

Internet Appendix

A Model Appendix

A.1 Model Optimality Conditions

This section derives the optimality conditions that must hold at equilibrium.

Firms. Define expected violation costs per dollar of debt to be

$$\zeta_{j,t} = \kappa_j \Gamma_{\omega,j}(\bar{\omega}_{j,t}),$$

which is equal to the product of the cost and probability of violation. The optimality condition for capital for a firm of type j is

$$Q_{j,t} = E_t \left\{ \Lambda_{j,t+1} \left[(1 - \tau) \underbrace{\frac{\partial Y_{j,t+1}}{\partial K_{j,t}}}_{\text{MPK}} + \underbrace{\left(1 - (1 - \tau)\delta \right) \bar{Q}_{j,t+1}}_{\text{remaining capital}} + \underbrace{\Psi_{j,t} \frac{\partial X_{j,t+1}^*}{\partial K_{j,t}}}_{\text{violation costs}} \right] \right\},$$

which equates the cost of a new unit of capital to the discounted value of the marginal income it will provide next period, the marginal sale value of the remaining capital next period, and the effect of that capital on expected violation costs. To this end, the term $\Psi_{j,t}$ represents the marginal benefit of reducing the firm's violation costs by increasing smoothed EBITDA, both today and in the future, and is equal to

$$\Psi_{j,t} = -\bar{\pi}^{-1} \frac{\partial \zeta_{j,t}}{\partial X_{j,t}} B_{j,t-1} + E_t \left\{ \Lambda_{j,t+1} \Psi_{j,t+1} \frac{\partial X_{j,t+1}^*}{\partial X_{j,t}} \right\}.$$

The optimality condition for debt is

$$1 = \Omega_{j,t}^B + \Omega_{j,t}^S s_{j,t},$$

which sets the benefit of debt (\$1 today) against the marginal cost of carrying an additional \$1 of debt into the next period and promising an additional $s_{j,t}$ in spread payments.

The marginal continuation costs of principal balances $\Omega_{j,t}^B$ and spread payments $\Omega_{j,t}^S$ are

$$\begin{aligned}\Omega_{j,t}^B &= E_t \left\{ \Lambda_{j,t+1} \bar{\pi}^{-1} \left[\left((1-\tau)r_t + \nu + \xi_{j,t+1} \right) + \frac{\partial \xi_{j,t+1}}{\partial B_t} + (1-\nu)\Omega_{j,t+1}^B \right] \right\} \\ \Omega_{j,t}^S &= E_t \left\{ \Lambda_{j,t+1} \bar{\pi}^{-1} \left[(1-\tau) + (1-\nu)\Omega_{j,t+1}^S \right] \right\}.\end{aligned}$$

The optimality condition for cash is

$$1 = \exp(\tilde{a}_t) \eta_{A,j} A_{j,t}^{-\zeta_A} + \bar{\pi}^{-1} (1+r_t) E_t \left[\Lambda_{j,t+1} \right],$$

which sets the cost of acquiring \$1 of cash equal to the utility benefit to the firm from the liquidity services as well as the continuation value of \$1 of cash next period, net of discounting and inflation. Last, the derivative terms used above can be evaluated as

$$\begin{aligned}\frac{\partial Y_{j,t+1}}{\partial K_{j,t}} &= \alpha \frac{Y_{j,t+1}}{K_{j,t}} & \frac{\partial X_{j,t+1}^*}{\partial K_{j,t}} &= (1-\rho_X) \frac{\partial Y_{j,t+1}}{\partial K_{j,t}} & \frac{\partial X_{j,t+1}^*}{\partial X_{j,t}} &= \rho_X \bar{\pi}^{-1} \\ \frac{\partial \xi_{j,t}}{\partial X_{j,t}} &= -\kappa_j f_{\omega,j}(\bar{\omega}_{j,t}) \frac{\bar{\omega}_{j,t}}{X_{j,t}} & \frac{\partial \xi_{j,t+1}}{\partial B_{j,t}} &= \kappa_j f_{\omega,j}(\bar{\omega}_{j,t+1}) \frac{\bar{\omega}_{j,t+1}}{B_{j,t}}.\end{aligned}$$

Saver. The saver's optimality condition for risk-free government debt is

$$1 = (1+r_t) \bar{\pi}^{-1} E_t \left[\Lambda_{S,t+1} \right].$$

Under the baseline assumption that the saver is risk-neutral we have $\Lambda_{S,t+1} = \beta$ and so

$$1 + r_t = \bar{\pi} \beta_S^{-1}.$$

The saver's optimality condition for corporate bonds is

$$1 = \Omega_{S,t}^B + \Omega_{S,t}^S (s_t^{bond} - q^{bond}), \quad (\text{A.1})$$

which sets the cost of buying \$1 of corporate bonds today equal to the marginal benefit of \$1 of corporate bond balances and the marginal benefit of an extra s_t^{bond} of corporate bond spread payments going forward, net of the holding cost q^{bond} . These marginal con-

tinuation values are equal to

$$\Omega_{S,t}^B = E_t \left\{ \Lambda_{S,t+1} \bar{\pi}^{-1} \left[r_t + \nu + (1 - \nu) \Omega_{S,t+1}^B \right] \right\} \quad (\text{A.2})$$

$$\Omega_{S,t}^S = E_t \left\{ \Lambda_{S,t+1} \bar{\pi}^{-1} \left[1 + (1 - \nu) \Omega_{S,t+1}^S \right] \right\}. \quad (\text{A.3})$$

Under our benchmark assumption that savers have risk-neutral preferences, so that $\Lambda_{S,t+1} = \beta_S$ and $1 + r_t = \bar{\pi} \beta_S^{-1}$, we can guess and verify that these quantities are both equal to constants:

$$\Omega_{S,t}^B = 1 \qquad \qquad \qquad \Omega_{S,t}^S = \frac{1}{r + \nu}.$$

Substituting into the optimality condition, we obtain

$$s_t^{bond} = q^{bond},$$

so that the corporate bond spread is effectively fixed.

Bank. The optimality conditions for the representative bank with respect to capital is

$$\mu_t = \hat{\eta}_k k_t^{\zeta^B}, \quad (\text{A.4})$$

where μ_t is the multiplier on the capital requirement, and $\hat{\eta}_k = \eta_k / \bar{k}^{\zeta^L}$. The optimality condition for constrained debt issuance $B_{C,t}^*$ is

$$0 = -1 - \Xi_t + \Omega_{B,t} + s_{C,t}^{loan} \Omega_{S,t},$$

where $\Omega_{B,t}$ and $\Omega_{S,t}$ are defined as in (A.2) and (A.3), and Ξ_t represents the present and future cost of tightening the capital requirement. Intuitively, the $\Omega_{B,t}$ and $\Omega_{S,t}$ expressions are re-used because the saver's marginal value of an additional dollar of principal balance or additional dollar of promised spread payments is the same across both products, although the amount of spread payments promised per dollar of bank loan and corporate bond may differ.

The marginal holding cost term Ξ , after applying (A.4) above, is equal to

$$\Xi_t = \chi^B \hat{\eta}_k k_t^{\zeta^B} + E_t \left[\Lambda_{S,t+1} \bar{\pi}^{-1} (1 - \nu) \Xi_{t+1} \right].$$

Substituting for this term and applying (A.2) and (A.3) now yields

$$s_{C,t}^{loan} = \Omega_{S,t}^{-1} (1 + \Xi_t - \Omega_{B,t}) = (r + \nu) \Xi_t.$$

In the case $\nu = 1$ (short-term debt), this becomes

$$s_{C,t}^{loan} = (1 + r) \chi^B \hat{\eta}_k k_t^{\zeta^B}.$$

Capital Producer. The optimality condition for a capital producer of type j is

$$\begin{aligned} Q_{j,t} &= \Phi'(i_{j,t})^{-1} \\ \bar{Q}_{j,t} &= Q_{j,t} + \frac{Q_{j,t} \Phi(i_{j,t}) - i_{j,t}}{1 - \delta} \end{aligned}$$

where $i_{j,t} \equiv I_{j,t}/K_{j,t-1}$. The difference between $Q_{j,t}$ and $\bar{Q}_{j,t}$ is second order and would disappear in a linearized solution.

A.2 Endogenizing Bank Securities Holdings

Let b denote total bank securities holdings scaled by bank assets, and let A denote bank AFS securities holdings scaled by bank assets. To provide a motive for banks to hold securities, we assume that banks have an optimal quantity of securities holdings \bar{b} , and face a quadratic cost from deviating from this

$$c(b) = \frac{\gamma}{2} (b - \bar{b})^2, \tag{A.5}$$

where without loss of generality we can set $\gamma = 1$. We assume that an exogenous fraction w of securities must be held as AFS securities, so that $b^{AFS} = wb$.

Banks also face a cost of holding securities that are marked to market by the regulator. For AC banks in the baseline environment, this cost is $c^{AFS}(b^{AFS})$, while for NC banks in the baseline environment, this cost is $c^{AFS}(0)$. We can parameterize the cost function as

$$c^{AFS}(b^{AFS}) = \frac{\phi}{2} (b^{AFS})^2, \tag{A.6}$$

where the choice of a quadratic cost is consistent with experiencing disutility proportional to the variance of the value of AFS securities.

In this setting, an AC bank minimizes

$$c(b_{AC}) - c^{AFS}(w_{AC}b_{AC}), \quad (\text{A.7})$$

while an NC bank maximizes

$$c(b_{NC}) - c^{AFS}(0). \quad (\text{A.8})$$

The first order conditions are

$$0 = c'(b_{AC}) + c'(w_{AC}b_{AC})w_{AC} \quad (\text{A.9})$$

$$0 = c'(b_{NC}). \quad (\text{A.10})$$

Substituting in the parametric forms of these functions and rearranging yields

$$\bar{b} - b_{AC} = \phi(w_{AC}b_{AC})w_{AC} \quad (\text{A.11})$$

$$\bar{b} - b_{NC} = 0. \quad (\text{A.12})$$

In this setting, an AC bank chooses b_{AC} to minimize

$$\frac{1}{2}(b_{AC} - \bar{b})^2 + \frac{\phi}{2}(wb_{AC})^2, \quad (\text{A.13})$$

while an NC bank maximizes

$$\frac{1}{2}(b_{AC} - \bar{b})^2. \quad (\text{A.14})$$

The first order conditions are

$$0 = b_{AC} - \bar{b} + \phi w^2 b_{AC}$$

$$0 = b_{NC} - \bar{b}.$$

which can be rearranged to yield

$$b_{AC} = \frac{\bar{b}}{1 + \phi w^2} \quad (\text{A.15})$$

$$b_{NC} = \bar{b}. \quad (\text{A.16})$$

Equation (A.16) implies that we can use the NC banks, who are unaffected by the constraint, to pin down the optimal (unconstrained) level of bank security holdings. Computing the average ratio of securities to assets among NC banks over the period 2021:Q1 to 2023:Q1, we obtain a value of $b_{NC} = 0.241$.

