Security Losses, Interbank Markets, and Monetary Policy Transmission:

Evidence from the Eurozone

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- **This paper: Securities losses can reduce credit supply even in well-capitalized banking systems**
- Mechanism:
  - Banks face inherent **liquidity risk** due to the maturity mismatch (Diamond and Rajan, 2001, 2005).
  - To manage negative liquidity shocks, banks **pledge securities as collateral** in interbank markets.
  - The **falling value of collateral holdings** lowers borrowing capacity in interbank markets
    $\Rightarrow$ Limits banks' ability to **insure liquidity risk** and **extend illiquid loans** to the private sector.

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Empirical evidence on the bank-based collateral channel of monetary policy remains limited.

This Paper

What is the effect of monetary policy on bank lending through the collateral channel?

- July 2022: The ECB raised the policy interest rate in response to increasing inflation.
  - Large heterogeneity in *security losses* across banks related to the ex-ante securities holdings and duration.
- Leverage micro-level data from the euro area:
  - Banks' securities holdings
  - Interbank lending
  - Firm-level credit registry
- We explore the effects of monetary tightening through security losses and examine the underlying mechanism.

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- Interbank Market
  - Losses in pledgeable securities reduce access to the interbank market.
  - Effect is stronger for banks with high collateral utilization.
  - No effect for banks' unsecured borrowing $\Rightarrow$ collateral constraint, not creditworthiness.
  - No differential effect based on capitalization.
  - Both AFS and HTM securities matter $\Rightarrow$ not driven by regulatory capital concerns.

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$\Longrightarrow$ Incomplete Banking Union: Internal capital markets do not overcome national segmentation. Local liquidity pools and deposit insurance firewalls continue to fragment monetary policy transmission within the euro area.

Related Literature

- **Transmission mechanism of monetary policy**
  - Jimenez et al. (2012), Rodnyansky and Darmouni (2017), Acharya et al. (2018), Gomez et al. (2021), Greenwald et al. (2024) ...
  - $\Longrightarrow$ Existing literature has highlighted the role of bank net wealth and regulatory capital. We show that lower pledgeable collateral restricts interbank access and lending.
  - Most related: **An asset liquidity channel: Synergies between the liquidity of bank portfolios and bank lending** (Altavilla, Bouchinca, Burlon, Giannetti, and Schumacker (2025) focus on excess reserve holdings; we consider the value of securities)
- **Collateral Channel of Monetary Policy**
  - Theoretical foundations: Bernanke and Gertler (1989); Kiyotaki and Moore (1997)...
  - Firm-level evidence: Chaney et al. (2012), Cvijanovic (2014), Adelino et al. (2015), Bahaj et al. (2020, 2022)...
  - $\Longrightarrow$ First empirical evidence on a **bank-based** collateral channel affecting both funding and lending
- **International transmission of bank liquidity shocks**
  - Peek and Rosengren (2000), Schnabl (2012), Campello (2002), Cetorelli and Goldberg (2012a and b) Gilje, Loutskina, and Strahan (2016), Morais et al. (2019)...
  - $\Longrightarrow$ We rely on granular data on interbank and within group loans to document the mechanism; First evidence that foreign subsidiaries benefit less from within group risk sharing

Security Losses

Computes the effect of the monetary policy tightening on the value of securities:

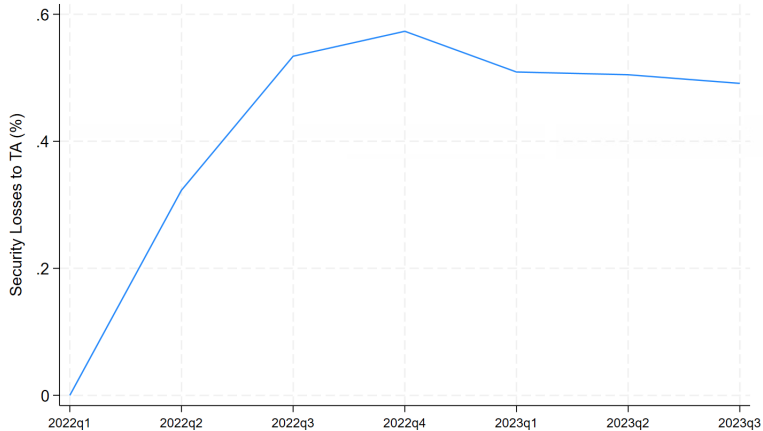
$$\text{Security Losses}_{b,t} = \frac{\sum_s \left(\frac{P^s_t - P^s_{2022Q1}}{P^s_{2022Q1}} \times \text{Value Held}^s_{b,2022Q1} \right)}{\text{Total Assets}_{b,2022Q1}}$$

