

# Securities Portfolio Management in the Banking Sector

Samuel Rosen  
Temple University

Xun Zhong  
Fordham University

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# Motivation

- Marketable securities make up 20 percent of the assets of the U.S. banks but we still don't know much about how and why banks manage them relative to other balance sheet items
- Reasons to study the way banks manage their securities portfolios:
  - 1 Directly related to other bank decisions we care about (e.g., lending)
  - 2 Informative about regulatory constraints and financial frictions
  - 3 Systemic risk concerns from indirect contagion and fire sales

# Summary of Our Analysis and Results

## What We Do:

- Measure bank-qtr-level securities buying/selling using publicly available data
- Document stylized empirical facts regarding bank portfolio management
- Establish empirical relationships with bank-level and macro factors
- Overarching goal: testing mechanisms for structural models

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- Overarching goal: testing mechanisms for structural models

## Summary of key findings:

- Deposit shocks are key to explain securities activity
- Banks sell more securities to meet withdrawals when cash holdings are low
- Less capitalized banks do not sell risky securities upon a funding shock
- Unrealized losses do not mitigate securities selling

## Related Literature

**Financial Asset Fire Sales and Indirect Contagion:** Coen, Lepore, and Schaanning (2019); Cont and Schaanning (2017, 2019); Cont and Wagalath (2013, 2016); Duarte and Eisenbach (2018); Greenwood, Landier, and Thesmar (2015); Kirti and Narasiman (2017); Rosen (2019); ...

**Lending and Securities Trading:** Abbassi et al. (2016); Diamond and Rajan (2011); Irani and Meizenthal (2017); Peydro et al., (2021); Shleifer and Vishny (2010); ...

**Bank Balance Sheet Management:** Adrian and Shin (2010); Ihrig et al (2019); Stulz et al. (2023); ...

**Causes and Impacts of Deposit Flows:** Dreschler, Savov, Schnabl (2017); Gelman and MacKinlay (2023); Kundu, Park, and Vats (2022); Supera (2021); ...

**Contribution** : empirical evidence how banks manage their securities  $\implies$  insights for models of bank behavior and measurement of systemic risk

## Conceptual Framework: Overview

Banks makes investment and financing decisions to maximize an objective function subject to constraints including balance sheet (BS) identity

$$\Delta Assets = \Delta Debt + \Delta Equity$$

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$$\Delta Assets = \Delta Debt + \Delta Equity$$

that can be decomposed as follows:

$$\begin{aligned} \Delta Assets = & \underbrace{\Delta Securities}_{\text{Outcome of Interest}} + \Delta SecurityValues + \Delta Loans + \Delta Cash \\ & + \Delta FFP + \Delta RevRepo + \Delta OtherAssets \end{aligned}$$

$$\Delta Debt = \Delta Deposits + \Delta FFP + \Delta Repo + \Delta OBM + \Delta OtherLiab$$

$$\Delta Equity = \Delta RetainedEarnings - NetEquityPayout + \Delta OtherEquity$$

## Conceptual Framework: Deposits

- In structural models (e.g., Corbae and D'Erasmus, 2021; De Nicolo et al., 2014), deposits often assume to follow exogenous process such as

$$\Delta Deposits = \epsilon_{D,t} \sim N(\mu_D, \sigma_D)$$

- External factors that influence deposits include monetary policy (Dreschler, Savov, and Schnabl, 2017), regulatory changes (Supera, 2021) and natural disasters (Kundu, Park, and Vats, 2022)
- Banks have some control over their deposits through deposit rates (Egan, Horatacsu, and Matvos, 2017) but not first-order driver
- Gelman and MacKinlay (2023) conservatively estimate that 43% of deposit flows do not stem from a bank actively seeking them



# Conceptual Framework: Securities Trading

- Despite being influenced by bank-level shocks, securities trading is ultimately the choice of a bank made given other BS changes

$$\Delta \text{Securities} = f(\Delta \text{Deposits}, \Delta \text{Loans}, \Delta \text{Cash}, \dots)$$

where the BS identity holds them together

# Data Overview

- FR Y-9C for quarterly BHC-level balance sheet, income statement, and regulatory data
- Regression analysis focuses on large BHCs with over \$50 billion in assets:
  - 36 unique BHCs
  - 2001:Q1 – 2022:Q4
- **NEW:** Additional analysis focusing on comm. banks (Call Reports)

## Measuring $\Delta$ Securities

- Banks hold securities in their banking book (BB) and trading book (TB)
- Within BB, banks report amortized cost (AC) and fair values (FV) Example
- Bank  $j$  net purchases of security type  $i$  during  $t$

$$\Delta \text{Securities}_{j,i,t}^{BB} = AC_{j,i,t}^{BB} - AC_{j,i,t-1}^{BB}$$

$$\Delta \text{Securities}_{j,i,t}^{TB} \approx FV_{j,i,t}^{TB} \frac{(AC_{agg,i,t}^{BB} / AC_{agg,i,t-1}^{BB})}{(FV_{agg,i,t}^{BB} / FV_{agg,i,t-1}^{BB})} - FV_{j,i,t-1}^{TB}$$

$$\Delta \text{Securities}_{j,i,t} = \Delta \text{Securities}_{j,i,t}^{BB} + \Delta \text{Securities}_{j,i,t}^{TB}$$

- Amounts can be summed across any set of security types for bank  $j$ :