Given our value for \bar{b} , we can now recover the parameter ϕ from (A.15). Averaging the ratios of securities to assets and AFS securities to total securities for AC banks over the period 2021:Q1 - 2023:Q1, we obtain values $w = 0.433$ and $b_{AC} = 0.206$. Substituting and solving for ϕ now yields

$$\phi = \frac{1}{w^2} \left(\frac{b_{AC}}{\bar{b}} - 1 \right) = \frac{1}{0.433^2} \left(\frac{0.206}{0.241} - 1 \right) = 0.899. \quad (\text{A.17})$$

Intuitively, the greater the disutility from being exposed to volatility in regulatory capital, the less securities an AC bank will hold, holding the AFS share w fixed. This allows us to use the lower securities holdings of AC banks to infer the disutility of regulatory risk ϕ .

Given this estimate, we can now solve for optimal bank securities holdings in a counterfactual economy in which all securities are marked to market. This can be modeled in our simple framework by setting $w = 1$. In this case, banks would choose counterfactual securities holdings \hat{b} to minimize

$$\frac{1}{2}(\hat{b} - \bar{b})^2 + \frac{\phi}{2}\hat{b}^2, \quad (\text{A.18})$$

yielding the optimality condition

$$0 = \hat{b} - \bar{b} + \phi\hat{b}. \quad (\text{A.19})$$

Solving for \hat{b} we obtain

$$\hat{b} = \frac{\bar{b}}{1 + \phi} = \frac{0.241}{1 + 0.899} = 0.127. \quad (\text{A.20})$$

This calculation implies that in a world where all securities are marked to market, we would observe a ratio of securities to assets of 0.127. This dramatic decline compared to bank securities holdings in the current equilibrium for both AC and NC banks shows the importance of allowing banks to endogenously choose their portfolios.

Last, we can compute the change in the effect of securities values on regulatory capital between the Baseline and the All Mark to Market economies. To do this, we compute the ratio of marked-to-market securities between the two economies as

$$\frac{1.0}{0.44 \times 0.70} \times \frac{0.127}{0.116} = 3.55. \quad (\text{A.21})$$

The first term on the left hand side of (A.21) adjusts for the share of banks that have their securities marked to market by regulators. In All Mark to Market economy, this is all

banks, represented by the 1.0 term in the numerator. In the Baseline economy, this only reflects AC banks, who are responsible for 44% of lending to firms in the Y14 sample, which itself represents 70% of the overall banking market. The second term accounts for differences in the amount of marked-to-market securities at each affected bank. According to (A.20) above, each bank holds securities equal to 0.127 of assets in the All Mark to Market counterfactual, compared to an average ratio of marked-to-market (AFS) securities to assets at Y14 banks in our 2021:Q1 - 2023:Q1 sample. Multiplying the two, we see that the aggregate quantity of marked-to-market securities would increase by 3.55 when moving from the Baseline to the All Mark to Market economy.

A.3 Model Robustness

In this section we evaluate the model's robustness to various assumptions.

Investment Elasticity. As explained in Section 7.4, because our regressions pin down the relative frictions across margins, we first calibrate the absolute friction for one firm margin (the investment friction ζ_K), and then calibrate the remaining friction (ζ) parameters to match our regression coefficients. To study the influence of our choice of ζ_K on our results, Figures A.1 and A.2 display versions of our main model results in Figures 7.1 and 7.2 that vary this parameter. In particular, Figure A.1 imposes a value of $\zeta_K = 0.125$ that is half that of our baseline calibration, while Figure A.2 imposes a value of $\zeta_K = 0.5$ that is twice that of our baseline calibration. In each case, we recalibrate the remaining parameters, including recalibrating the other ζ parameters to match our empirical regressions.

Comparing Figures A.1 and A.2 to Figures 7.1 and 7.2 in the main text, we observe that the strength of the investment friction is, perhaps unsurprisingly, most important for aggregate investment, which falls by more in the economy with low investment frictions, and by less in the economy with high investment frictions. However, for our main results on the *relative* investment response across policy regimes, the results are similar. While our benchmark calibration found that investment is 1.4pp lower on impact in the Baseline economy relative to the Book Value economy, the corresponding difference is 1.5pp for the economy with low investment frictions, and 1.2pp for the economy with high investment frictions. Thus, we conclude that our main results on the impact of regulatory accounting standards on interest rate transmission are robust to the calibration of the investment elasticity.

Long-Term Debt. In our baseline model, we assume that debt is one-quarter debt ($\nu = 1$). In practice, most debt to firms has substantially longer maturity than a single quarter, potentially making it more difficult to crowd out new lending to small firms. To show that our results are robust to the maturity of debt, Figure A.3 displays results after recalibrating our model under an average debt maturity of four quarters ($\nu = 0.25$). As before, we then compute the response to our tightening cycle experiment under the same set of regulatory accounting policies (Baseline, Book Value, All Mark to Market).

Perhaps surprisingly, extending the maturity of debt barely changes our results. While we previously found that investment is 1.4pp lower in the Baseline economy on impact than in the Book Value economy, the corresponding number in our long-term debt extension is also 1.4pp. Similarly, while we previously found that investment is 4.5pp lower in the Baseline economy on impact than in the Book Value economy, this value is again essentially equal at 4.5pp in our long-term debt extension. Thus, our quantitative results are highly robust to extending the maturity of debt.

The reason for this robustness is our calibration procedure. Holding all other parameters fixed, extending the maturity of debt would decrease the responsiveness of credit growth to a change in spreads, because only a fraction of that debt is turning over and therefore exposed to changing spreads, while spreads on non-maturity debt are unaffected by the change in spreads. All else equal, this would weaken the regulatory capital channel we have highlighted in this paper. However, holding other parameters fixed, this weaker response of debt to a change in bank securities values would also cause us to seriously understate the magnitude of firm credit responses, as measured by our implied regression coefficients. To restore the model's ability to match our estimated regression coefficients, the recalibration step will strengthen the curvature of the bank capital holding cost, leading to a larger change in spreads. This larger change in spreads in turn causes a larger proportional change in the issuance of *new* debt, until the proportional response of total debt is similar to that in the short-term debt model.

In summary, recalibrating our model causes it to offset this weakening effect of long-term debt on the mechanism with a strengthening of the quantitative pass-through from securities values to spreads, until we match our regression coefficients, yielding results extremely similar to our baseline results.

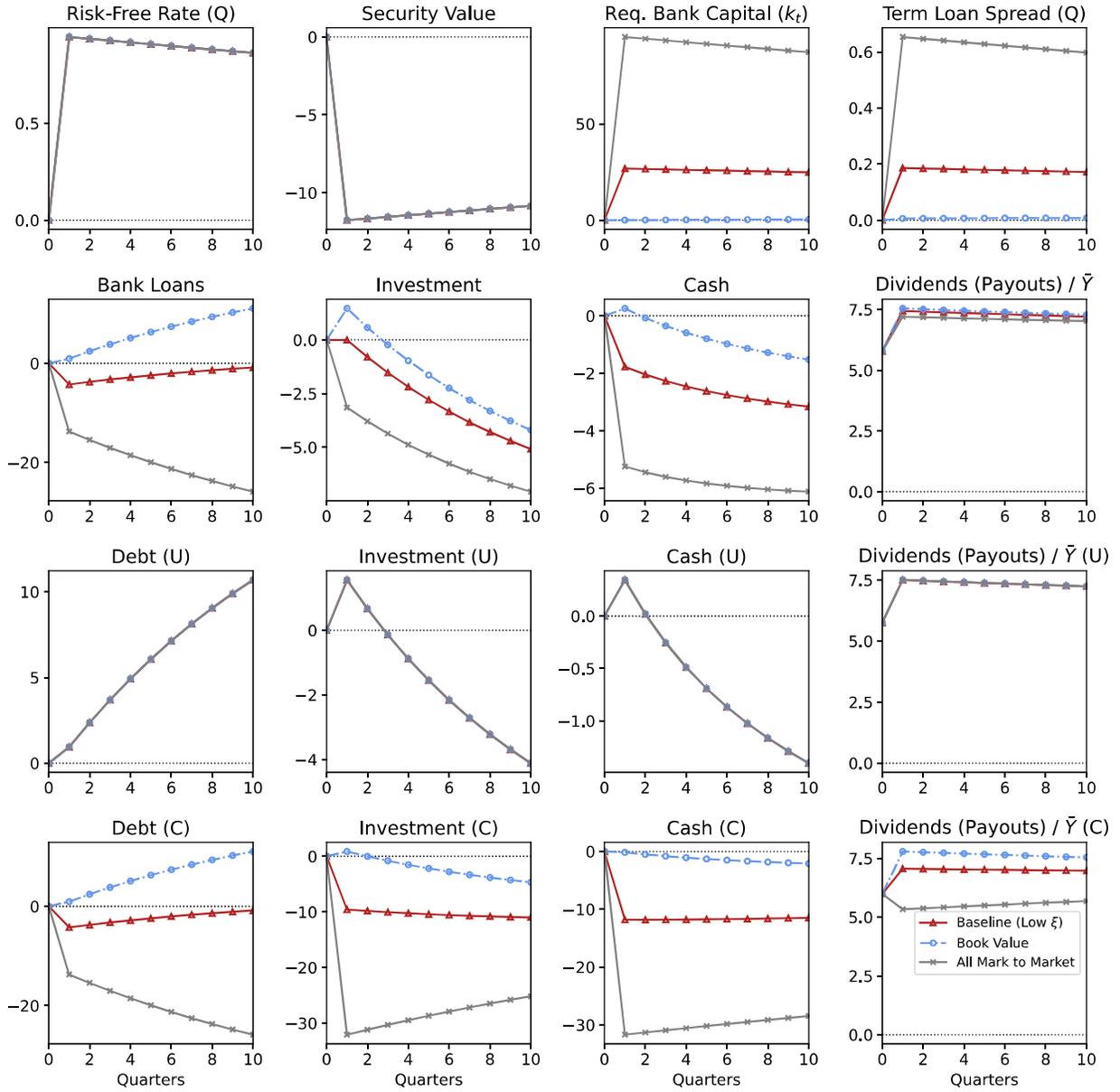


Figure A.1: Model Responses, Low Investment Frictions

Notes: This figure plots the economy's response to the combined set of shocks $(\varepsilon_{\beta,1}, \varepsilon_{\pi,1}, \varepsilon_{\lambda,1})$ described above. Variable definitions are as follows: Risk-Free Rate (R_t , the one-period risk-free rate), Security Value (P_t), Required Bank Capital (k_t), Output (Y_t), Bank Loans (B_t^{loan}), Investment (I_t), Cash (A_t), Dividends (Payouts) / \bar{Y} (D_t/\bar{Y}). Aggregate variables (firm variables without a type subscript) are computed as sums over constrained and unconstrained firms. All variables are displayed in percent changes from steady state with the exception of Dividends / \bar{Y} , which displays levels in percent.