- s = security (ISIN), b = bank, t = quarter
- Captures the change in value of a bank's ex-ante securities portfolio based on fluctuations in individual security prices.
- Treating a bank's ex-ante security holdings as fixed

Construct security losses for:

1. All securities
2. HTM vs. AFS respectively

Security Losses Over Time



- Most of the losses were realized in Q2 and Q3 of 2022, following the first interest rate hike.
- Securities in our sample are primarily sovereign bonds $\rightarrow$ political and country risk effects are absorbed by country × time FE.

Security Losses, Security Holdings and Bank Characteristics

	Security Losses							Security Holdings					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Security Holdings$_b$/TA$_b$	0.0554*** (0.00264)	0.0535*** (0.00300)	0.0535*** (0.00301)	0.0543*** (0.00341)	0.0537*** (0.00352)	0.0523*** (0.00364)	0.0507*** (0.00324)						
log(TA$_b$)		-0.000267 (0.000201)	-0.000347 (0.000229)	-0.000392 (0.000278)	-0.000503 (0.000321)	-0.000525 (0.000321)	-0.000197 (0.000292)	-0.0321*** (0.00261)	-0.0323*** (0.00307)	-0.0206*** (0.00376)	-0.0296*** (0.00412)	-0.0286*** (0.00401)	-0.0251*** (0.00418)
Deposits$_b$/TA$_b$			-0.00137 (0.00199)	-0.00221 (0.00226)	-0.00231 (0.00227)	-0.000205 (0.00272)	0.00119 (0.00255)		-0.00273 (0.0283)	-0.0472 (0.0310)	-0.0606 (0.0454)	0.0414 (0.0353)	0.0724 (0.0480)
Excess Liquidity$_b$/TA$_b$				-0.00126 (0.00581)	-0.00213 (0.00595)	-0.000398 (0.00607)	-0.00391 (0.00530)			-0.365*** (0.0779)	-0.406*** (0.0765)	-0.285*** (0.0778)	-0.309*** (0.0772)
ECB Borrowing$_b$/TA$_b$					0.00663 (0.00956)	0.0111 (0.0101)	-0.00693 (0.00889)				0.587*** (0.123)	0.742*** (0.123)	0.686*** (0.125)
Interbank Borrowing$_b$/TA$_b$						0.00680 (0.00488)	-0.0000627 (0.00435)					0.328*** (0.0621)	0.339*** (0.0633)
Total Capital Ratio$_b$							0.00294 (0.00222)						0.0284 (0.0327)
N	498	498	498	498	498	498	498	498	498	498	498	498	498
R^2	0.464	0.466	0.466	0.467	0.467	0.468	0.468	0.229	0.230	0.230	0.230	0.231	0.231

- Security losses are large for banks with large holdings of securities.
  Not correlated with banks' characteristics, such as **capitalization, reliance on deposits or asset liquidity**
- Security holdings are **negatively correlated with banks' excess reserve holdings**
  $\rightarrow$ securities are a substitute for excess liquidity.
- Banks with high security holdings borrow more in the **interbank market** and from the **central bank**
  $\rightarrow$ security holdings are a crucial means of accessing liquidity.

Security Losses and the Interbank Market

Impact of Security Losses on Interbank Borrowing

$$\text{Loan amount}_{b,c,l,h,t} = \alpha + \beta \text{ Security Losses}_{b,t-1} + \delta_{b,l} + \mu_{c,t} + \theta_{h,t} + \epsilon_{b,c,l,h,t}$$

	Loan Amount			
	(1)	(2)	(3)	(4)
All Security Losses$_{b,t-1}$	-3.691***			
	(1.403)			
Collateral Security Losses$_{b,t-1}$		-9.006***		-6.226*
		(3.211)		(3.325)
Non-Collateral Security Losses$_{b,t-1}$			-1.236	
			(1.014)	
Collateral Security Losses$_{b,t-1}$ × Collateral Util. Rate$_{b,2022q1}$				-4.939***
				(1.251)
Bank Lender – Bank Borrower FE	Yes	Yes	Yes	Yes
Country Lender – Time FE	Yes	Yes	Yes	Yes
Country Borrower – Time FE	Yes	Yes	Yes	Yes
N	120,799	120,005	120,005	99,344
R^2	0.899	0.898	0.898	0.896

- Following the MP tightening, banks with more security losses receive less credit in the interbank market.
- 1 s.d. ↑ in banks' losses is associated with a 3.76% decline in credit received in the interbank market.