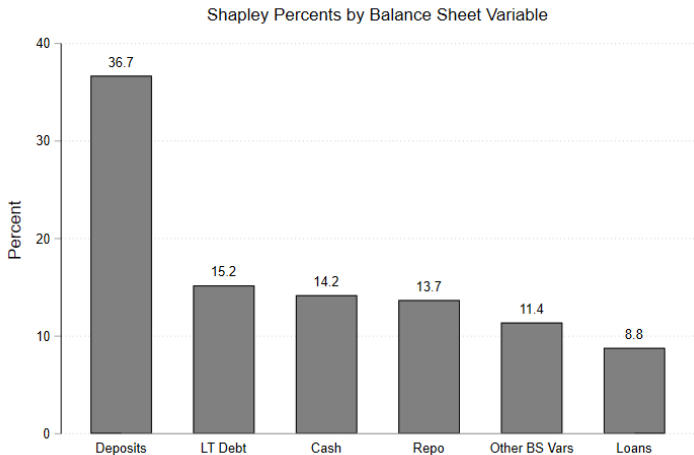
$$\Delta \text{Securities}_{j,l,t} = \sum_{i \in l} \Delta \text{Securities}_{j,i,t}$$

Details

## Stylized Facts About *Securities* and $\Delta$ *Securities*

- 20% of aggregate BHC assets in marketable securities [Figure](#)
- Can group securities by high-quality liquid assets (HQLA) status
  - 50–60% of aggregate marketable securities are HQLA [Figure](#)
  - $\approx 80\%$  of HQLA securities are agency MBS [Figure](#)
- Except for 2008q4 and a few others, BHCs as sector tend to be net purchasers of securities [Figure](#)
- BHCs adjust HQLA holdings at 5x magnitude to non-HQLA [Figure](#)

## $\Delta$ Securities Variance Decomposition within Balance Sheet



↪  $>1/3$  of explained variation in securities purchases from deposit changes

# Empirical Approach

$$\Delta \text{Securities}_{j,t} = \beta' \Delta \text{Deposits}_{j,t} + \gamma' X_{i,t} + \epsilon_{j,t}$$

- Focus on  $\Delta \text{Deposits}$  given variance decomposition
- $X_{i,t}$  includes other externally-driven BS variables: drawn loan commitments, net charge-offs, losses in security values, and retained earnings
- All variables divided by  $\text{Assets}_{j,t-1}$

# Benchmark Results

$$\Delta \text{Securities}_{j,t} = \beta' \Delta \text{Deposits}_{j,t} + \gamma' X_{i,t} + \epsilon_{j,t}$$

	(1)	(2)
$\Delta$ Deposits	0.199*** (14.90)	
$\Delta$ Deposits (Idiosyncratic, Positive)		0.219*** (10.32)
$\Delta$ Deposits (Idiosyncratic, Negative)		0.133*** (4.75)
$\Delta$ Deposits (Systematic)		0.220*** (6.85)
Other BS Controls	Yes	Yes
R <sup>2</sup>	0.171	0.165
N	2909	2823

- ↪ Asymmetric response to idiosyncratic deposit shock: more purchase upon inflow than sell upon outflow [Details](#)
- ↪ Similar findings for HQLA vs non-HQLA [Table](#)

[Summary Stats](#)
[Full Table](#)

## What factors influence selling decisions?

Bank-specific relative characteristics that may matter:

- Cash holdings
- Equity capital
- Leverage
- **NEW**: Accumulated unrealized losses

Regulatory environment as proxied by sub-period:

- 2001–2007: Pre-GFC regulatory regime and credit boom
- 2008–2009: GFC and immediate aftermath
- 2010–2015: Transition to post-GFC regulatory regime
- 2016–2022: “Modern” regulatory regime

Approach: use interaction terms to proxy for partial derivatives. For example:

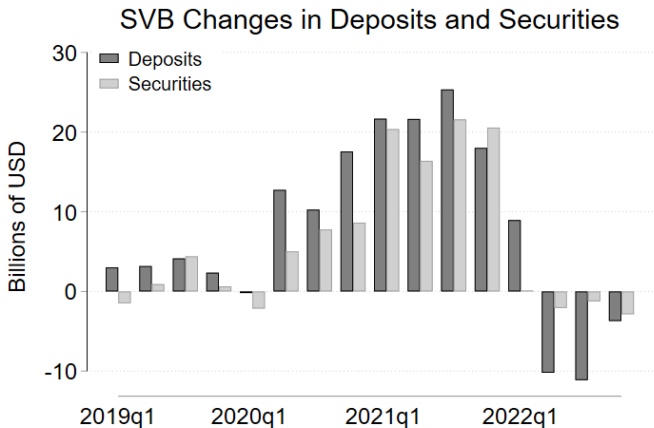
$$\frac{\partial \Delta \text{Securities}_t}{\partial \Delta \text{Deposits}_t^- \partial \text{Cash}_{t-1}} < 0 \implies \underbrace{\beta}_{>0} \Delta \text{Deposits}_t^- \times \mathbb{I}_{\text{LowCash}, t-1}$$



## Key Results with Interaction Terms

- **Cash:** banks sell more to meet withdrawals when cash holdings are low [Table](#)
- **Capitalization:** Less capitalized banks do not sell their risky securities upon a deposit withdrawal [Table](#)
- **Unrealized losses** do not mitigate securities selling [Table](#)

# Silicon Valley Bank (SVB)



↪ Large deposit flows associated with large securities purchases

↪ Muted selling response to avoid realizing losses?