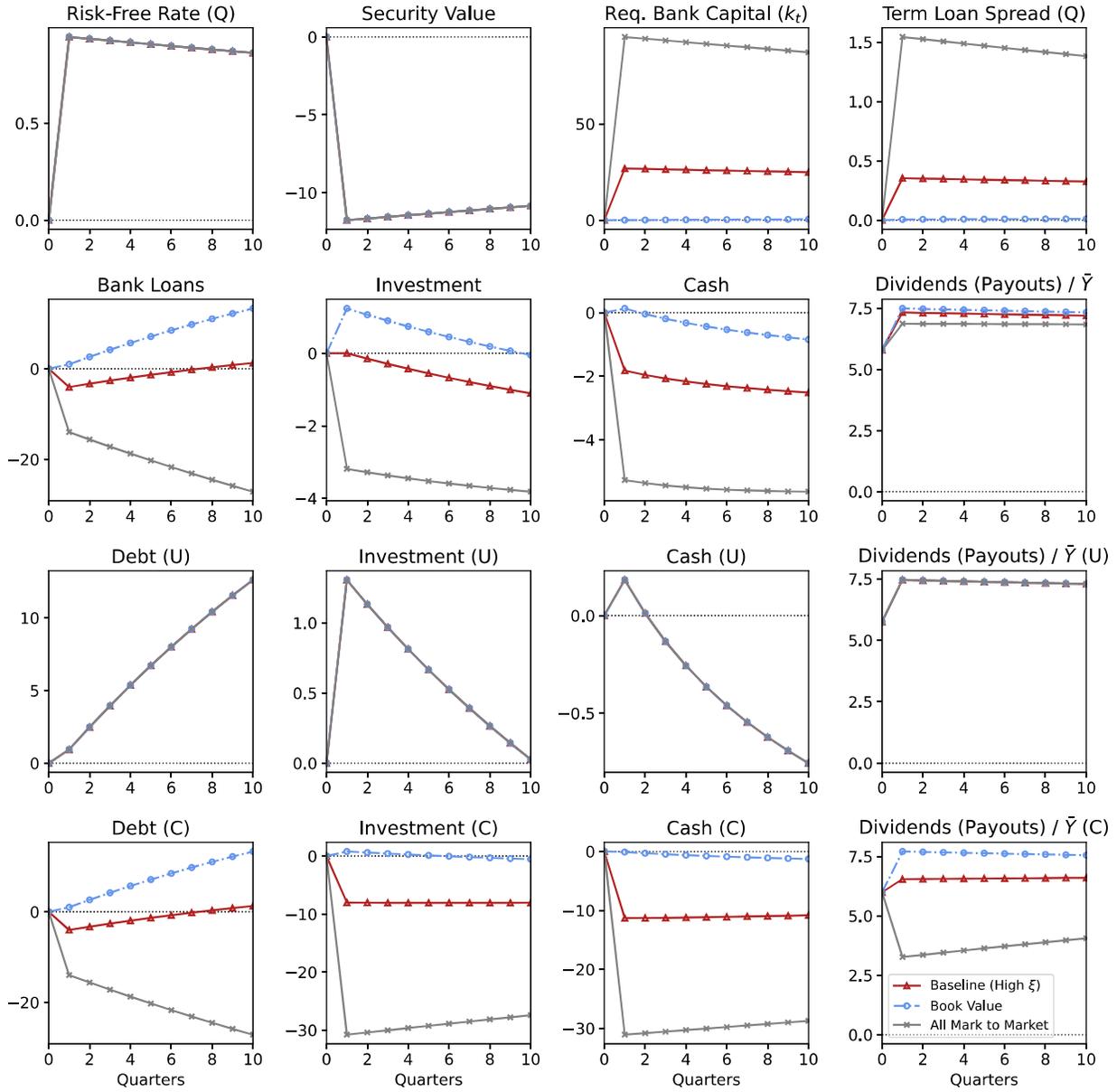


Figure A.2: Model Responses, High Investment Frictions

Notes: This figure plots the economy's response to the combined set of shocks $(\varepsilon_{\beta,1}, \varepsilon_{\pi,1}, \varepsilon_{\lambda,1})$ described above. Variable definitions are as follows: Risk-Free Rate (R_t , the one-period risk-free rate), Security Value (P_t), Required Bank Capital (k_t), Output (Y_t), Bank Loans (B_t^{loan}), Investment (I_t), Cash (A_t), Dividends (Payouts) / \bar{Y} (D_t/\bar{Y}). Aggregate variables (firm variables without a type subscript) are computed as sums over constrained and unconstrained firms. All variables are displayed in percent changes from steady state with the exception of Dividends / \bar{Y} , which displays levels in percent.

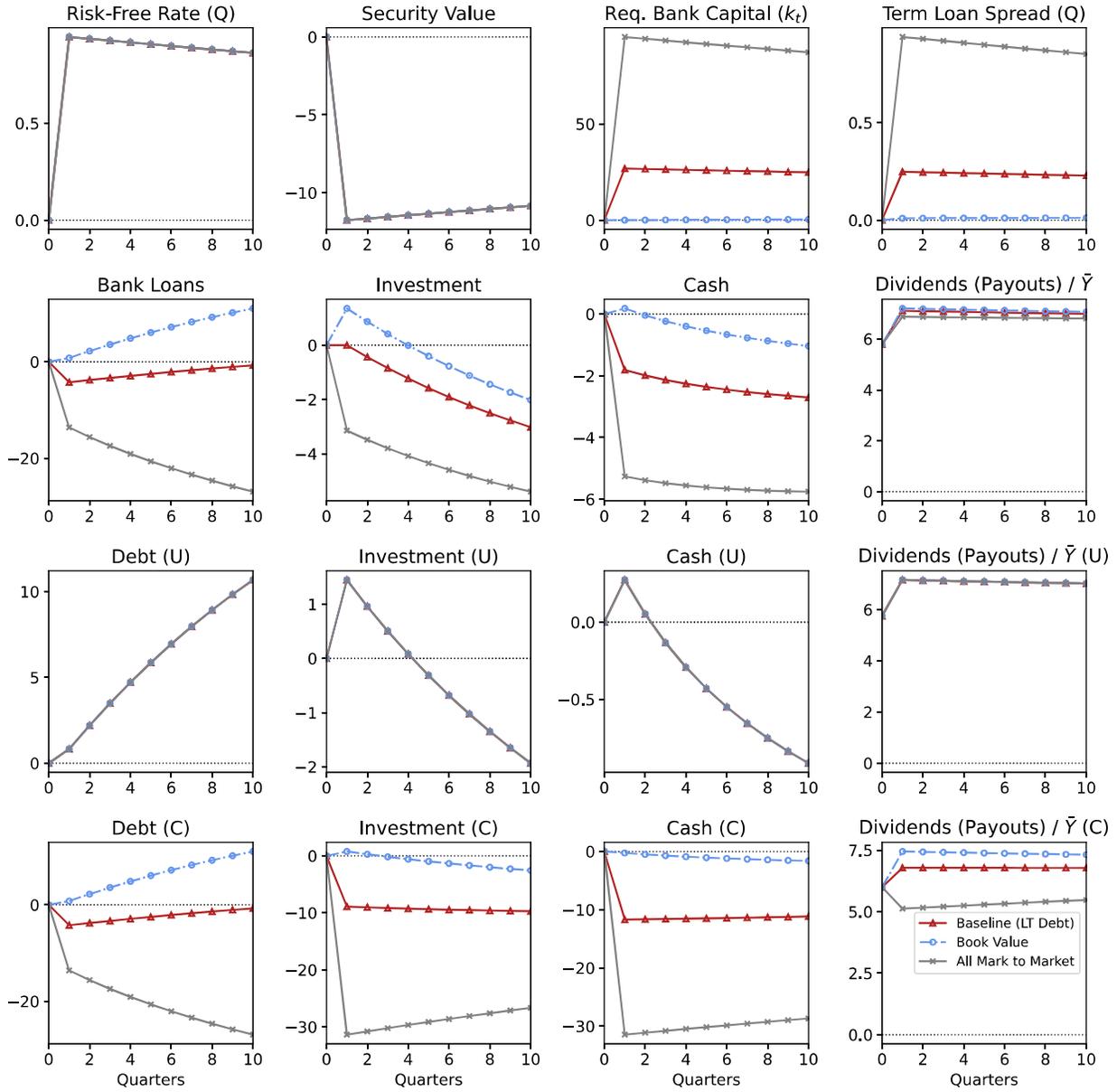
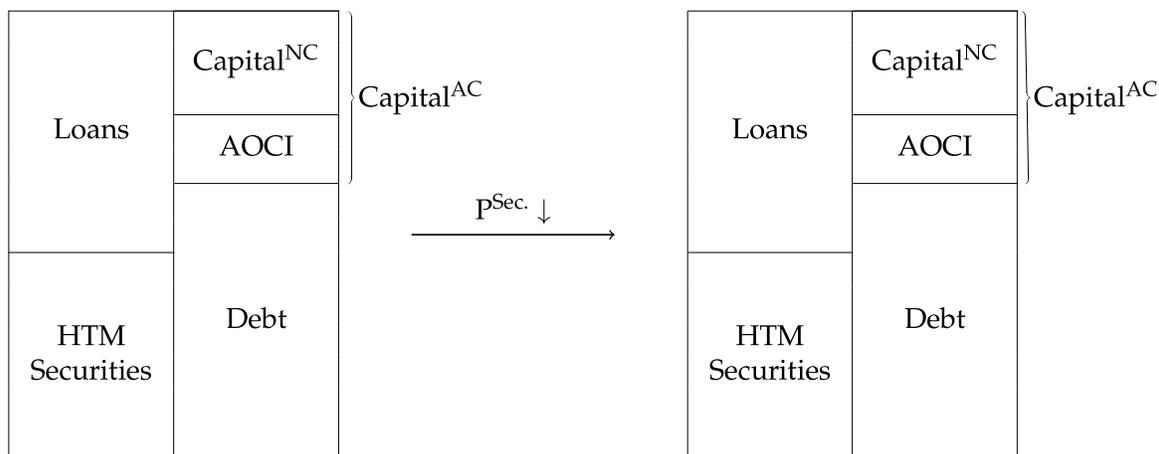


Figure A.3: Model Responses, Long-Term Debt

Notes: This figure plots the economy's response to the combined set of shocks $(\varepsilon_{\beta,1}, \varepsilon_{\pi,1}, \varepsilon_{\lambda,1})$ described above. Variable definitions are as follows: Risk-Free Rate (R_t , the one-period risk-free rate), Security Value (P_t), Required Bank Capital (k_t), Output (Y_t), Bank Loans (B_t^{loan}), Investment (I_t), Cash (A_t), Dividends (Payouts) / \bar{Y} (D_t/\bar{Y}). Aggregate variables (firm variables without a type subscript) are computed as sums over constrained and unconstrained firms. All variables are displayed in percent changes from steady state with the exception of Dividends / \bar{Y} , which displays levels in percent.

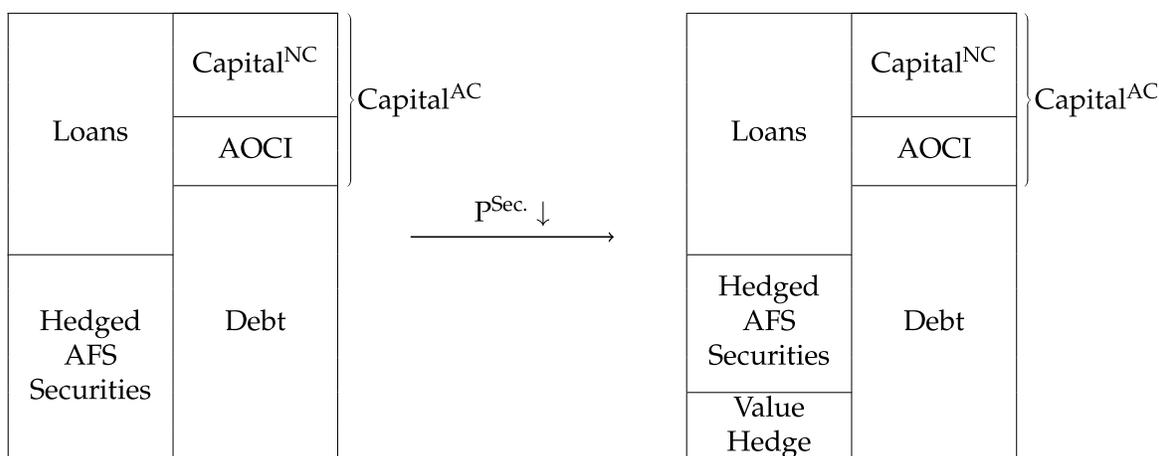
B Balance Sheet Dynamics

Figure B.1: Accounting treatment for HTM Securities.