Impact of Security Losses on Interbank Borrowing

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Collateral channel

- A decrease in the value of pledgeable securities reduces banks' interbank borrowing capacity.
- We do not observe an analogous effect for nonpledgeable securities.

Impact of Security Losses on Interbank Borrowing

$$\text{Loan amount}_{b,c,l,h,t} = \alpha + \beta \text{ Security Losses}_{b,t-1} + \delta_{b,l} + \mu_{c,t} + \theta_{h,t} + \epsilon_{b,c,l,h,t}$$

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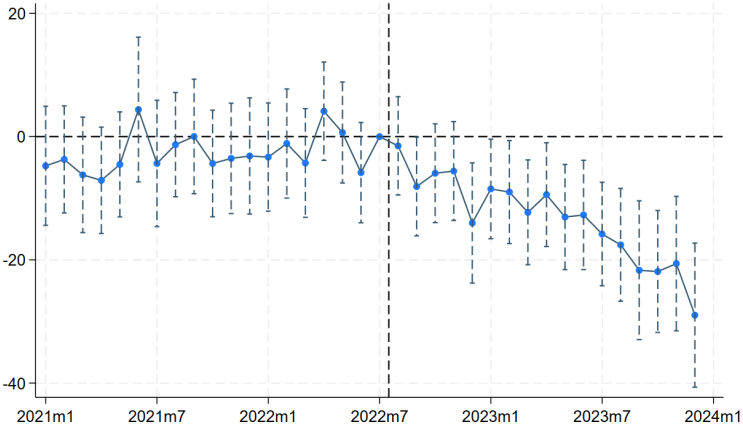
Collateral channel

- Banks that rely heavily on securities as collateral experience a larger drop in interbank borrowing.

Impact of Security Losses on Interbank Borrowing: Dynamic Effects

$$\text{Loan amount}_{b,c,l,h,t} = \alpha + \sum_{k \neq 2022m7} \beta_k (\text{Collateral Security Losses}_{b,2023Q4} \times \mathbf{1}_{t=k}) + \delta_{b,l} + \mu_{c,t} + \theta_{h,t} + \epsilon_{b,c,l,h,t}$$



Impact of Security Losses on Interbank Borrowing: Channels

	Loan Amount			
	Repo	Non-Repo	All Instruments	
	(1)	(2)	(3)	(4)
Collateral Security Losses$_{b,t-1}$	-25.22***	2.480	-9.953***	
	(5.602)	(4.592)	(3.632)	
Collateral Security Losses$_{b,t-1}$ × Total Capital Ratio$_{b,2022q1}$			2.088	
			(3.458)	
AFS Security Losses$_{b,t-1}$				-13.24**
				(5.441)
HTM Security Losses$_{b,t-1}$				-6.930**
				(3.325)
Bank Lender – Bank Borrower FE	Yes	Yes	Yes	Yes
Country Lender – Time FE	Yes	Yes	Yes	Yes
Country Borrower – Time FE	Yes	Yes	Yes	Yes
N	13,258	85,280	120,005	120,005
R^2	0.809	0.888	0.898	0.898

Collateral channel

- Security losses have an effect only on the amount that a bank is able to borrow through the repo market.
- Security losses appear to have no effect on banks' access to the unsecured market.

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Alternative channel: Net worth

- The impact of security losses is not stronger for banks with lower ex-ante capital ratios.

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Alternative channel: Net worth

- Marked-to-market AFS securities affect bank capital requirements
- Finding: Losses on both AFS and HTM securities reduce banks' access to interbank credit.

Liquidity Redistribution Within Banking Groups

Intragroup Lending Offsets Collateral Losses of Borrowing Banks

	Loan Amount	
	Borrowing Banks' Losses	
	Between Groups	Within Group
	(1)	(2)
Collateral Security Losses$_{b,t-1}$	-16.73***	13.61***
	(3.778)	(3.971)
Bank Lender – Bank Borrower FE	Yes	Yes
Country Lender – Time FE	Yes	Yes
Country Borrower – Time FE	Yes	Yes
N	99,134	20,855
R^2	0.881	0.907

1. The decrease in interbank borrowing is entirely driven by lending from banks outside the banking group
2. Intra-group lending has a counteracting effect
   - 1 s.d. ↑ in losses is associated with a 13.6% increase in intra-group credit.

