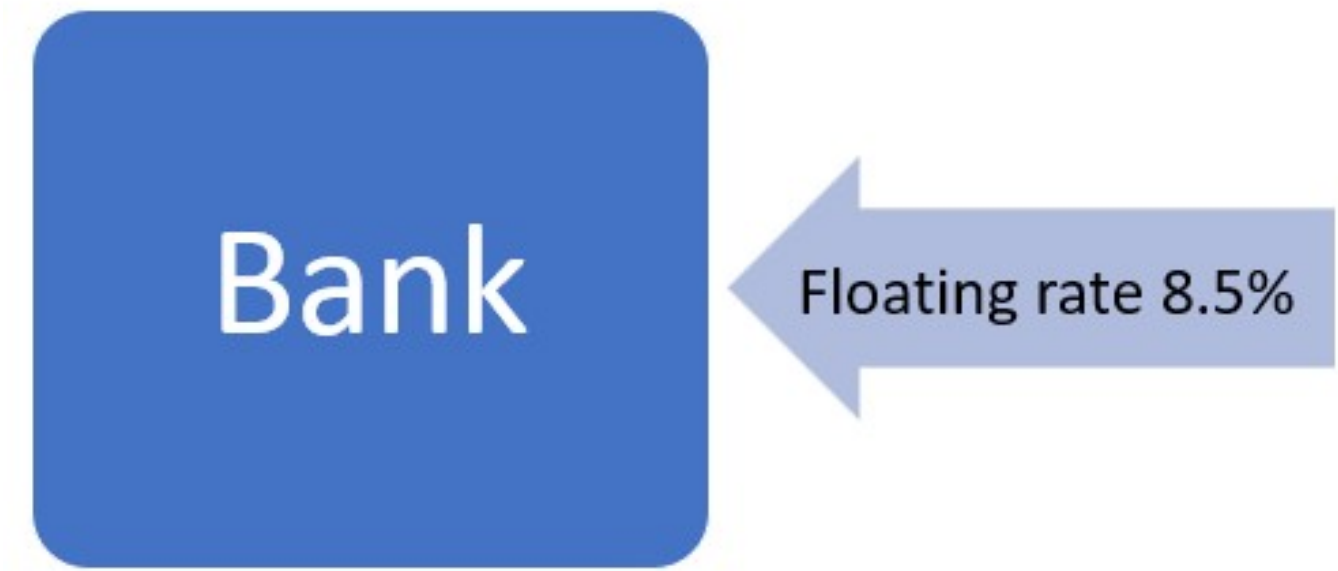

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