## NEW: Additional Analysis with Call Report Data

- Analysis so far focuses on 36 large BHCs, what about commercial banks?
- Securities results confirmed in large sample of commercial banks:
  - 1/3 of explained variation from deposit changes [Figure](#)
  - Asymmetric response to overall deposit flows [Table](#)
- New results obtained:
  - Asymmetric buying vs selling result holds across bank size [Table](#)
  - Results similar when deposit flows are split by interest-bearing status [Table](#) or whether transaction accounts [Table](#)
  - Asymmetry mitigated within insured or uninsured deposit flows [Table](#)

# Conclusion

**Research Question:** how and why banks manage their securities portfolios?

**Summary of key findings:**

- Deposit shocks are key to explain securities activity
- Banks sell more securities to meet withdrawals when cash holdings are low
- Less capitalized banks do not sell risky securities upon a funding shock
- Unrealized losses do not mitigate securities selling

**Policy Implications:**

- Higher cash balances mitigating securities selling from BHCs
- Systemic risk from fire sales by undercapitalized banks may be overstated

Thank you!

Figure: First Page of Schedule HC-B in the FR Y-9C Reporting Form

Schedule HC-B—Securities

Dollar Amounts in Thousands	Held-to-Maturity								Available-for-Sale							
	(Column A) Amortized Cost				(Column B) Fair Value				(Column C) Amortized Cost				(Column D) Fair Value			
	BHCK	Bil	Mill	Thou	BHCK	Bil	Mill	Thou	BHCK	Bil	Mill	Thou	BHCK	Bil	Mill	Thou
1. U.S. Treasury securities .....	0211				0213				1286				1287			
2. U.S. government agency obligations (exclude mortgage-backed securities):																
a. Issued by U.S. government agencies <sup>1</sup> .....	1289				1290				1291				1293			
b. Issued by U.S. government- sponsored agencies <sup>2</sup> .....	1294				1295				1297				1298			
3. Securities issued by states and political subdivisions in the U.S. ....	8496				8497				8498				8499			
4. Mortgage-backed securities (MBS)																
a. Pass-through securities:																
(1) Guaranteed by GNMA .....	1698				1699				1701				1702			
(2) Issued by FNMA and FHLMC .....	1703				1705				1706				1707			
(3) Other pass-through securities .....	1709				1710				1711				1713			
b. Other mortgage-backed securities (include CMOs, REMICs, and stripped MBS):																
(1) Issued or guaranteed by FNMA, FHLMC, or GNMA .....	1714				1715				1716				1717			
(2) Collateralized by MBS issued or guaranteed by FNMA, FHLMC, or GNMA .....	1718				1719				1731				1732			
(3) All other mortgage-backed securities .....	1733				1734				1735				1736			
5. Asset-backed securities (ABS) .....	C026				C988				C989				C027			
6. Other debt securities:																
a. Other domestic debt securities .....	1737				1738				1739				1741			
b. Foreign debt securities .....	1742				1743				1744				1746			

Note: Picture above from the reporting form used on December 31, 2008.

## Computing Bank Selling Outcomes

For a security type  $i$ , the transition equations for the AC and FV of a bank  $j$ 's holdings in their banking book (BB) from period  $t - 1$  to  $t$  are

$$\begin{aligned}AC_{j,i,t}^{BB} &= (1 - s_{j,i,t}^{BB})AC_{j,i,t-1}^{BB} \\FV_{j,i,t}^{BB} &= (1 - s_{j,i,t}^{BB})(1 - \Psi_{j,i,t}^{BB})FV_{j,i,t-1}^{BB}\end{aligned}$$

where  $s_{j,i,t}^{BB}$  is the net share of the banking book holdings sold during the quarter and  $\Psi_{j,i,t}^{BB}$  is net percent decline in the market value of the holdings over the quarter.

Note: We are careful to use the term "net" because we do not and cannot observe gross purchases or sales during the period in the FR Y-9C data.

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## Computing Bank Selling Outcomes

Expression for net share sold of security type  $i$  by bank  $j$  in their BB between  $t - 1$  and  $t$  is

$$s_{j,i,t}^{BB} = \frac{AC_{j,i,t-1}^{BB} - AC_{j,i,t}^{BB}}{AC_{j,i,t-1}^{BB}}$$

and the expression for net percent decline in market value is

$$\psi_{j,i,t}^{BB} = 1 - \frac{FV_{j,i,t}^{BB}}{(1 - s_{j,i,t}^{BB})FV_{j,i,t-1}^{BB}}$$

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## Computing Bank Selling Outcomes

Limitation: AC values are only reported separately for securities held on the BB, not securities held in the trading book (TB).

Solution: Estimate the net share of the holdings in the TB sold of security type  $i$  by bank  $j$  using the following expression

$$s_{j,i,t}^{TB} = 1 - \frac{FV_{j,i,t}^{TB}}{FV_{j,i,t-1}^{TB}(1 - \Psi_{agg,i,t}^{BB})}$$

where  $\Psi_{agg,i,t}^{BB}$  is the net market price decline computed according to BB holdings (AC and FV) of security type  $i$  aggregated across all BHCs.

Note: We use aggregated data instead of the individual bank's data to avoid the potentially distortive impact of outlier values on the net share sold estimates.