Notes: The figure shows changes in a hypothetical bank's balance sheet following a decline in security prices where securities are booked in HTM.

Figure B.2: Accounting treatment for hedged AFS Securities.



Notes: The figure shows changes in a hypothetical bank's balance sheet following a decline in security prices where securities are booked in AFS and matched with a qualified fair value hedge.

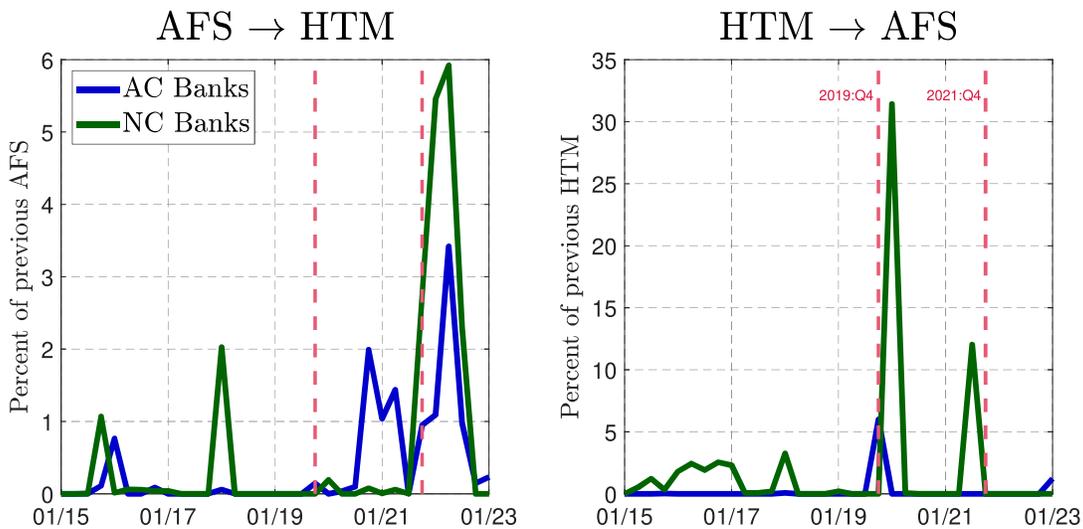
C Security Reclassifications

Accounting reclassifications are intended to be rare, but permissible under certain circumstances. Conditions under which a security holder can reclassify from HTM to AFS include (see ASC 320-10-25-6):

- Evidence of significant deterioration in security issuer’s creditworthiness
- A change in tax law that eliminates or reduces the tax-exempt status of interest of the debt security
- A major business combination or major disposition that necessitates the sale or transfer of held-to-maturity securities to maintain the entity’s interest rate risk position or credit risk policy
- A change in statutory or regulatory requirements significantly modifying either what constitutes a permissible investment or the maximum level of investments in certain kinds of securities, thereby causing an entity to dispose a held-to-maturity security
- A significant increase in the industry’s capital requirements by the regulator that causes the entity to downsize by selling held-to-maturity securities
- A significant increase in the risk weights of debt securities used for regulatory risk-based capital purposes

Also relevant for security reclassifications is that holders are allowed a one-time election to sell and/or transfer debt securities classified as held-to-maturity that reference a rate expected to be discontinued (e.g., LIBOR), see ASC 848-10-35-1.

Figure C.1: Accounting designation changes



Notes: Data from FR Y-14 Schedule B.1. The chart shows the fraction of securities transferred between AFS and HTM accounting designations relative to total AFS or HTM securities in the previous quarter. Vertical dashed lines indicate 2019:Q4 and 2021:Q4.

D Data

Table D.1: AC and NC Banks.

AC BHCs	NC BHCs
JPMORGAN CHASE & CO	CHARLES SCHWAB CORP
BANK OF AMER CORP	M&T BK CORP
STATE STREET CORP	KEYCORP
WELLS FARGO & CO	HUNTINGTON BSHRS
NORTHERN TR CORP	PNC FNCL SVC GROUP
CITIGROUP	FIFTH THIRD BC
MORGAN STANLEY	TRUIST FC
GOLDMAN SACHS GROUP THE	U.S. BANCORP
DB USA CORP	CITIZENS FNCL GRP
BANK OF NY MELLON CORP	BMO FNCL CORP
	MUFG AMERS HOLDS CORP
	ALLY FNCL
	CAPITAL ONE FC
	HSBC N AMER HOLDS
	REGIONS FC
	TD GRP US HOLDS LLC
	SANTANDER HOLDS USA
	UBS AMERS HOLD LLC
	RBC US GRP HOLDS LLC

Notes: This table lists the AC and NC banks in our data for our main sample 2021:Q1-2023:Q1. Banks are identified to be one of the two categories according to the variable BHCAP838 from the Y-9C filings.

Table D.2: FR Y-14Q H.1 Variable Definitions.

Variable Name	Description / Use in main analysis	Field No.
Zip code	Zip code of headquarters	7
Industry	Derived 2-Digit NAICS Code	8
TIN	Taxpayer Identification Number	11
Internal Credit Facility ID	Used together with BHC and previous facility ID to construct loan histories	15
Previous Internal Credit Facility ID	Used together with BHC and facility ID to construct loan histories	16
Term Loan	Loan facility type reported as Term Loan, includes Term Loan A-C, Bridge Loans, Asset-Based, and Debtor in Possession.	20
Credit Line	Loan facility type reported as revolving or non-revolving line of credit, standby letter of credit, fronting exposure, or commitment to commit.	20
Purpose	Credit facility purpose	22
Committed Credit	Committed credit exposure	24
Used Credit	Utilized credit exposure	25
Line Reported on Y-9C	Line number reported in HC-C schedule of FR Y-9C	26
Participation Flag	Used to determine whether a loan is syndicated	34
Variable Rate	Interest rate variability reported as "Floating" or "Mixed"	37
Interest Rate	Current interest rate	38
Date Financials	Financial statement date used to match firm financials to Y-14 date	52
Net Sales Current	Firm sales over trailing 12-month period	54
Net Income	Current net income for trailing 12-months used to construct return on assets	59, 60
Cash	Cash & Marketable Securities	61
Fixed Assets	Fixed assets	69
Total Assets	Total assets, current year and prior year	70
Short Term Debt	Used in calculating total debt	74
Long Term Debt	Used in calculating total debt	78
Total Liabilities	Firm Total Liabilities	80
Syndicated Loan	Syndicated loan flag	100

Notes: Nominal series are converted into real series using the consumer price index for all items taken from St. Louis Fed's FRED database. The corresponding "Field No." can be found in the data dictionary (Schedule H.1, pp. 162-217): https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20200331_i.pdf

Table D.3: FR Y-14Q B.1 & B.2 and Vendor Data Variable Definitions.

Variable Name	Description / Use	Schedule / Field No.
Unique Identifier	Unique ID used by BHC to identify each record over time	B.1/B.2
Identifier Value	ID, corresponds to a CUSIP, ISIN, or SEDOL identifier, if it exists	B.1
Security description	Reported asset class of security	B.1
Market value	Fair value of security holding in \$USD	B.1
Price	Price of security in \$USD.	B.1
Amortized cost	Purchase price of debt security in \$USD adjusted for amortization/accretion of discounts/premia and adjusted for hedge gains and losses	B.1
Accounting intent	Available-for-sale, held-to-maturity.	B.1
Hedge type	Use only fair value hedges.	B.2/6
Hedged risk	Use only hedges linked to interest rate risk.	B.2/7
Hedge percentage	Portion of the asset holding being hedged, 0-100 percent.	B.2/9
Hedge sidedness	Use only two-sided hedges.	B.2/12
Security duration	Effective rate duration at security level.	ICE

Notes: Variables and further descriptions for FR Y-14Q schedules B.1 and B.2 may be found in data dictionary: https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20200331_i.pdf

Table D.4: Compustat Variable Definitions.

Variable Name	Description	Compustat Name
Total Assets	Total firm assets	atq
Employer Identification Number	Used to match to TIN in Y14	ein
Total Liabilities	Total firm liabilities	ltq
Net Income	Firm net income (converted to 12-month trailing series)	niq
Total Debt	Debt in current liabilities + long-term debt	dlcq + dlttq
Sales	Total firm sales	saleq
Fixed Assets	Net property, plant, and equipment	ppentq
Cash	Cash & Marketable securities	cheq

Notes: All data obtained from the Wharton Research Data Services. Nominal series deflated using the consumer price index for all items taken from St. Louis Fed's FRED database.

Table D.5: Variables from Y-9C filings.

Variable Code	Variable Label
BHCK2170	Total Assets
BHCK2948	Total Liabilities
BHCK4340	Net Income
BHCK3197	Earning assets that reprice or mature within one year
BHCK3296	Interest-bearing deposit liabilities that reprice or mature within one year
BHCK3298	Long-term debt that reprices within one year
BHCK3408	Variable-rate preferred stock
BHCK3409	Long-term debt that matures within one year
BHDM6631	Domestic offices: noninterest-bearing deposits
BHDM6636	Domestic offices: interest-bearing deposits
BHFN6631	Foreign offices: noninterest-bearing deposits
BHFN6636	Foreign offices: interest-bearing deposits
BHCAP793	CET 1 Capital Ratio
BHCA7206	Tier 1 Capital Ratio
BHCA7205	Total Capital Ratio
BHCKB529	Loans and Leases held for investment
BHCK5369	Loans and Leases held for sale
BHCM3543	Trading Assets: Derivatives positive fair value
BHCK3547	Trading Liabilities: Derivatives with a negative fair value
BHCKA126	Derivatives, Interest Rate Contracts: Total gross notional amount of derivative contracts held for trading
BHCK8733	Derivatives, Interest Rate Contracts: Contracts held for trading: Gross positive fair value
BHCK8737	Derivatives, Interest Rate Contracts: Contracts held for trading: Gross negative fair value
BHCAP838	AOCI opt-out election
BHCM3531, BHCM3532, BHCM3533	Trading book: Government securities
BHCKG379, BHCKG380, BHCKG381, BHCKK197, BHCKK198	Trading book: Mortgage-backed securities
BHCKHT62, BHCKG386	Trading book: Other debt securities
BHCKG210	Trading book: Short position for debt securities
BHCKJJ33	Provision for loan and lease losses
BHCAB530	AOCI
BHCAA223	Risk-weighted Assets

Notes: The table lists variables that are collected from the Consolidated Financial Statements or FR Y-9C filings for Bank-Holding Companies from the Board of Governors' National Information Center database. The one-year income gap is defined as $(BHCK\ 3197 - (BHCK\ 3296 + BHCK\ 3298 + BHCK\ 3408 + BHCK\ 3409)) / BHCK\ 2170$. Total deposits are given by $(BHDM\ 6631 + BHDM\ 6636 + BHFN\ 6631 + BHFN\ 6636)$. Nominal series are deflated using the consumer price index for all items taken from St. Louis Fed's FRED database.