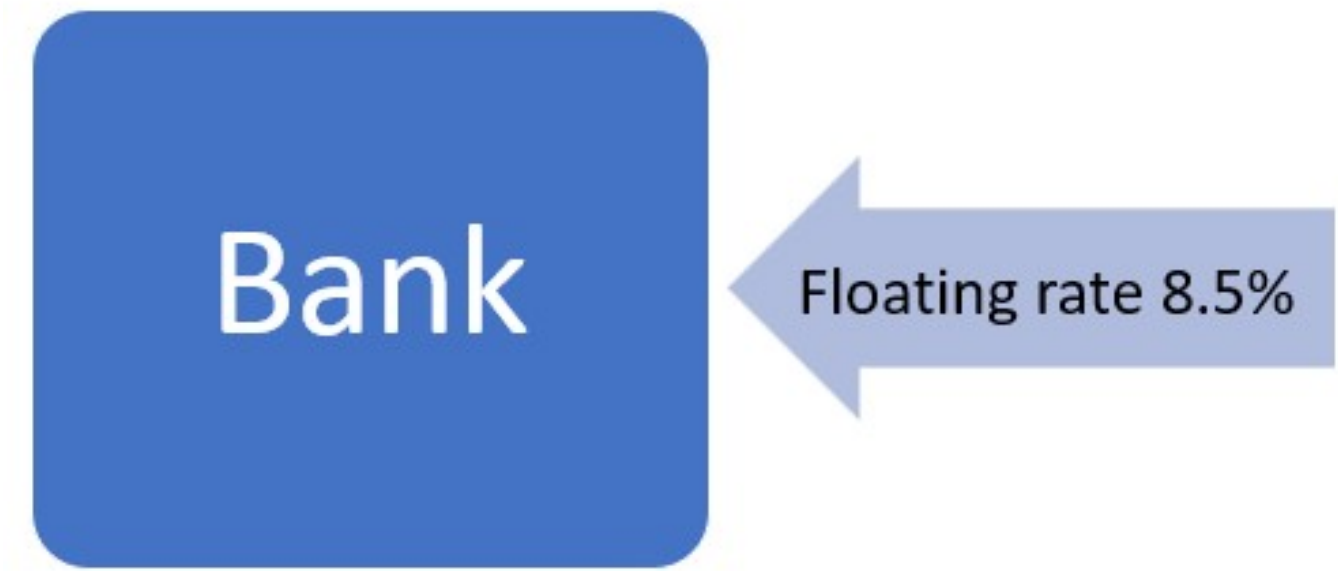
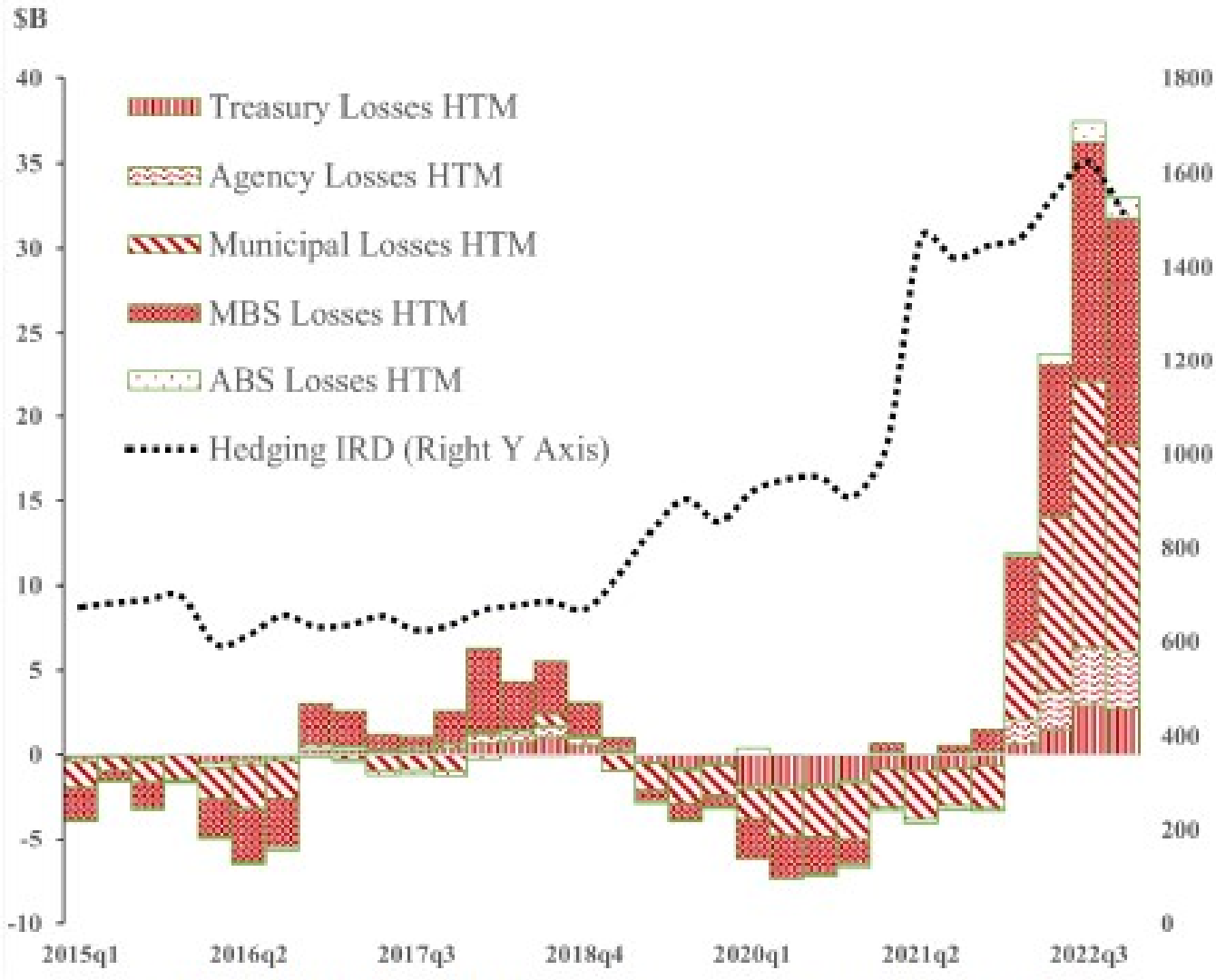