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## Computing Amounts Sold

Converted selling to dollar amounts:

$$sold_{j,i,t}^{BB} = s_{j,i,t}^{BB} AC_{j,i,t-1}^{BB}$$

$$sold_{j,i,t}^{TB} = s_{j,i,t}^{TB} FV_{j,i,t-1}^{TB}$$

Sum the BB and TB subtotals

$$sold_{j,i,t} = sold_{j,i,t}^{BB} + sold_{j,i,t}^{TB}$$

Amounts can be summed across any set of security types for bank  $j$ :

$$sold_{j,tot,t} = \sum_i sold_{j,i,t}$$

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## Computing Unrealized Losses

Compute unrealized losses:

$$\begin{aligned} \text{unreal}_{j,i,t}^{BB} &= \left( \frac{\Psi_{j,i,t}^{BB}}{1 - \Psi_{j,i,t}^{BB}} \right) FV_{j,i,t}^{BB} \\ \text{unreal}_{j,i,t}^{TB} &= \left( \frac{\Psi_{agg,i,t}^{BB}}{1 - \Psi_{agg,i,t}^{BB}} \right) FV_{j,i,t}^{TB} \end{aligned}$$

Sum the banking and trading books subtotals

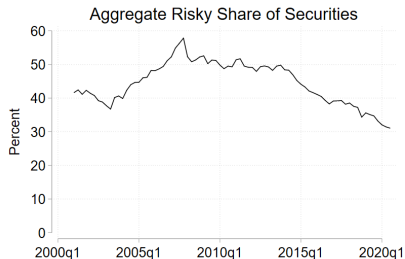
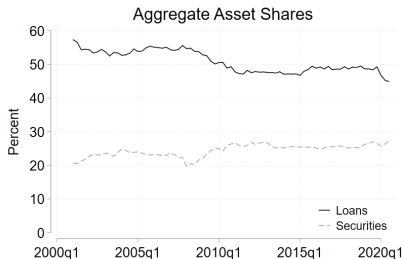
$$\text{unreal}_{j,i,t} = \text{unreal}_{j,i,t}^{BB} + \text{unreal}_{j,i,t}^{TB}$$

Amounts can be summed across any set of security types for bank  $j$ :

$$\text{unreal}_{j,tot,t} = \sum_i \text{unreal}_{j,i,t}$$

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# Bank Holding Companies in Aggregate

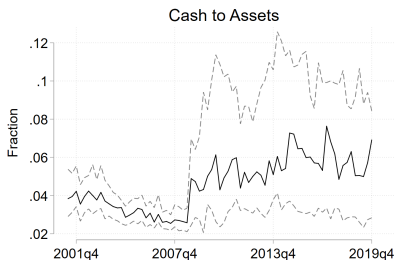
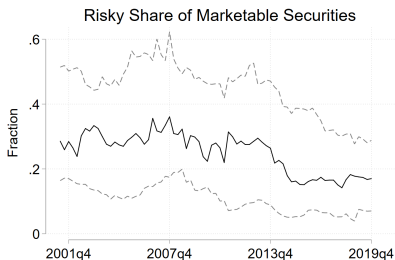
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- Around 20% of assets in marketable securities
- 40–60% of marketable securities are risky

HQLA securities: U.S. Treasury securities, U.S. government agency obligations, and agency mortgage-backed securities (MBS)

Non-HQLA (i.e., risky) securities: everything else, which include non-agency MBS, asset-backed securities (ABS), corporate debt, structured financial products (SFP), equities, and municipal bonds

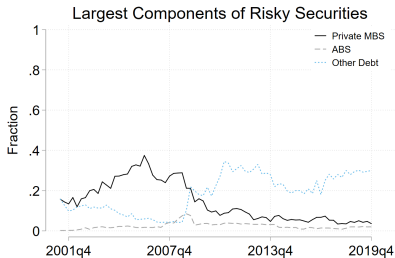
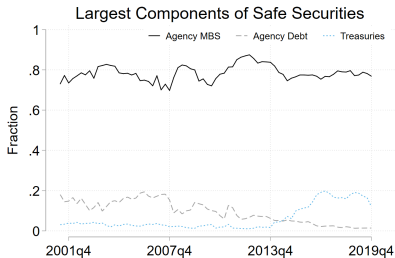
# Bank Holding Companies in Regression Sample

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Note: Solid lines are median, dashed lines are 25th/75th percentiles.

- Cross-sectional variations in risky proportions of banks' securities portfolios and relative cash holdings, particularly since GFC

# Bank Holding Companies in Regression Sample

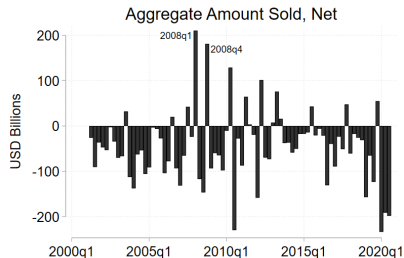
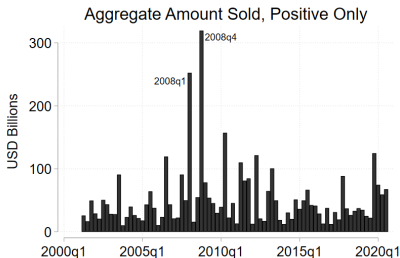
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Note: Lines are cross-sectional medians.