E Sample Restrictions and Filtering Steps

We apply the following filtering steps to the H.1 schedule:

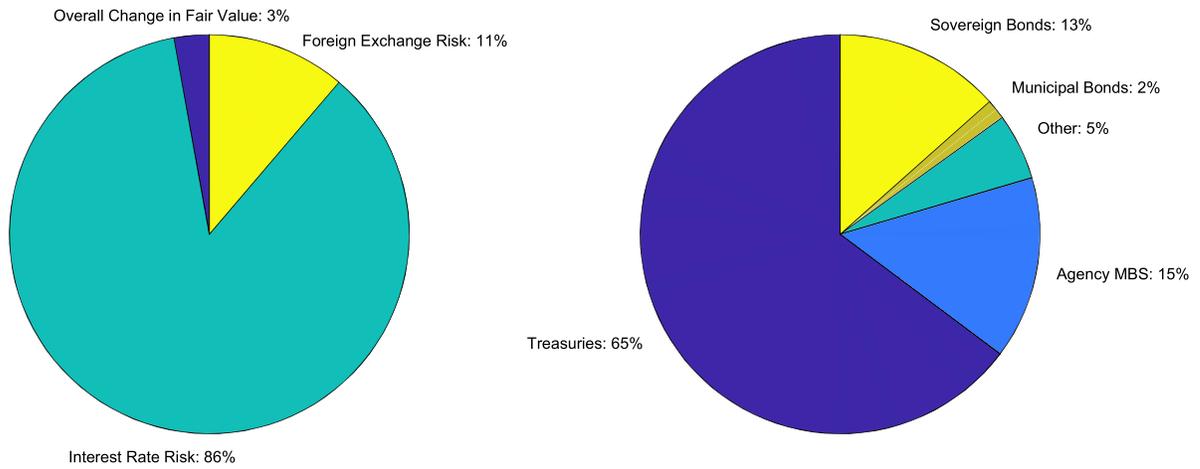
1. We constrain the sample to loan facilities with line reported on the HC-C schedule in the FR Y9-C filings as commercial and industrial loans, “other” loans, “other” leases, and owner-occupied commercial real estate (corresponding to Field No. 26 in the H.1 schedule of the Y14 to be equal to 4, 8, 9, or 10; see Table D.2). In addition, we drop all observations with NAICS codes 52 and 53 (loans to financial firms and real estate firms).
2. Observations with negative or zero values for committed exposure, negative values for utilized exposure, with committed exposure less than utilized exposure, and gaps in their loan histories are excluded.
3. When aggregating loans at the firm level, we exclude observations for which the firm identifier “TIN” is missing. To preserve some of these missing values, we fill in missing TINs from a history where the non-missing TIN observations are all the same over a unique facility ID.
4. When using information on firms’ financials in the analysis, we apply a set of filters to ensure that the reported information is sensible. We exclude observations (i) if total assets, total liabilities, short-term debt, long-term debt, cash assets, tangible assets, or interest expenses are negative, (ii) if tangible assets, cash assets, or total liabilities are greater than total assets, and (iii) if total debt (short term + long term) is greater than total liabilities.
5. When using the interest rate on loans in our calculations, we exclude observations with interest rates below 0.5 or above 50 percent to minimize the influence of data entry errors.

We apply the following filtering steps to the B.1 and B.2 schedules:

1. We exclude hedges with hedge horizons past the observation date.
2. We exclude observations with negative market values, amortized costs, or prices.
3. If the pricing date differs from the observation date, we refill the price variable one year backwards or forward, so that pricing date and observation date align.

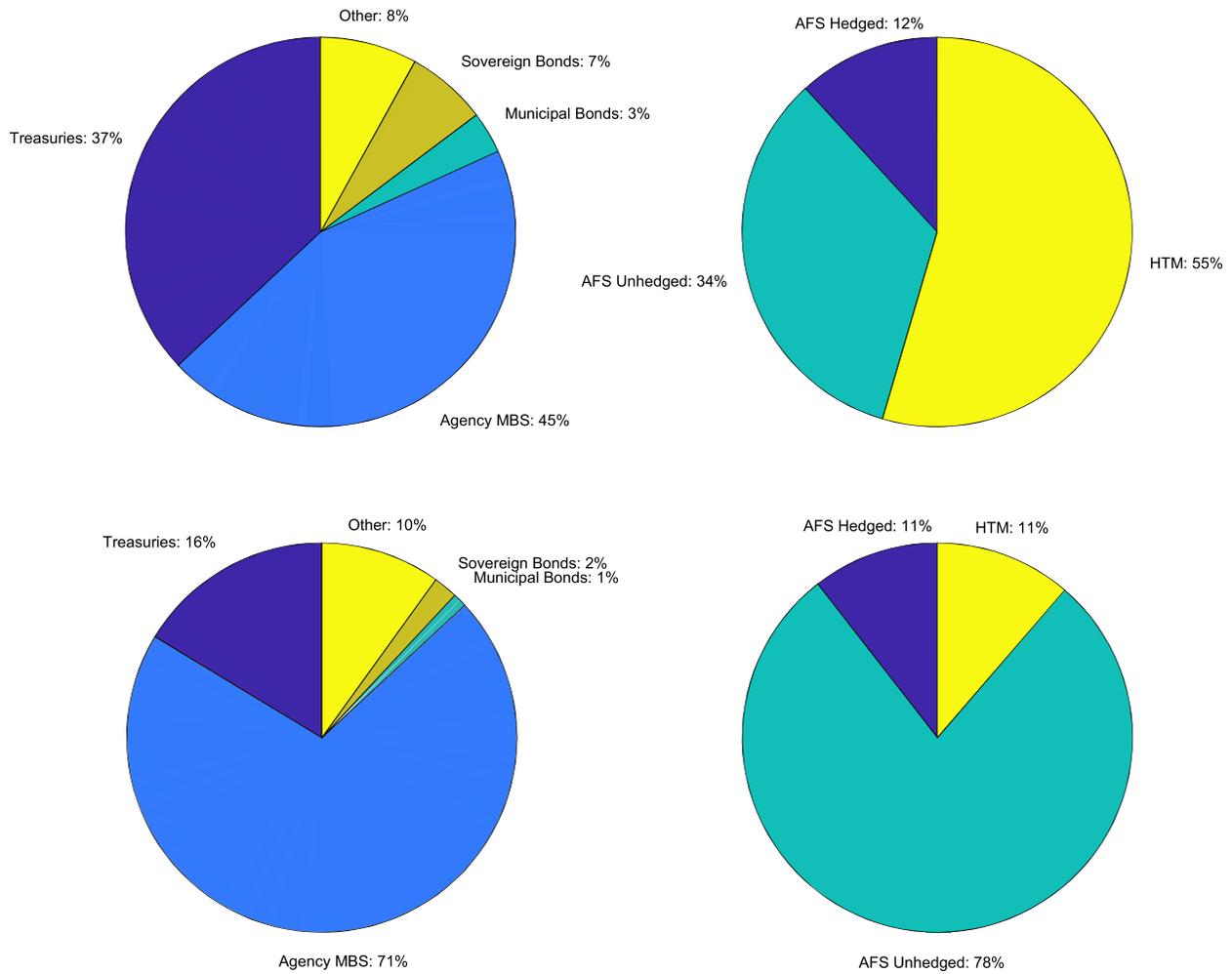
F Stylized Facts

Figure F.1: Composition of Accounting Hedges.



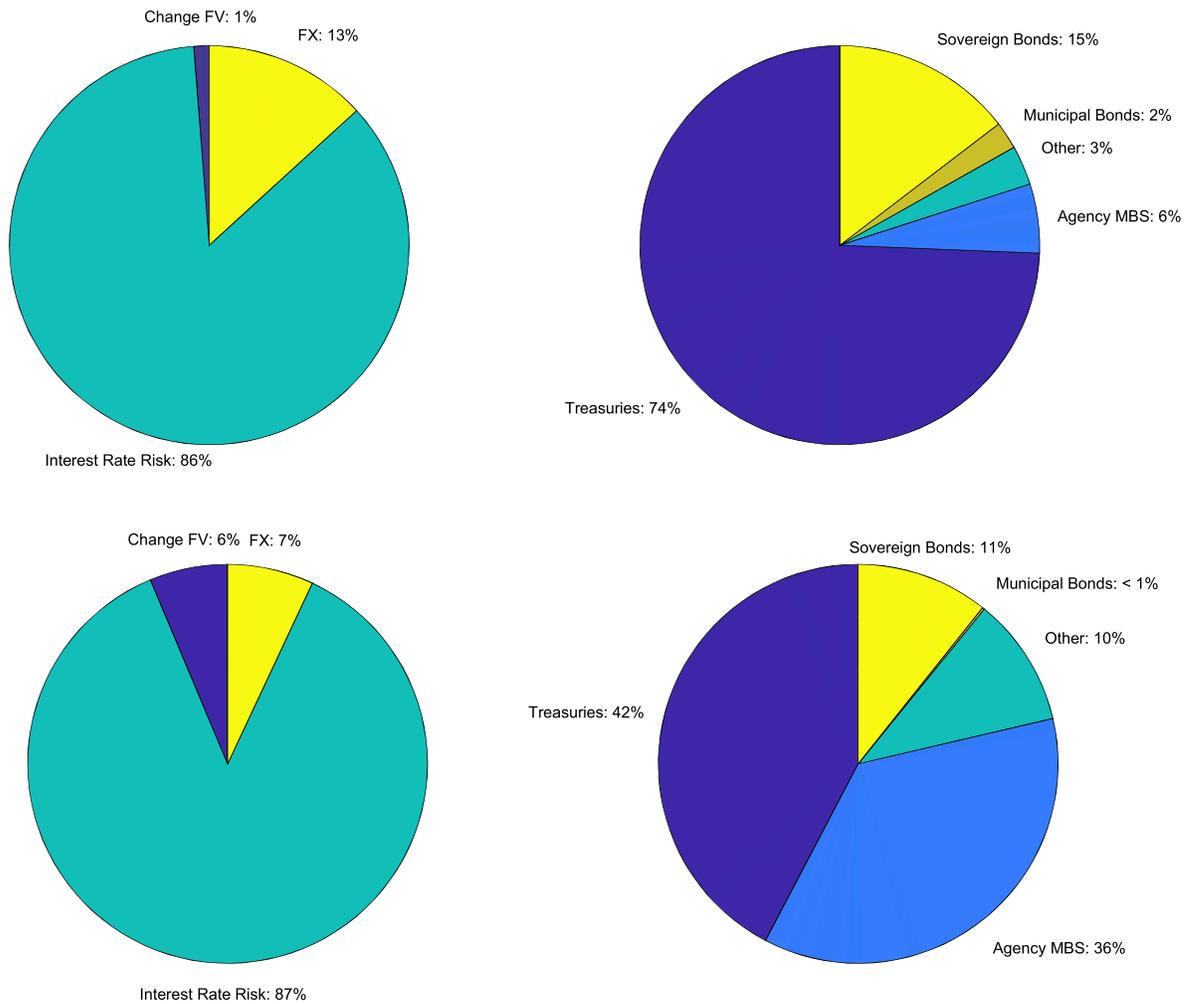
Notes: Data from FR Y-14Q sampled in 2021:Q4. The charts show the allocation shares of qualified accounting hedges by hedge type (left panel) and by hedged item or asset class (right panel). Shares are computed as percent of total market value hedged.