Banks **INCREASE** Hedging as HTM Losses Rise

- Aggregated HTM Losses for Banks below $250B in assets



(a) Total Held-to-Maturity Losses vs Hedging IRDs

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Banks **INCREASE** Hedging as AFS Losses Rise

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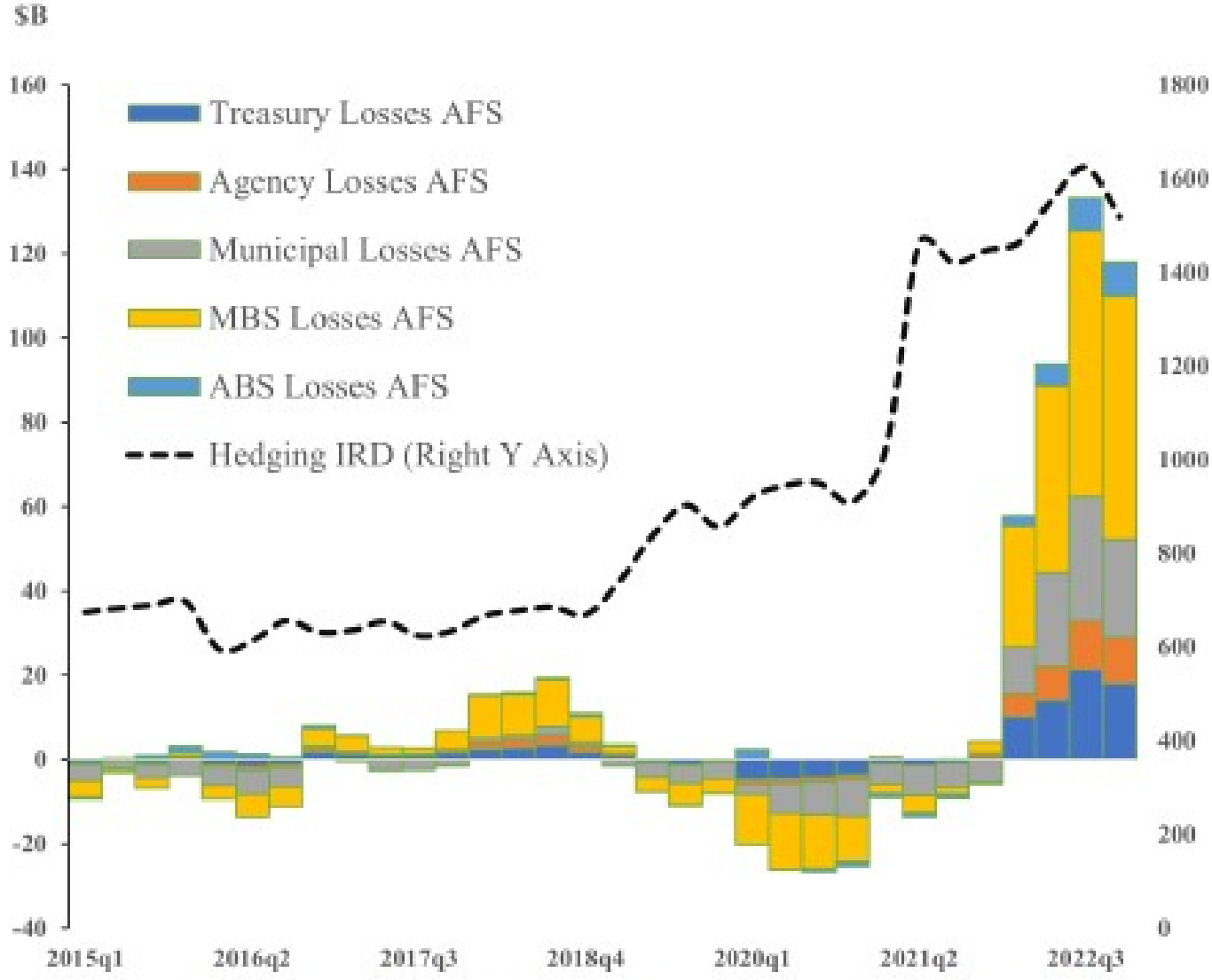