- Largest HQLA security type is agency MBS
- Non-HQLA securities mostly private MBS before GFC and “other” debt thereafter

# Bank Holding Company Securities Selling in Aggregate

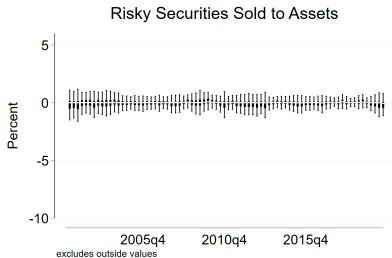
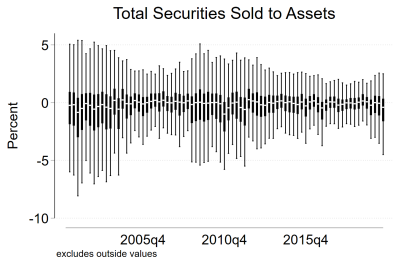
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↪ BHCs as a whole tend to be net purchasers of securities

# Securities Selling Across Bank Holding Companies

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↪ BHCs tend to adjust HQLA securities holdings (e.g., agency MBS)



## Summary Statistics for BHC-Qtr Reg Sample

	<i>N</i>	Mean	SD	1%	10%	50%	90%	99%
Securities Purchased	2909	0.58	2.05	-4.83	-1.21	0.22	2.78	9.25
Risky Securities Purchased	2909	0.14	0.94	-2.92	-0.52	-0.00	1.02	4.35
Unreal. Losses Securities	2909	0.03	0.30	-0.73	-0.27	0.01	0.34	1.35
New Loans	2909	0.54	4.93	-18.90	-2.82	0.19	3.94	26.67
$\Delta$ Unuse. Comm.	2909	0.64	4.08	-16.79	-1.64	0.44	3.06	21.79
Net Chargeoffs	2909	0.10	0.14	-0.01	0.00	0.05	0.24	0.76
New Cash	2909	0.20	2.09	-6.19	-1.83	0.04	2.30	8.30
New Other Assets	2909	0.24	1.56	-4.66	-1.11	0.09	1.70	6.88
$\Delta$ Deposits	2909	1.68	4.15	-6.05	-1.71	0.99	5.29	25.83
$\Delta$ FFP	2761	-0.01	0.80	-3.02	-0.64	0.00	0.65	3.08
New Other Borrowing	2909	0.22	2.01	-5.62	-1.88	0.05	2.53	7.78
Net Equity Payout	2909	0.01	0.57	-2.32	-0.62	0.09	0.37	2.22
$\Delta$ Equity through RE	2909	0.04	0.70	-3.22	-0.73	0.20	0.53	2.11

Note: All variables are computed as percent of  $Assets_{t-1}$ .

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## Benchmark Results (Full)

	(1)	(2)
$\Delta$ Deposits	0.199*** (14.90)	
$\Delta$ Deposits (Idiosyncratic, Positive)		0.219*** (10.32)
$\Delta$ Deposits (Idiosyncratic, Negative)		0.133*** (4.75)
$\Delta$ Deposits (Systematic)		0.220*** (6.85)
$\Delta$ Unuse. Comm.	0.005 (0.51)	0.006 (0.67)
Net Chargeoffs	-0.037 (-0.15)	0.033 (0.13)
Unreal. Losses Securities	0.543*** (3.50)	0.617*** (3.85)
$\Delta$ Equity through RE	0.005 (0.09)	0.006 (0.11)
Constant	0.002*** (4.70)	0.001 (1.13)
$R^2$	0.171	0.165
$N$	2909	2823

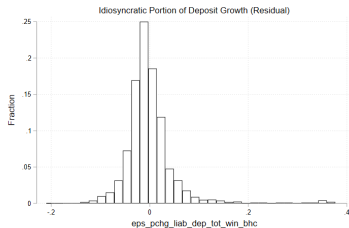
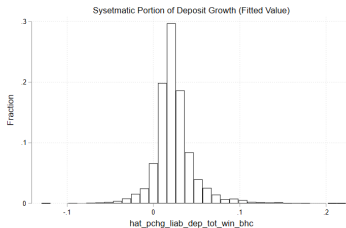
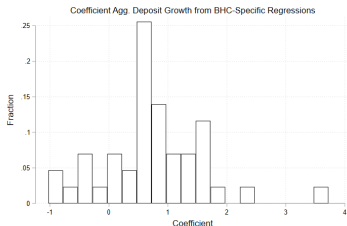
# Bank-level Deposit Growth: Systematic vs Idiosyncratic

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged Bank-level Deposit Growth		-0.026 (-1.30)			-0.048** (-2.31)		-0.051** (-2.44)
Agg. Comm. Bank Deposit Growth			0.792*** (7.90)		0.736*** (7.15)		
$\Delta$ Eff. Fed. Funds Rate				-0.014*** (-4.68)	-0.006* (-1.85)		
Constant	0.024*** (21.55)	0.024*** (20.07)	0.010*** (4.92)	0.024*** (21.69)	0.012*** (5.46)	0.024*** (22.17)	0.025*** (21.01)
Quarter FE	No	No	No	No	No	Yes	Yes
R <sup>2</sup>	0.000	0.001	0.036	0.014	0.041	0.084	0.088
N	2866	2823	2866	2866	2823	2866	2823

- Majority of bank-qtr-level variation in deposits are idiosyncratic
- Use fitted values and residuals from (5) *at the BHC-level* to measure systematic and idiosyncratic portions [Figures](#)

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# Bank-level Deposit Growth: Systematic vs Idiosyncratic



- ↪ Cross-sectional variation in agg. deposit growth betas
- ↪ Cross-sectional variation in portions