Banking Group Liquidity Support: Domestic vs. Foreign Subsidiaries

Lending by:	Loan Amount		
	All	Foreign subs.	Domestic subs.
	(1)	(2)	(3)
Collateral Security Losses$_{b,t-1}$ × Foreign$_b$	3.573	71.22*	-4.625
	(12.72)	(39.40)	(13.57)
Collateral Security Losses$_{b,t-1}$ × Domestic$_b$	9.948***	8.796	5.346*
	(3.834)	(7.820)	(2.956)
Bank Lender – Bank Borrower FE	Yes	Yes	Yes
Country Lender – Time FE	Yes	Yes	Yes
Country Borrower – Time FE	Yes	Yes	Yes
N	16,132	1,420	15,214
R^2	0.910	0.867	0.922

- **Only domestic subsidiaries** receive more intra-group loans in response to security losses.

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- Foreign subsidiaries lend across borders, while domestic subsidiaries lend within the headquarters' country.
- **Internal capital markets exhibit border effects:** national deposit insurance and local liquidity pools.
- No evidence of border effects for external capital markets. Details

Corporate Lending

Security Losses and Bank Lending to Firms

$$\text{Loan Amount}_{b,g,f,t} = \alpha + \beta\ \text{Security Losses}_{b,t-1} + \gamma X_{b,t} + \delta_{f,t} + \mu_{g,t} + \theta_{b,f} + \epsilon_{b,g,f,t}$$

	Loan Amount		
	(1)	(2)	(3)
Collateral Security Losses$_{b,t-1}$	-2.910***	-2.542***	-5.476***
	(0.572)	(0.541)	(0.576)
Bank Controls	No	Yes	Yes
Bank – Firm FE	Yes	Yes	Yes
Firm – Time FE	Yes	Yes	Yes
Banking Group – Time FE	No	No	Yes
N	16,290,844	16,290,840	16,290,839
R^2	0.972	0.972	0.972

- Banks that experience larger security losses lend less to a given firm relative to other banks.
- 1 s.d. increase in banks' losses is associated with a 5.48% decline in lending to firms.

Security Losses and Bank Lending to Firms

$$\text{Loan Amount}_{b,g,f,t} = \alpha + \beta\ \text{Security Losses}_{b,t-1} + \gamma X_{b,t} + \delta_{f,t} + \mu_{g,t} + \theta_{b,f} + \epsilon_{b,g,f,t}$$

	Loan Amount						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collateral Security Losses$_{b,t-1}$	-2.910***	-2.542***	-5.476***				
	(0.572)	(0.541)	(0.576)				
Collateral HTM Security Losses$_{b,t-1}$				−2.903***		-3.025***	-3.370***
				(0.572)		(0.566)	(0.599)
Collateral AFS Security Losses$_{b,t-1}$					-1.460	-2.228	-10.971***
					(2.558)	(2.406)	(3.999)
Collateral AFS Security Losses$_{b,t-1}$ ×Total Capital Ratio$_{b,2022q1}$							45.846**
							(19.189)
Bank Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Bank – Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm – Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banking Group – Time FE	No	No	Yes	No	No	No	No
N	16,290,844	16,290,840	16,290,839	16,290,840	16,290,840	16,290,840	15,803,384
R^2	0.972	0.972	0.972	0.972	0.972	0.972	0.972

- Lending declines are primarily driven by the losses in securities accounted for at historical cost.
- The negative effect of AFS securities losses is larger for banks with lower regulatory capital (Greenwald et al., 2024)

Security Losses, Bank Lending to Firms and Collateral Channel

	Loan Amount		
	(1)	(2)	(3)
Collateral Security Losses$_{b,t-1}$	-1.982***	-3.922***	-9.542***
	(0.671)	(1.020)	(3.982)
Collateral Security Losses$_{b,t-1}$ × Collateral Utilization Rate$_{b,2022q1}$	-1.406***		
	(0.541)		
Collateral Security Losses$_{b,t-1}$ × Excess Liquidity$_{b,2022q1}$		6.798**	
		(2.503)	
Collateral Security Losses$_{b,t-1}$ × NSFR$_{b,2022q1}$			5.924***
			(2.816)
Bank Controls	Yes	Yes	Yes
Bank – Firm FE	Yes	Yes	Yes
Firm – Time FE	Yes	Yes	Yes
N	12,536,518	12,610,601	6,072,838
R^2	0.968	0.968	0.974