(a) Total Available-for-Sale Losses vs Hedging IRDs

Do Banks Systematically Make SVB's Mistake? First Glance Suggests. . . No

1. Banks are expected to hedge as HTM/AFS Losses $\uparrow$ (rates $\uparrow$)

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3. Banks actively hedge HTM/AFS Losses when funding risks are present (uninsured deposits)

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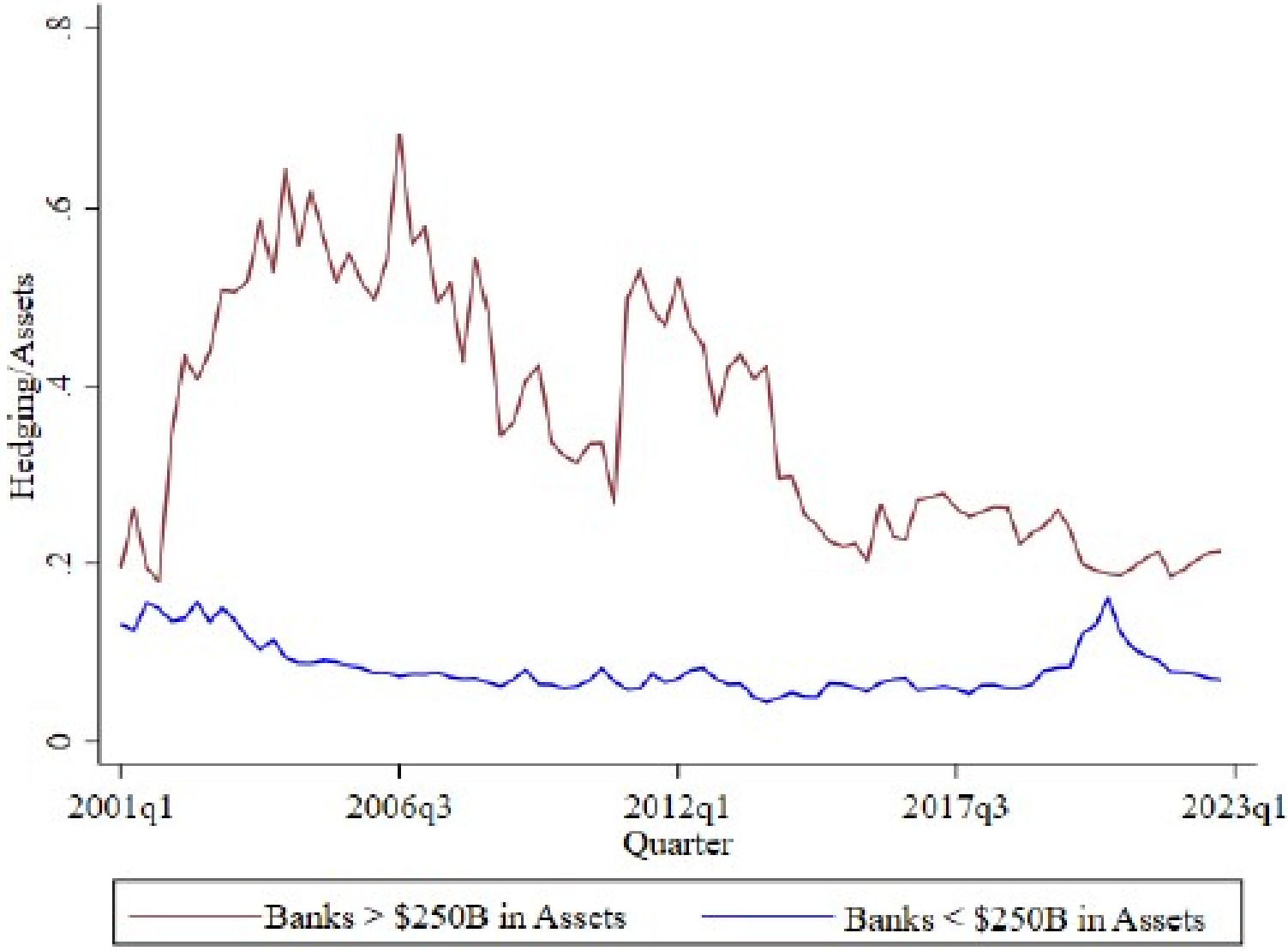
2) Drechsler, Savov and Schnable (2021) finds deposits act like long-term liabilities when matching with long-term lending
   - What about uninsured deposits that act more like short-term liabilities?