Figure F.2: Securities Portfolios for AC banks (top) and NC Banks (bottom).



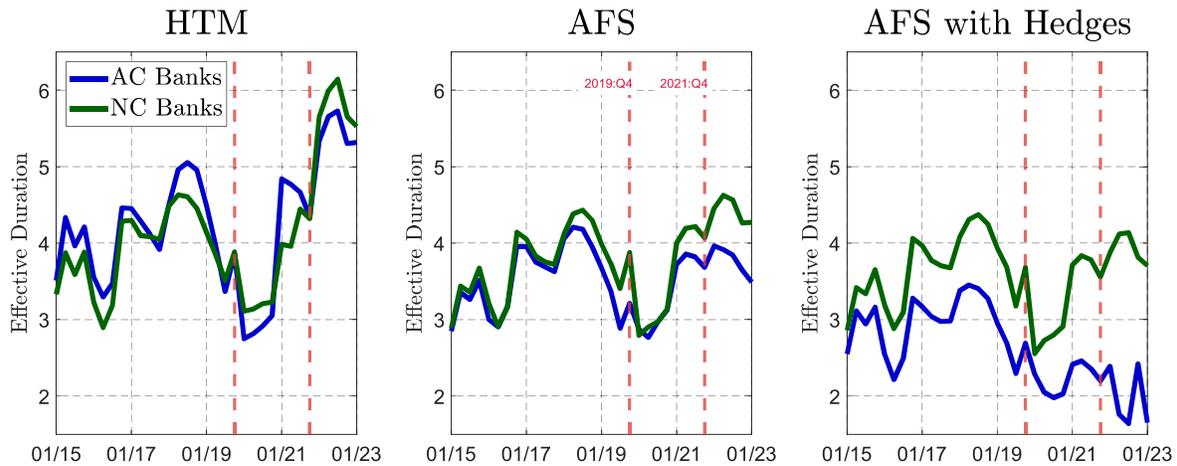
Notes: Data from FR Y-14Q sampled in 2021:Q4. The charts show the allocation shares of aggregate securities portfolio by asset class (left panels) and by accounting designation (right panels), separately for AC banks (top) and NC banks (bottom). Shares are computed as percent of total market value.

Figure F.3: Accounting Hedges for AC banks (top) and NC Banks (bottom).



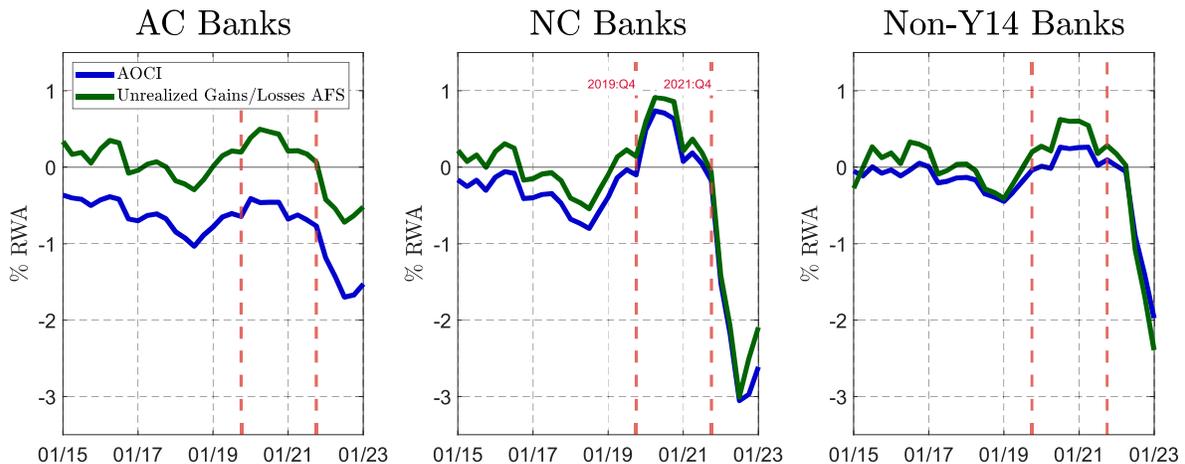
Notes: Data from FR Y-14Q sampled in 2021:Q4. The charts show the allocation shares of qualified accounting hedges by hedge type (left panels) and by hedged item or asset class (right panels), separately for AC banks (top) and NC banks (bottom). Shares are computed as percent of total market value hedged.

Figure F.4: Duration of Securities Portfolios.



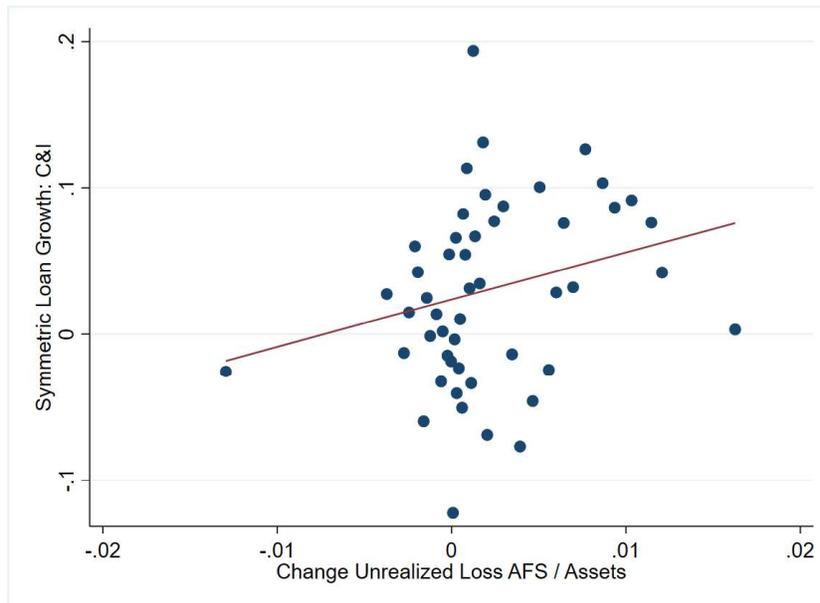
Notes: The graph shows the evolution of the effective duration of banks' HTM and AFS securities portfolios weighted by the market value of securities. The right panel takes into account that hedges shorten the maturity of AFS securities (i.e. a security that is fully hedged has a zero maturity).

Figure F.5: AOCI and Unrealized Gains/Losses AFS.



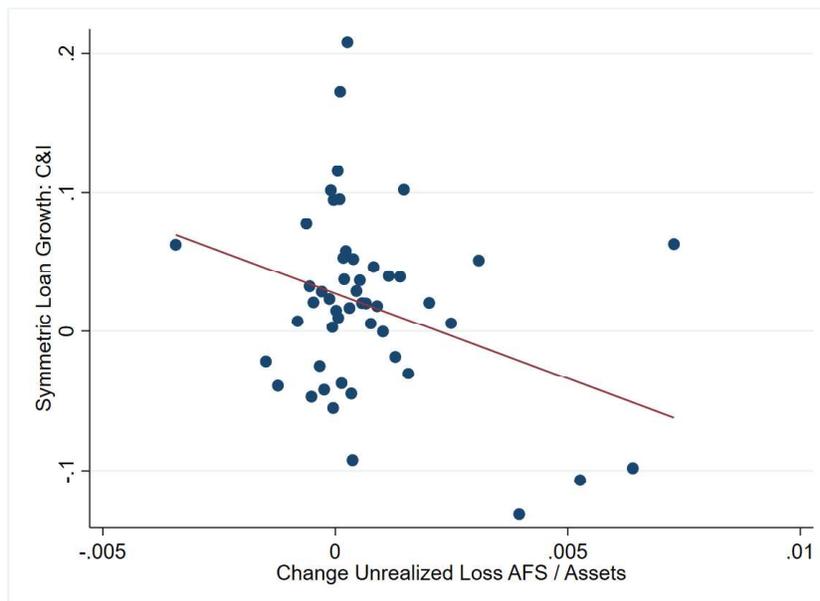
Notes: The graph shows the evolution of AOCI and unrealized gains/losses on AFS securities (both relative to risk-weighted assets) for AC banks (left panel), NC banks (middle), and non-Y14 banks (right). Source: Y-9C data.

Figure F.6: Unrealized Losses AFS and Lending Growth—NC Banks.



Notes: Data from FR Y-9C over 2021:Q1-2023:Q1 for NC banks that are part of the Y-14 sample. Binscatter plot of the change in unrealized losses on AFS securities between t and $t + 1$ (relative to total assets at t) against the C&I lending growth between t and $t + 2$ computed using the symmetric growth rate.

Figure F.7: Unrealized Losses AFS and Lending Growth—AC Banks.



Notes: Data from FR Y-9C over 2021:Q1-2023:Q1 for AC banks that are part of the Y-14 sample. Binscatter plot of the change in unrealized losses on AFS securities between t and $t + 1$ (relative to total assets at t) against the C&I lending growth between t and $t + 2$ computed using the symmetric growth rate.

G Credit Supply Effects

In this appendix, we explore extensions and test the robustness of our empirical findings in Section 6.

First, we consider alternative fixed effects specifications. Table G.2 omits the firm-time fixed effects and replaces those by variations of location-, size-, and industry-time fixed effects, which extends the sample to include firms that borrow from a single lender. Second, loans differ by contract terms such as maturity, whether they are adjustable- or fixed-rate loans, and whether a loan is syndicated. To ensure that we compare loans with similar contract terms, we extend the firm-time fixed effects with such characteristics. Table G.3 shows the updated estimation results. For both extensions, our results are similar to our baseline estimates.

Third, we extend the sample to include bank-firm observations that also cover credit lines. Columns (i) and (ii) of Table G.4 show that our results vanish when we consider used credit amounts. This finding can be explained by the fact that banks have less control over restricting the usage of credit lines which are strongly demand-driven. However, banks may adjust committed credit amounts. We therefore consider regressions with changes in committed credit as a dependent variable in columns (iii) and (iv) of Table G.4. Despite this change, we still find that our baseline results are substantially weaker, which may be explained by the fact that many firms have substantial room between their committed and used credit lines and adjusting the committed amounts may not change the used amounts substantially. However, once we restrict the unused amount to be below 10 percent of the total committed amount in columns (v) and (vi) of Table G.4, our initial results reappear. Thus, our findings are robust to including credit lines into the analysis if those do not have substantial unused credit.

Fourth, a potential concern may be that firms reduce their credit demand at banks with larger value losses of securities, as opposed to banks restricting credit supply, since firms might be worried about overall bank health. We view such a concern to be less applicable to the set of relatively large banks in our data over most of the sample when the stability of the U.S. financial system was not being questioned. However, in 2023:Q1, financial stability concerns may have played a role with the turmoil around SVB. We therefore rerun our regressions on a sample that ends in 2022:Q4. The results are shown in Table G.5. The findings for value changes of AFS securities remain the same for this new sample. We also find positive and marginally significant results for value changes of HTM securities. These results can be explained by the collateral channel or the net worth channel discussed in Section 3.