## Changes in Non-HQLA vs HQLA Securities

	Any Type	Non-HQLA Only	HQLA Only
$\Delta$ Deposits (Idiosyncratic, Positive)	0.219*** (10.32)	0.056*** (4.95)	0.158*** (8.36)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.133*** (4.75)	0.039*** (2.79)	0.071*** (2.97)
$\Delta$ Deposits (Systematic)	0.220*** (6.85)	0.053*** (3.70)	0.146*** (5.20)
Other BS Controls	Yes	Yes	Yes
R <sup>2</sup>	0.165	0.052	0.114
N	2823	2823	2823

↪ Similar  $\Delta$  Deposits findings for non-HQLA vs HQLA securities but (1) lesser coefficient magnitudes and (2) less variance explained

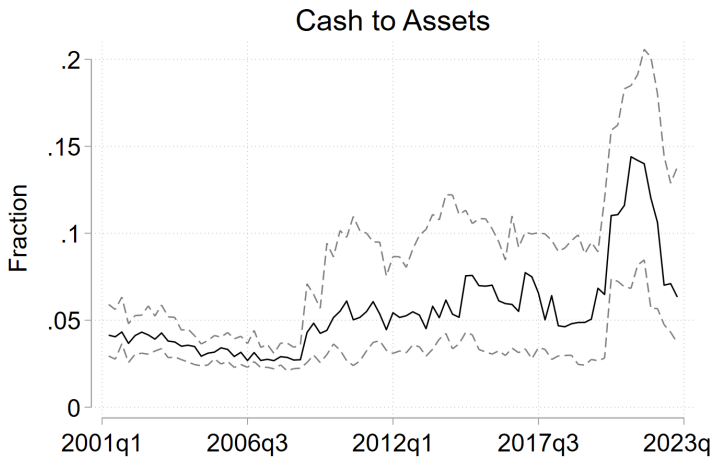
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[Full Table](#)

## New Securities: Non-HQLA vs HQLA (Full)

	Any Type	Non-HQLA Only	HQLA Only
$\Delta$ Deposits (Idiosyncratic, Positive)	0.219*** (10.32)	0.056*** (4.95)	0.158*** (8.36)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.133*** (4.75)	0.039*** (2.79)	0.071*** (2.97)
$\Delta$ Deposits (Systematic)	0.220*** (6.85)	0.053*** (3.70)	0.146*** (5.20)
$\Delta$ Unuse. Comm.	0.006 (0.67)	-0.006 (-1.24)	0.013 (1.59)
Net Chargeoffs	0.033 (0.13)	-0.289** (-2.01)	0.307 (1.48)
Unreal. Losses Securities	0.617*** (3.85)	0.044 (0.56)	0.593*** (4.16)
$\Delta$ Equity through RE	0.006 (0.11)	-0.016 (-0.50)	0.010 (0.21)
Constant	0.001 (1.13)	0.001 (1.61)	0.000 (0.50)
$R^2$	0.165	0.052	0.114
$N$	2823	2823	2823

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# Cash Holdings Over Time



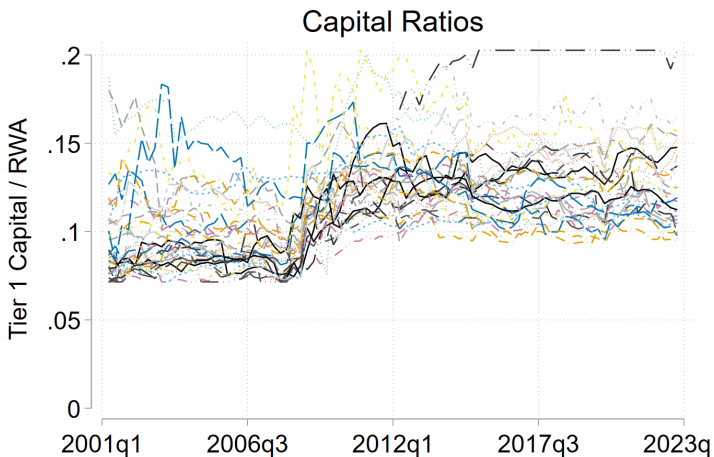
# Impact of Initial Cash Holdings

	(1)	(2)	(3)	(4)
$\Delta$ Deposits (Idiosyncratic, Positive)	0.219*** (10.32)	0.212*** (7.30)	0.196*** (7.83)	0.191*** (5.47)
x Cash Ratio $\leq$ 4%		0.008 (0.21)		0.003 (0.07)
x Post-2016 Dummy			0.062 (1.61)	0.052 (0.93)
x Cash Ratio $\leq$ 4% x Post-2016 Dummy				0.023 (0.30)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.133*** (4.75)	0.082*** (2.61)	0.149*** (4.71)	0.079* (1.96)
x Cash Ratio $\leq$ 4%		0.168*** (4.43)		0.186*** (4.01)
x Post-2016 Dummy			-0.051 (-1.23)	0.009 (0.19)
x Cash Ratio $\leq$ 4% x Post-2016 Dummy				-0.090 (-0.88)
$\Delta$ Equity through RE	0.006 (0.11)	0.002 (0.04)	0.014 (0.25)	0.010 (0.17)
Other BS Controls				
R <sup>2</sup>	0.165	0.171	0.167	0.173
N	2823	2823	2823	2823

- ↪ Banks sell more securities in response to deposit shocks when cash holdings are relatively low
- ↪ No difference in post-2016 period including the LCR