Data & Hedging Activity Variables

- Drop banks over $250 billion in assets



Data & Hedging Activity Variables

- Schedule RC-L (Derivatives and Off-Balance Sheet Items)
  - Call Reports (2015Q1-2022Q4) list trading and hedging interest rate derivatives separately
- HTM/AFS Losses = Amortized - Fair Value of Securities
- 10Y Swap Rates, 10Y Treasury Rates
- 6,539 unique banks with 1,884 banks using hedging IRD

Summary of Hedging vs. Non-Hedging Banks

- Hedging banks are larger and riskier

	Hedging N=39,110		Non-Hedging N=136,583		Mean
Variables	Mean	SD	Mean	SD	Difference
Total Assets ($M)	4,360	12,000	481	2,500	3,879***
Hedging IRD (%)	6.00	10.66	0.00	0.00	6.00***
Trading IRD (%)	1.22	4.69	0.13	1.43	1.09***
Interest Rate Futures (%)	0.00	0.00	0.00	0.00	0.00***
Interest Rate Forwards (%)	0.84	2.87	0.01	0.33	0.83***
Interest Rate Swaps (%)	2.28	5.49	0.07	1.00	2.21***
Pay Fixed Swaps (%)	1.06	2.76	0.00	0.00	1.06***
Loans (%)	68.69	13.22	60.84	19.11	7.84***
Deposits (%)	82.60	6.86	82.72	13.41	-0.13**
Uninsured/Deposits (%)	26.56	14.51	20.44	13.16	6.12***
Reserves (%)	4.16	5.64	5.07	7.19	-0.91***
Total Equity (%)	10.85	2.70	13.02	10.88	-2.18***
Common Equity Tier 1 (%)	10.18	2.37	12.75	10.31	-2.57***
Maturity Gap Ratio (%,)	12.15	13.58	6.08	13.97	6.07***
Non Performing Assets (%)	0.06	0.20	0.08	0.23	-0.02***
HTM+AFS Securities (%)	17.29	12.27	19.92	16.50	-2.63***

Summary of Hedging vs. Non-Hedging Banks

- Hedging banks are larger and riskier
- More loans, uninsured deposits, less equity

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1) Banks use hedging and trading interest rate derivatives differently
2) Banks increase hedging activity to mitigate losses in fixed-income portfolios
3) Banks reduce hedging activity when gains increase in fixed-income portfolios
4) Banks increase hedging activity due to funding risks from unsecured deposits

Empirical Model and Variable Selection

$$H = g(X_1, X_2, D)$$
$$P(D = 1) = f(X_1, X_2)$$

H is the hedging decision
X_1 are HTM/AFS Losses, uninsured deposits, interest rate guidance
X_2 are established variables such as maturity GAP and MBS originations (Kim, 2021)
$D = 1$ if bank fails
Purnandanam (2007) models this as endogenous, but it may not be if banks anticipate forward interest rate guidance

H1: Trading vs. Hedging Interest Rate Derivatives

- As rates ↑, trading sells swaps (like SVB)