Fifth, we extend the sample backwards as far as possible to include periods of monetary easings. Table G.6 shows the updated results for the period 2016:Q4-2023:Q1. While our key findings remain, the coefficients reduce somewhat in magnitude. This comparison indicates that the effects are larger following a sharp unexpected monetary tightening as it occurred in 2022. To further explore the possibility of asymmetric effects, we separate positive and negative AFS value changes in Table G.7. We find larger and statistically significant effects for negative AFS value changes, though we cannot reject that the estimates are different from the ones of positive AFS value changes at standard confidence levels.

Sixth, in addition to the intensive margin responses, we further analyze extensive margin adjustments. That is, the dependent variable in our baseline regression (6.1) includes all bank-firm observations in t and $t + 2$ that show an existing lending relationship for both periods and are non-zero in at least one of the periods. However, non-existing relationships in either t or $t + 2$ are not part of the sample. We incorporate such new lending relationships or the end of old relationships by including zero-observations for $L_{i,j,t}$ or $L_{i,j,t+2}$ in such instances. The updated results are shown in Table G.8. The estimated coefficients β increase in magnitude and are even more precisely estimated, showing that such extensive margin adjustments further strengthen our findings.⁴⁵

Seventh, we reestimate regression (6.1) for various horizons to portray the dynamic response of credit. Table G.9 shows the results. The crowding out effect is already sizable and significant within the same quarter during which securities change value. Hence, the transmission of monetary policy through bank securities portfolios operates at a high frequency since asset prices change instantly and lead to quick credit adjustments. The response builds up over time and becomes strongest at the three-quarter horizon.

Eighth, we test whether the identified supply effects apply not only to credit quantities but also to interest rates charged on loans. Table G.10 shows the results for regressions that use changes in interest rates as a dependent variable in (6.1), again portraying the dynamic response for various horizons. We find negative coefficients for β that indicate the identification of supply adjustments. At the three-quarter horizon, the responses are statistically different from zero at the 5 percent confidence level. However, compared with the credit responses, the statistical significance is weaker overall.⁴⁶

⁴⁵However, we do not measure the exact strength of the spillover effect in dollar terms based on these estimates, since the symmetric growth rate that we use as a dependent variable in regression (6.1) approximates all new relationships or the ending of old relationships as either -2 or 2 .

⁴⁶We note that although this evidence supports a rise in interest rates, it is not strictly necessary since our model mechanism ultimately works through quantities, as constrained firms adjust other margins such as investment to offset credit lost due to crowding out. While crowding out occurs via credit spread increases in our model, it could also occur via credit rationing as in e.g., Stiglitz and Weiss (1981), with a smaller increase or no increase in spreads, due to information frictions not present in our model.

And, finally, we test for a pretrend by running a placebo regression that uses $(L_{i,j,t} - L_{i,j,t-2}) / (0.5 \cdot (L_{i,j,t} - L_{i,j,t-2}))$ as a dependent variable in (6.1). Table G.11 shows that our findings vanish for this alternative setup.

Table G.1: Summary Statistics.

Variable	Obs.	Mean	Std.	P10	Median	P90	AC	NC
Main Regressors								
Δ Value SEC/Assets	183	-.44	.61	1.26	.16	.10	-.35	-.49
Δ Value AFS/Assets	183	-.28	.39	-.91	-.11	.06	-0.13	-0.36
Δ Value HTM/Assets	183	-.16	.40	-.55	-.012	.02	-.22	-0.13
Bank Controls								
ROA	183	.62	.42	.22	.55	1.11	0.53	0.64
Income Gap	183	37.30	11.74	28.50	38.85	49.23	36.89	37.50
Leverage	183	90.23	1.81	87.93	90.40	92.47	91.60	89.50
Ln(Total Assets)	183	19.67	1.01	18.73	19.22	21.39	20.65	19.16
Deposit Share	183	69.50	16.06	50.79	75.23	84.51	68.75	74.03
Loan Share	183	42.40	17.27	15.41	45.25	63.85	24.79	51.63
Unused Credit/Assets	183	8.13	5.37	2.23	6.63	16.98	3.72	10.44

Notes: Summary statistics for the regressors in regression (6.1) at the bank level. All variables are multiplied by 100, except for Ln(Total Assets). Averages for AC and NC banks shown. Sample: 2021:Q1 - 2023:Q1.

Table G.2: Omitting Firm-Time Fixed Effects.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	4.59** (1.91)	6.09** (2.31)	3.47** (1.51)	5.46** (2.33)
Δ Value HTM			-4.59** (2.04)	-3.15 (2.04)
Fixed Effects				
Location \times Size \times Time	✓		✓	
Location \times Size \times Time \times Industry		✓		✓
Bank & AC \times Time	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
R-squared	0.25	0.46	0.26	0.46
Observations	51,242	25,906	51,242	25,906
Number of Firms	12,544	7,719	12,544	7,719
Number of Banks	28	28	28	28

Notes: Estimation results for regression (6.1). Columns (i) and (iii) include location-size-time fixed effects based on U.S. states and percentiles of the total asset distribution and columns (ii) and (iv) include location-size-time-industry fixed effects, which additionally use 2-digit NAICS codes. Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.3: Firm-Time Fixed Effects Extensions.

	(i)	(ii)	(iii)	(iv)	(v)
Δ Value AFS	6.08*** (1.85)	5.65*** (1.94)	5.49*** (1.56)	5.33*** (1.65)	5.63** (2.08)
Fixed Effects					
Firm \times Time	✓				
Firm \times Time \times Syn.		✓			
Firm \times Time \times Mat.			✓		
Firm \times Time \times Float.				✓	
Firm \times Time \times All					✓
Bank & AC \times Time	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓
R-squared	0.57	0.53	0.54	0.54	0.53
Observations	13,038	11,606	12,523	11,376	10,277
Number of Firms	1,289	1,165	1,242	1,142	1,035
Number of Banks	27	27	27	27	25

Notes: Estimation results for regression (6.1). Column (i) shows the baseline estimate using firm-time fixed effects, Column (ii) extends the fixed effects by whether the loan is syndicated, Column (iii) by the loan's maturity based on three bins (less than one quarter, less than one year, and more than one year), Column (iv) by whether the loan carries an adjustable or a floating rate, and Column (v) uses all three additional characteristics. Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.4: Credit Lines.

	<u>Used</u>		<u>Committed</u>		<u>Committed Res.</u>	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ Value AFS	3.07 (1.99)	2.46 (2.70)	1.32 (1.01)	2.10** (0.90)	5.70** (2.19)	7.00*** (1.92)
Δ Value HTM	0.66 (1.06)	-0.30 (0.94)	0.93 (0.88)	0.60 (0.76)	2.93** (1.33)	2.93* (1.48)
Fixed Effects						
Firm \times Time	✓		✓		✓	
Firm \times Time \times Purpose		✓		✓		✓
Bank & AC \times Time	✓	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓	✓
R-squared	0.69	0.71	0.47	0.5	0.53	0.53
Observations	84,241	66,960	84,241	66,960	23,575	18,525
Number of Firms	5,622	4,581	5,622	4,581	2,371	1,899
Number of Banks	28	28	28	28	28	28

Notes: Estimation results for regression (6.1) which extends the sample to include bank-firm observations that also cover credit lines. Columns (i) and (ii) employ used credit for the dependent variable, while the remaining columns use committed credit instead. Columns (v) and (vi) restrict unused credit to be below 10 percent of total committed credit. All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii) and (iv). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.5: Excluding 2023:Q1.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	8.16*** (2.70)	9.95*** (2.66)	8.44*** (2.40)	10.26*** (2.43)
Δ Value HTM			3.20* (1.58)	2.52* (1.36)
Fixed Effects				
Firm \times Time	✓		✓	
Firm \times Time \times Purpose		✓		✓
Bank & AC \times Time	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
R-squared	0.59	0.56	0.59	0.56
Observations	11,020	9,365	11,020	9,365
Number of Firms	1,243	1,065	1,243	1,065
Number of Banks	27	26	27	26

Notes: Estimation results for regression (6.1). All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii) and (iv). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2022:Q4. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.6: Extended Sample.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	3.17** (1.49)	4.87*** (1.77)	3.23** (1.53)	4.91*** (1.79)
Δ Value HTM			1.24 (0.94)	0.60 (0.91)
Fixed Effects				
Firm \times Time	✓		✓	
Firm \times Time \times Purpose		✓		✓
Bank & AC \times Time	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
R-squared	0.56	0.55	0.56	0.55
Observations	41,541	33,269	41,541	33,269
Number of Firms	2,301	1,896	2,301	1,896
Number of Banks	34	34	34	34

Notes: Estimation results for regression (6.1). All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii) and (iv). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2016:Q4 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.7: Asymmetric Effects.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ Value AFS (-)	3.38** (1.49)	5.62*** (1.63)			3.24** (1.48)	5.50*** (1.60)
Δ Value AFS (+)			3.66 (4.06)	3.77 (5.18)	3.07 (4.00)	2.80 (5.04)
Fixed Effects						
Firm \times Time	✓		✓		✓	
Firm \times Time \times Purpose		✓		✓		✓
Bank & AC \times Time	✓	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓	✓
R-squared	0.56	0.55	0.56	0.55	0.56	0.55
Observations	41,561	33,290	41,561	33,290	41,561	33,290
Number of Firms	2,303	1,897	2,303	1,897	2,303	1,897
Number of Banks	35	35	35	35	35	35

Notes: Estimation results for regression (6.1), separating positive and negative AFS value changes. All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii), (iv), and (vi). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2016:Q4 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.8: Extensive Margin.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	48.38*** (14.23)	43.47*** (11.57)	47.48*** (13.48)	43.70*** (11.26)
Δ Value HTM			-7.61 (11.82)	1.89 (9.14)
Fixed Effects				
Firm \times Time	✓		✓	
Firm \times Time \times Purpose		✓		✓
Bank & AC \times Time	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
R-squared	0.69	0.71	0.69	0.71
Observations	23,200	19,744	23,200	19,744
Number of Firms	2,781	2,385	2,781	2,385
Number of Banks	30	28	30	28

Notes: Estimation results for regression (6.1) that incorporates new lending relationships and the ending of old relationships. All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii) and (iv). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.9: Dynamic Response.

	h=1	h=2	h=3	h=4	h=5
Δ Value AFS	6.82** (3.18)	11.80*** (3.80)	12.56*** (4.11)	9.91* (5.17)	6.03 (4.04)
Fixed Effects					
Firm \times Time	✓	✓	✓	✓	✓
Bank & AC \times Time	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓
R-squared	0.59	0.57	0.57	0.57	0.58
Observations	5,087	5,087	5,087	5,087	5,087
Number of Firms	771	771	771	771	771
Number of Banks	27	27	27	27	27

Notes: Estimation results for regression (6.1) that uses $2 \cdot (L_{i,j,t+h} - L_{i,j,t}) / (L_{i,j,t+h} + L_{i,j,t})$ as a dependent variable for $h = 1, 2, \dots$. All specifications are estimated for a balanced sample, include firm-time fixed effects, as well as various bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.10: Interest Rates.