Negative effect of securities losses is stronger for banks:

- with high collateral utilization ⇒ collateral scarcity leads to a sharper contraction in bank lending following
- with low excess liquidity ⇒ weaker buffers against shocks, stronger reduction in credit supply
- with less stable funding (low NSFR) ⇒ effect is attenuated when liabilities are more stable

Security Losses, Banking Group Structure and Lending

	Loan Amount		
	All Banks	Domestic Banks	Banking Groups
	(1)	(2)	(3)
Collateral Security Losses$_{b,t-1}$ × Stand-Alone Bank$_b$	-6.761***	-7.368***	
	(2.052)	(2.064)	
Collateral Security Losses$_{b,t-1}$ × Subsidiary$_b$	-1.951***	-1.985***	
	(0.8181)	(0.855)	
Collateral Security Losses$_{b,t-1}$ × Foreign Subsidiary$_b$			-4.125***
			(1.093)
Collateral Security Losses$_{b,t-1}$ × Domestic Subsidiary$_b$			-1.446***
			(0.556)
Bank Controls	No	No	No
Bank – Firm FE	Yes	Yes	Yes
Firm – Time FE	Yes	Yes	Yes
Banking Group – Time FE	No	No	Yes
N	16,290,844	13,748,918	10,611,217
R^2	0.972	0.972	0.974

- One euro of security losses translates into a larger contraction in lending for stand-alone banks rather than for subsidiaries of banking groups

Security Losses, Banking Group Structure and Lending: Within Banking Groups

	Loan Amount		
	All Banks	Domestic Banks	Banking Groups
	(1)	(2)	(3)
Collateral Security Losses$_{b,t-1}$ × Stand-Alone Bank$_b$	-6.761***	-7.368***	
	(2.052)	(2.064)	
Collateral Security Losses$_{b,t-1}$ × Subsidiary$_b$	-1.951***	-1.985***	
	(0.8181)	(0.855)	
Collateral Security Losses$_{b,t-1}$ × Foreign Subsidiary$_b$			-4.125***
			(1.093)
Collateral Security Losses$_{b,t-1}$ × Domestic Subsidiary$_b$			-1.446***
			(0.556)
Bank Controls	No	No	No
Bank – Firm FE	Yes	Yes	Yes
Firm – Time FE	Yes	Yes	Yes
Banking Group – Time FE	No	No	Yes
N	16,290,844	13,748,918	10,611,217
R^2	0.972	0.972	0.974

- Foreign subsidiaries contract credit more than domestic ones for the same euro amount of losses.
- This is consistent with the finding that foreign subsidiaries do not benefit from liquidity redistribution.

Conclusion

- We document a collateral channel in the bank-based transmission of monetary policy.
- Monetary tightenings reduce the value of securities, limiting interbank liquidity and lowering credit supply.
  $\Rightarrow$ High security holdings make banks more sensitive to monetary policy shocks
- Differences in banking structure (standalone banks, domestic and foreign banking groups) may mitigate or amplify asymmetries in monetary transmission
  - Internal capital markets help domestic subsidiaries mitigate the adverse effects of security losses.