	Dependent Variable: $\Delta IRD_{i,t}$			
	Rising Rates$_t$		*Falling Rates*	
	Trading	*Hedging*	*Trading*	*Hedging*
	(1)	(2)	(3)	(4)
$\Delta Rates_t$	-0.007***	-0.002	-0.02***	-0.057***
	(-4.1)	(-0.35)	(-3.75)	(-9.31)
$\Delta Rates_{t-1}$	-0.002	0.003	-0.002	0.006
	(-0.76)	(0.6)	(-0.47)	(0.95)
$\Delta Rates_{t-2}$	0.007**	-0.004	-0.004	-0.022**
	(2.14)	(-0.48)	(-0.46)	(-2.05)
$\Delta Rates_{t-3}$	-0.003	0.003	0.001	0.005
	(-1.33)	(0.78)	(0.35)	(1.09)
Observations	4,632	23,114	2,837	14,482
Interest Rates	10Y Swap	10Y Swap	10Y Swap	10Y Swap
Bank FE	✓	✓	✓	✓
Bank Clusters	✓	✓	✓	✓
Time Clusters	✓	✓	✓	✓
Adjusted R^2	0.02	0.02	0.02	0.07
Within R^2	0.01	0.00	0.05	0.09

H1: Trading vs. Hedging Interest Rate Derivatives

- As rates ↑, trading sells swaps (like SVB)
- As rates ↑, hedging may be bank-level, not macro

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Time Clusters	✓	✓	✓	✓
Adjusted R^2	0.02	0.02	0.02	0.07
Within R^2	0.01	0.00	0.05	0.09

Empirical Model for H2 and H3

- Time fixed effects λ_t accounts for borrower hedging
- Controls for maturity gap, size, and deposits

$$\frac{\textit{Hedging IRD}_{it}}{Assets_{it}} = \alpha_i + \lambda_t + \frac{\textit{Held-to-Maturity Security Losses}_{i,t}}{Assets_{it}} + \frac{\textit{Available-for-Sale Security Losses}_{i,t}}{Assets_{it}} + \frac{\textit{Maturity Gap}_{it}}{Assets_{it}} + X'\beta + \varepsilon_{it}$$

H2 and H3: Bank-Level Losses

	Dependent Variable: Hedging$_{i,t}$			
	All Periods (1)	*All Periods* (2)	*Rising Rates* (3)	*Falling Rates* (4)
HTM Losses$_{i,t}$	0.78***	2.36***	0.768***	1.104
	(3.35)	(3.82)	(2.98)	(1.19)
AFS Losses$_{i,t}$	0.665***	1.383***	0.66***	1.572***
	(3.72)	(2.73)	(3.1)	(3.78)
Maturity Gap$_{i,t}$	0.082***	0.022	0.113***	0.035
	(4.35)	(1.01)	(4.99)	(1.7)
Mortgage Originations$_{i,t}$		0.237***		
		(4.32)		
Log (Assets)$_{i,t}$	0.021**	-0.005	0.025**	0.027**
	(2.22)	(-0.46)	(2.26)	(2.29)
Deposits$_{i,t}$	-0.11***	-0.07	-0.114***	-0.12***
	(-2.81)	(-1.59)	(-2.7)	(-2.73)
Observations	37,763	7,919	20,967	15,502
Bank FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Bank Clusters	✓	✓	✓	✓
Time Clusters	✓	✓	✓	✓
Adjusted R^2	0.78	0.92	0.76	0.80
Within R^2	0.02	0.10	0.03	0.02

Heckman Two-Stage Selection Model

- Addresses selection bias
- IRD and non-IRD banks have different characteristics (Sinkey Jr and Carter, 2000; Minton, Stulz, and Williamson, 2009)

	Hedging Interest Rate Derivatives			
Panel B: 2nd Stage Regression	(1)	(2)	(3)	(4)
HTM Losses$_{i,t}$	2.579***			2.546***
	(3.01)			(2.99)
AFS Losses$_{i,t}$		1.509***		1.585***
		(5.40)		(5.65)
Maturity Gap$_{i,t}$			0.118***	0.154***
			(7.01)	(8.37)
Selected Obs	34,944	34,944	36,097	34,944
Nonselected Obs	138,572	138,572	139,596	138,572
Controls	✓	✓	✓	✓
Wald χ^2	990.13	973.03	884.35	1,020.51

Held to Maturity Losses - Asymmetric?