# Capital Ratios Over Time



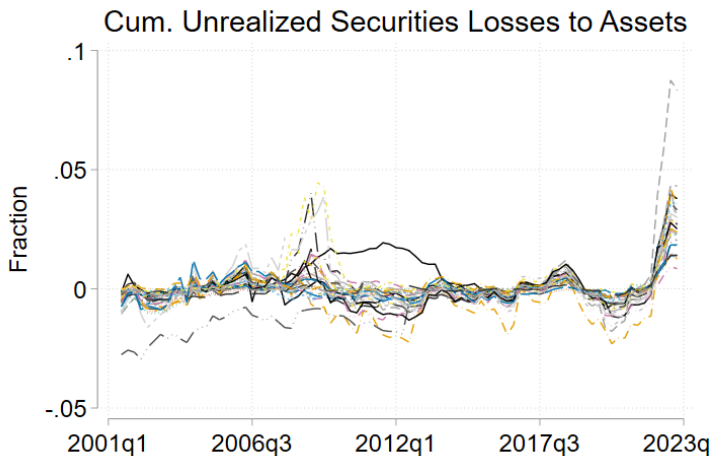
↪ Since 2012, all BHCs in sample have capital ratio above 10%

## Impact of Equity Capitalization

	(1)	(2)	(3)
	All Securities	HQLA	Non-HQLA
$\Delta$ Deposits (Idiosyncratic, Positive)	0.241*** (9.46)	0.190*** (8.41)	0.049*** (3.69)
× Cap Ratio $\leq$ 10%	-0.101*** (-2.75)	-0.098*** (-3.25)	0.001 (0.03)
× GFC Dummy	0.213** (2.02)	-0.079 (-0.82)	0.157*** (3.71)
× Cap Ratio $\leq$ 10% × GFC Dummy	-0.148 (-1.06)	0.083 (0.68)	-0.097 (-1.57)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.119*** (3.73)	0.050* (1.77)	0.045*** (2.83)
× Cap Ratio $\leq$ 10%	0.020 (0.48)	0.083** (2.32)	-0.045* (-1.94)
× GFC Dummy	0.053 (0.47)	0.008 (0.09)	0.018 (0.34)
× Cap Ratio $\leq$ 10% × GFC Dummy	-0.002 (-0.01)	0.002 (0.02)	0.018 (0.26)
R <sup>2</sup>	0.172	0.122	0.061
N	2823	2823	2823

- ↪ Less capitalized banks do not sell non-HQLA upon outflow  $\implies$  do not amplify fire sales (Rosen, 2019)
- ↪ Less capitalized banks buy less HQLA upon inflow and sell more upon outflow
- ↪ Banks purchased more non-HQLA upon inflow during GFC consistent with fire sale discounts (e.g., Shleifer and Vishny, 2010)

# Cumulative Unrealized Losses Over Time



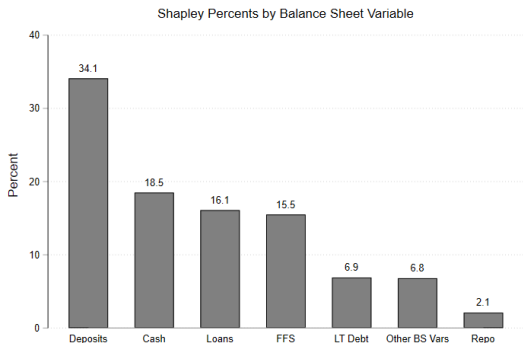
↪ 2022 is not only period banks holding non-trivial unrealized losses

## Impact of Cumulative Unrealized Losses

	(1)	(2)	(3)
	All Securities	HQLA	Non-HQLA
$\Delta$ Deposits (Idiosyncratic, Positive)	0.215***	0.167***	0.045***
	(9.52)	(8.47)	(3.87)
× Cum. Unreal. Loss Ratio > 1%	0.025	-0.062	0.075***
	(0.43)	(-1.16)	(2.58)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.130***	0.072***	0.037***
	(4.69)	(2.92)	(2.62)
× Cum. Unreal. Loss Ratio > 1%	0.024	-0.021	0.036
	(0.27)	(-0.31)	(0.85)
$R^2$	0.165	0.116	0.059
$N$	2823	2823	2823

↪ Null result: unrealized losses do not mitigate selling upon deposit outflow

## Variance Decompositions: Shapley Percentages



- $>1/3$  of explained variation in securities purchases from deposit changes
- Compared to BHC sample, more variance explained by other asset changes

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## Benchmark Results with Commercial Banks

	(1)	(2)
$\Delta$ Deposits	0.143*** (116.97)	
$\Delta$ Deposits (Idiosyncratic Bank-Specific, Positive)		0.180*** (77.16)
$\Delta$ Deposits (Idiosyncratic Bank-Specific, Negative)		0.105*** (51.83)
$\Delta$ Deposits (Systematic Bank-Specific)		0.088*** (36.56)
$R^2$	0.081	0.076
$N$	424405	418622

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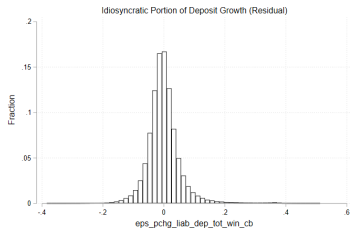
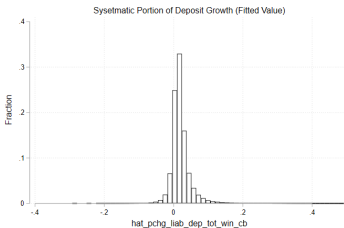
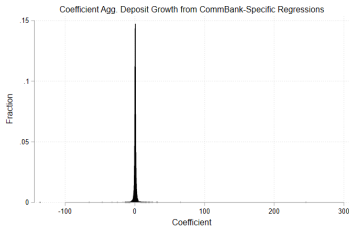
# Bank-level Deposit Growth: Systematic vs Idiosyncratic