Additional Material

Security losses vary significantly by bank type

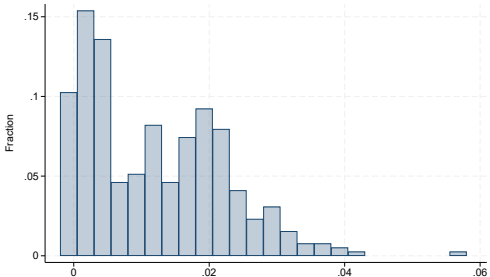

Figure 1: Domestic Subsidiaries of Banking Groups

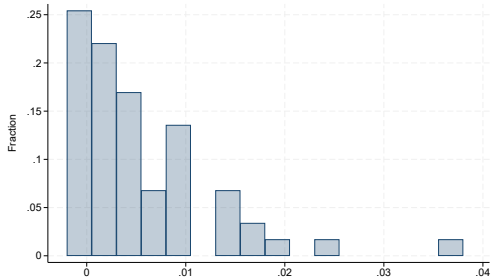

Figure 2: Foreign Subsidiaries of Banking Groups

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Security Losses by Country

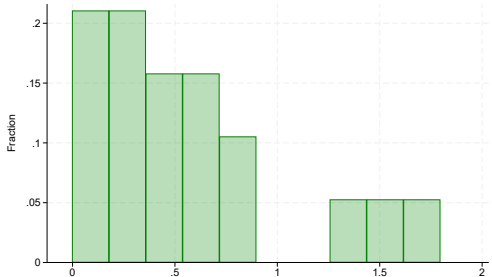

Figure 3: Median Bank

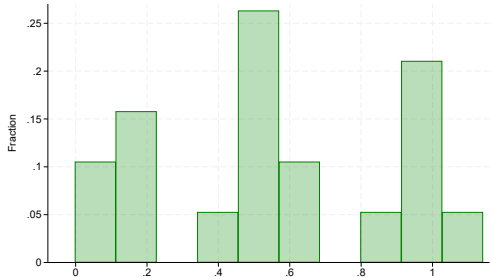

Figure 4: Weighted Average

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Security Holdings by Country

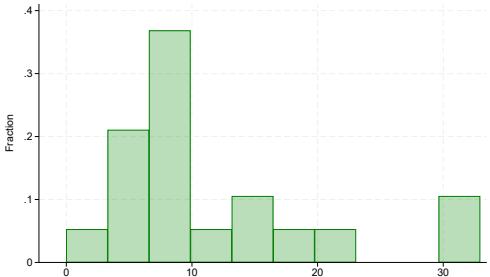

Figure 5: All Securities (Median Bank)

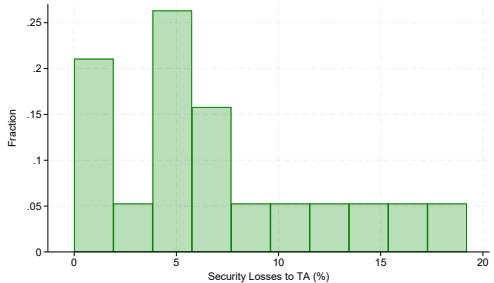

Figure 6: Long-Term Securities (Median Bank)

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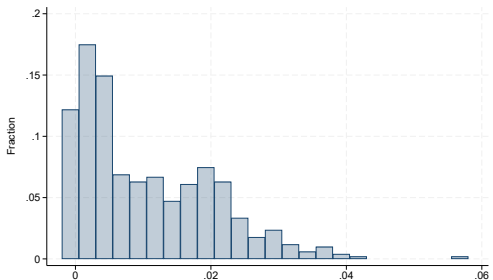
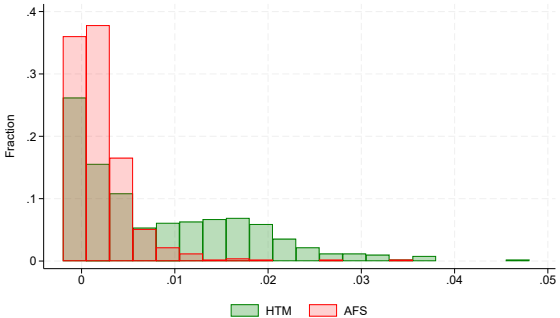
Distribution of Securities Losses





- On average, banks suffer securities losses of 1% of their total assets (or 12% of their total equity).
- AFS losses are four times smaller than HTM + smaller dispersion of AFS losses.

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Between-Group Lending to Domestic and Foreign Subsidiaries

	Loan Amount	
	Borrowing Subsidiary's Losses	Lending Subsidiary's Losses
	(1)	(2)
Collateral Securities Losses$_{b,t-1}$	-4.119*	
$\times$Foreign$_b$	(-1.71)	
Collateral Securities Losses$_{b,t-1}$	-22.92***	
$\times$Domestic$_b$	(5.939)	
Collateral Securities Losses$_{l,t-1}$		-6.699
$\times$Foreign$_l$		(6.421)
Collateral Securities Losses$_{l,t-1}$		-13.57**
$\times$Domestic$_l$		(5.590)
Bank Lender – Bank Borrower FE	Yes	Yes
Country Lender – Time FE	Yes	Yes
Country Borrower – Time FE	Yes	Yes
N	35271	35243
R^2	0.842	0.841

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