- Rates ↑ Muni/MBS hedging ↑;

	Dependent Variable: Hedging IRD$_{i,t}$			
	All Periods (1)	*All Periods* (2)	*Rates Rising* (3)	*Rates Falling* (4)
HTM Losses on Treasuries$_{i,t}$	1.600	1.199	0.882	-4.244
	(0.74)	(0.56)	(0.4)	(-0.34)
HTM Losses on Non-MBS Agencies$_{i,t}$	-1.126	-1.175	-1.19	-1.801
	(-1.15)	(-1.26)	(-1.22)	(-0.83)
HTM Losses on Munis$_{i,t}$	1.063**	1.112**	1.395***	-2.019*
	(2.46)	(2.45)	(3.26)	(-1.80)
HTM Losses on MBS$_{i,t}$	1.581***	1.335***	1.105**	3.959
	(3.18)	(2.68)	(2.11)	(1.77)
HTM Losses on ABS & Other$_{i,t}$	-1.407	-0.466	-3.54	35.262
	(-0.34)	(-0.11)	(-0.91)	(1.49)
Maturity Gap$_{i,t}$		0.079***	0.108***	0.038*
		(4.22)	(4.95)	(1.81)
Log (Assets)$_{i,t}$		0.02**	0.023**	0.027**
		(2.1)	(2.12)	(2.24)
Deposits$_{i,t}$		-0.097***	-0.098**	-0.115***
		(-2.52)	(-2.37)	(-2.63)

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Available for Sale Losses - Asymmetric Hedging

- Asymmetric Hedging is more evident for AFS Losses

	Dependent Variable: Hedging IRD$_{i,t}$			
	All Periods (1)	*All Periods* (2)	*Rates Rising* (3)	*Rates Falling* (4)
AFS Losses on Treasuries$_{i,t}$	-0.026	0.185	0.215	4.382*
	(-0.05)	(0.33)	(0.38)	(1.78)
AFS Losses on Non-MBS Agencies$_{i,t}$	0.783*	1.053***	0.94**	3.814***
	(1.93)	(2.56)	(2.08)	(2.7)
AFS Losses on Munis$_{i,t}$	0.357**	0.507***	0.521**	1.107
	(1.98)	(2.64)	(2.21)	(1.33)
AFS Losses on MBS$_{i,t}$	0.766***	0.862***	0.881***	1.372
	(3.11)	(3.54)	(3.44)	(1.48)
AFS Losses on ABS % Other$_{i,t}$	1.391*	1.283	1.452	0.048
	(1.7)	(1.56)	(1.57)	(0.04)
Maturity Gap$_{i,t}$		0.081***	0.111***	0.035*
		(4.3)	(4.94)	(1.7)
Log (Assets)$_{i,t}$		0.021**	0.024**	0.027**
		(2.2)	(2.23)	(2.32)
Deposits$_{i,t}$		-0.107***	-0.111***	-0.117***
		(-2.77)	(-2.65)	(-2.67)

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Security Losses and Funding Risks

- Hedging increases when Losses & Uninsured Deposits Increase

	Dependent Variable: Hedging$_{i,t}$					
	All Periods		*Rates Rising*		*Rates Falling*	
	(1)	(2)	(3)	(4)	(5)	(6)
HTM Losses$_{i,t}$ × *Uninsured Deposit %$_{i,t}$*	3.107**		3.408**		-0.757	
	(2.38)		(2.53)		(-0.14)	
AFS Losses$_{i,t}$ × *Uninsured Deposit %$_{i,t}$*		0.652		0.535		1.299
		(1.36)		(1.06)		(0.79)
HTM Losses$_{i,t}$	-0.454		-0.6		1.246	
	(-0.91)		(-1.17)		(0.73)	
AFS Losses$_{i,t}$		0.456**		0.48*		1.225**
		(1.99)		(1.84)		(2.3)
% Uninsured Deposits$_{i,t}$	0.038**	0.038**	0.047**	0.048**	0.009	0.012
	(2.00)	(2.00)	(2.35)	(2.32)	(0.34)	(0.46)
Observations	33,979	33,979	18,907	18,907	13,841	13,841
Controls	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Bank Clusters	✓	✓	✓	✓	✓	✓
Time Clusters	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.78	0.78	0.76	0.76	0.80	0.80
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   - Evidence suggests that may be unusual enough to warrant a reclassification

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Conclusion

Thank you for coming! I appreciate any and all comments!

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