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged Bank-level Deposit Growth		0.150*** (56.41)			0.148*** (55.70)		0.145*** (53.30)
Agg. Comm. Bank Deposit Growth			0.599*** (84.29)		0.553*** (72.36)		
$\Delta$ Eff. Fed. Funds Rate				-0.007*** (-35.79)	-0.002*** (-8.59)		
Constant	0.022*** (242.82)	0.018*** (201.05)	0.011*** (72.75)	0.021*** (241.15)	0.008*** (48.63)	0.022*** (247.64)	0.018*** (204.59)
Quarter FE	No	No	No	No	No	Yes	Yes
R <sup>2</sup>	0.000	0.024	0.014	0.003	0.038	0.039	0.061
N	590643	580032	590643	590643	580032	590643	580032

- Majority of bank-qr-level variation in deposits are idiosyncratic
- Use fitted values and residuals from (5) *at the BHC-level* to measure systematic and idiosyncratic portions [Figures](#)

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# Bank-level Deposit Growth: Systematic vs Idiosyncratic



- ↪ Cross-sectional variation in agg. deposit growth betas
- ↪ Cross-sectional variation in portions



# Bank Size

	(1) All	(2) < \$1 bln	(3) 1-10 bln	(4) 10-50 bln	(5) Over 50 bln
$\Delta$ Deposits (Idiosyncratic, Positive)	0.180*** (77.16)	0.176*** (69.79)	0.204*** (30.67)	0.202*** (11.71)	0.271*** (9.78)
$\Delta$ Deposits (Idiosyncratic, Negative)	0.105*** (51.83)	0.107*** (49.53)	0.086*** (13.58)	0.101*** (5.26)	0.117*** (4.30)
$\Delta$ Deposits (Systematic)	0.088*** (36.56)	0.085*** (32.55)	0.095*** (13.14)	0.152*** (6.77)	0.182*** (5.79)
$R^2$	.07642944	.07192515	.11177345	.13522212	.18226768
$N$	4.19e+05	3.70e+05	40841.000	5099.000	2506.000

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## Deposit Flows by Interest-bearing Status

	(1)	(2)	(3)	(4)	(5)
	All	< \$1 bln	1-10 bln	10-50 bln	Over 50 bln
$\Delta$ Noninterest-bearing Deposits (Positive)	0.127*** (39.98)	0.121*** (35.48)	0.150*** (15.97)	0.186*** (6.89)	0.258*** (5.74)
$\Delta$ Noninterest-bearing Deposits (Negative)	0.100*** (23.32)	0.099*** (21.85)	0.095*** (6.55)	0.119** (2.48)	0.124** (2.43)
$\Delta$ Interest-bearing Deposits (Positive)	0.154*** (82.67)	0.151*** (75.83)	0.171*** (30.51)	0.170*** (10.70)	0.212*** (8.96)
$\Delta$ Interest-bearing Deposits (Negative)	0.131*** (47.30)	0.131*** (45.00)	0.118*** (12.36)	0.134*** (4.67)	0.119** (2.57)
$R^2$	0.084	0.079	0.126	0.155	0.209
$N$	424405	375670	41077	5138	2520

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# Deposit Flows by Transaction Status

	(1)	(2)	(3)	(4)	(5)
	All	< \$1 bln	1-10 bln	10-50 bln	Over 50 bln
$\Delta$ Transaction Deposits (Positive)	0.163*** (62.32)	0.162*** (58.26)	0.176*** (20.88)	0.233*** (8.89)	0.177*** (4.07)
$\Delta$ Transaction Deposits (Negative)	0.106*** (31.30)	0.102*** (28.57)	0.119*** (10.37)	0.127*** (3.82)	0.141** (2.58)
$\Delta$ Nontransaction Deposits (Positive)	0.139*** (73.04)	0.135*** (64.95)	0.157*** (29.28)	0.162*** (11.38)	0.247*** (10.72)
$\Delta$ Nontransaction Deposits (Negative)	0.143*** (47.14)	0.146*** (45.26)	0.129*** (13.16)	0.142*** (4.66)	0.121*** (2.71)
$R^2$	0.084	0.079	0.122	0.154	0.190
$N$	424405	375670	41077	5138	2520

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## Deposit Flows by Insured Status

	(1)	(2)	(3)	(4)	(5)
	All	< \$1 bln	1-10 bln	10-50 bln	Over 50 bln
$\Delta$ Uninsured Deposits (Positive)	0.133*** (34.93)	0.132*** (28.63)	0.128*** (17.44)	0.157*** (8.48)	0.205*** (6.91)
$\Delta$ Uninsured Deposits (Negative)	0.164*** (31.61)	0.171*** (26.41)	0.149*** (15.96)	0.145*** (5.65)	0.147*** (4.37)
$\Delta$ Insured Deposits (Positive)	0.163*** (49.36)	0.166*** (40.61)	0.158*** (26.29)	0.154*** (10.17)	0.176*** (6.10)
$\Delta$ Insured Deposits (Negative)	0.116*** (26.90)	0.115*** (22.14)	0.097*** (11.40)	0.146*** (6.51)	0.225*** (6.45)
$R^2$	0.098	0.092	0.109	0.159	0.197
$N$	132217	87833	36780	5092	2512

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