	h=1	h=2	h=3	h=4	h=5
Δ Value AFS	-0.02 (0.03)	-0.09 (0.05)	-0.16** (0.06)	-0.13 (0.11)	-0.10 (0.13)
Fixed Effects					
Firm \times Time	✓	✓	✓	✓	✓
Bank & AC \times Time	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓
R-squared	0.6	0.81	0.89	0.91	0.92
Observations	5,017	5,017	5,017	5,017	5,017
Number of Firms	765	765	765	765	765
Number of Banks	27	27	27	27	27

Notes: Estimation results for regression (6.1) that uses changes in interest rates $r_{i,j,t+h} - r_{i,j,t}$ as a dependent variable for $h = 1, 2, \dots$. All specifications are estimated for a balanced sample, include firm-time fixed effects, as well as various bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table G.11: Placebo Regression.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	-0.33 (1.98)	-0.08 (1.84)	-0.26 (1.97)	-0.06 (1.84)
Δ Value HTM			0.44 (0.57)	0.08 (0.72)
Fixed Effects				
Firm \times Time	✓		✓	
Firm \times Time \times Purpose		✓		✓
Bank & AC \times Time	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
R-squared	0.58	0.56	0.58	0.56
Observations	16,570	14,082	16,570	14,082
Number of Firms	1,423	1,215	1,423	1,215
Number of Banks	29	28	29	28

Notes: Estimation results for regression (6.1) which uses $2 \cdot (L_{i,j,t} - L_{i,j,t-2}) / (L_{i,j,t} + L_{i,j,t-2})$ as a dependent variable. All specifications include firm-time fixed effects that additionally vary by the loan purpose in columns (ii) and (iv). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include AC-banks-time fixed effects and bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

H Mechanism

In this section, we further explore the mechanisms explaining our results and contrast them with alternative channels.

AC Banks - Hedged vs. Unhedged Securities. We rerun regression (6.3) but additionally distinguish AFS value changes into hedged and unhedged ones. The results—reported in Table H.1—show that the coefficient related to unhedged security value changes interacted with the AC-banks indicator is statistically different from zero when we use the finer firm-time-loan purpose fixed effects. In contrast, we do not find such differential effects for hedged securities. These findings are consistent with the regulatory capital channel, which operates for unhedged securities at AC banks.

Bank Capital. We investigate differences across banks depending on their capital positions. To this end, we consider the regression

$$\frac{L_{i,j,t+2} - L_{i,j,t}}{0.5 \cdot (L_{i,j,t+2} + L_{i,j,t})} = \beta_1 \cdot \frac{\Delta Value_{j,t+1}^{AFS}}{Assets_{j,t}} + \beta_2 \cdot \frac{\Delta Value_{j,t+1}^{AFS}}{Assets_{j,t}} \cdot Cap_{j,t} + \gamma X_{j,t} + \kappa_j + u_{i,j,t}, \quad (\text{H.1})$$

where $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$ is now interacted with a measure of bank capital $Cap_{j,t}$. For bank capital positions, we consider CET1, Tier 1, and total bank capital, and use the difference between the ratio and the requirement for each.

The estimation results for regressions (H.1) are reported in Table H.2. Across the various capital measures, β_2 is negative and statistically different from zero at standard confidence levels. That is, banks that are less capitalized show stronger spillover effects, confirming a prediction from Section 3. For the reported estimation results, we control for interaction terms between $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$ and various other bank controls, ensuring that we are not picking up an alternative channel based on correlations between bank observables.

Interest Rate Risk Channel. We provide further evidence that our baseline findings are explained by banks' exposure to interest rate risk that leads to fluctuations in the value of their securities portfolios, as opposed to other simultaneous reactions to changes in interest rates. To this end, we consider three extensions of regression (6.1) that are summarized in Table H.3 where Column (i) shows our baseline results.

First, Kashyap and Stein (2000) show that the effect of monetary policy on lending is stronger for banks with less liquid balance sheets, that is, with lower security holdings relative to assets. Intuitively, as monetary policy tightens, these banks have less liquid assets to sell and therefore need to contract lending. In contrast, we find that banks with larger value changes of securities relative to assets show a stronger lending response (which tend to be banks with more ex-ante securities relative to assets). To account for the channel by Kashyap and Stein (2000), we further control for banks' ex-ante AFS and HTM holdings, as well as their trading securities (distinguishing government, mortgage-backed, and other debt securities, as well as short positions for debt securities, see Appendix Table D.5 for details). The estimation results with these additional controls are shown in Column (ii) of Table H.3. If anything, our findings slightly strengthen in magnitude and statistical significance.

Second, we employ an instrumental variable regression. As discussed above, value changes of a bank's AFS portfolio can be the result of a number of risk factors and we aim to isolate the channel working through unexpected changes in interest rates. As an

instrument for $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$, we therefore use the interaction between the yield change of the one-year treasury security from t to $t + 1$, which captures changes in the stance of monetary policy, and a bank's AFS portfolio valued at market prices relative total assets at time t .

The first-stage regression yields a negative coefficient with respect to our instrument which is statistically different from zero at the 1 percent confidence level with an F-statistic of 45. Intuitively, an unexpected increase in interest rates leads to a more negative response of the value of a bank's AFS portfolio the larger the initial value of that portfolio. Table H.3 reports the second-stage results in Column (iii). The coefficient associated with $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$ remains positive and statistically significant at the 5 percent confidence level for the instrumental variable regression, providing additional evidence for the interest rate risk channel. The estimated coefficient is also larger than our baseline estimate, indicating that unexpected value changes of securities may yield even stronger spillover effects.

Third, we directly control for other simultaneous responses to interest rate movements. Specifically, changes in interest rates affect the interest rate gap between deposit rates and short-term market rates, resulting in deposit fluctuations (Drechsler, Savov and Schnabl, 2017). In turn, banks may alter their credit supply schedule to firms. Moreover, changes in the stance of monetary policy can affect banks differently depending on the maturity structure of their balance sheets. For example, banks that hold more adjustable-rate loans may obtain relatively more interest income in the short-run when monetary policy tightens (Gomez et al., 2021).

While our baseline controls—in particular banks' deposit shares and their income gap—partly account for such simultaneous deposit flows and cash flow effects, we directly control for them by including changes in bank deposits and net income from t to $t + 1$ (both relative to total assets at time t) as separate regressors into our baseline regression (6.1).⁴⁷

Moreover, a potential alternative explanation for our results is that banks with larger value losses of securities also experienced a stronger decline in the expected profitability of their legacy loans, leading to a contraction in lending that is not caused by the value losses of securities but by the poor performance of the loan portfolio. To address this concern, we directly control for the change in the quality of a bank's existing term loan portfolio using banks' reported probabilities of default and provision for loan losses from

⁴⁷We use banks' net income change as opposed to changes in the net interest margin to account for other non-interest income changes. However, the results are unaffected by this choice. They equally hold when controlling for changes of net interest margins instead.

banks' income statements from t to $t + 1$.⁴⁸

Column (iv) of Table H.3 reports the new estimation results. While the coefficients on the added regressors are not statistically different from zero, the size and significance of the coefficient with respect to $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$ remain largely unchanged, providing further evidence that our initial results are not driven by such simultaneous developments but by responses to security price changes.

Table H.1: AC Banks - Hedged vs. Unhedged.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS Unhedged	-1.16 (4.77)	-1.41 (5.29)	-1.73 (4.98)	-1.62 (4.94)
Δ Value AFS Unhedged \times AC	6.85 (9.00)	14.44 (9.34)	14.70 (9.49)	24.21** (10.19)
Δ Value AFS Hedged			19.61 (21.11)	18.93 (32.31)
Δ Value AFS Hedged \times AC			-49.57 (40.62)	-49.16 (57.78)
Fixed Effects				
Firm \times Time	✓		✓	
Firm \times Time \times Purpose		✓		✓
Bank	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
Derivatives	✓	✓	✓	✓
Bank Controls \times Δ Value AFS Unhedged	✓	✓	✓	✓
Bank Controls \times Δ Value AFS Hedged			✓	✓
R-squared	0.57	0.55	0.57	0.55
Observations	13,027	11,093	13,027	11,093
Number of Firms	1,288	1,105	1,288	1,105
Number of Banks	26	26	26	26

Notes: Estimation results for regression (6.3). All specifications include firm-time and bank fixed effects. Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. All specifications include controls for derivative contracts from the trading and derivative book (see footnote 25 for details) and $\Delta Value_{j,t+1}^{HTM} / Assets_{j,t}$. Interaction terms between the various demeaned bank controls and $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$ are included for hedged securities in columns (iii) and (iv) and for unhedged securities in all specifications. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

⁴⁸Specifically, we compute changes in banks' reported probabilities of default on their total term loan portfolio weighted by used credit amounts and omitting the observation associated with the dependent variable (leave-one-out). Provision for loan losses are measured using item BHCKJJ33 from the Y-9C filings (see Appendix Table D.5 for details).

Table H.2: Bank Capital Positions.

	(i)	(ii)	(iii)
Δ Value AFS	5.82 (4.50)	6.00 (4.89)	7.42 (5.12)
Δ Value AFS \times CET1	-1.06* (0.57)		
Δ Value AFS \times Tier1		-1.17* (0.66)	
Δ Value AFS \times Total			-1.50** (0.69)
Firm \times Time FE; Bank FE	✓	✓	✓
Bank Controls	✓	✓	✓
Bank Controls \times Δ Value AFS	✓	✓	✓
R-squared	0.57	0.57	0.57
Observations	13,038	13,038	13,038
Number of Firms	1,289	1,289	1,289
Number of Banks	27	27	27

Notes: Estimation results for regression (H.1). All specifications include firm-time and bank fixed effects. Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, the ratio of unused credit lines to assets, and each respective capital buffer. All specifications include interaction terms between the various demeaned bank controls and $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$, apart from bank leverage which is highly correlated with the other capital measures. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table H.3: Interest Rate Risk Channel.

	(i)	(ii)	(iii)	(iv)
Δ Value AFS	6.08*** (1.85)	7.71*** (1.47)	14.07** (6.12)	6.58*** (2.07)
Δ Net Income				0.64 (2.83)
Δ Deposits				-0.06 (0.20)
Δ Probability Default				31.79 (45.21)
Δ Provision Losses				5.91 (6.43)
Firm \times Time FE	✓	✓	✓	✓
Bank FE; AC \times Time FE	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓
Banking Book Securities		✓	✓	
Trading Book Securities		✓		
Estimator	OLS	OLS	IV	OLS
First Stage F-Stat.			45	
R-squared	0.57	0.57	0.57	0.57
Observations	13,038	13,027	13,038	13,038
Number of Firms	1,289	1,288	1,289	1,289
Number of Banks	27	26	27	27

Notes: Estimation results for regression (6.1). All specifications include firm-time fixed effects, AC-banks time fixed effects, and bank fixed effects. Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. Columns (ii) and (iii) include AFS securities at market value as well as HTM securities at book value, both relative to assets. Column (ii) includes banks' securities from the trading portfolio at time t : government, mortgage-backed, and other debt securities, as well as short positions on debt securities (all relative to assets). Column (iii) considers an instrumental variable regression using the interaction between the yield change of the one-year treasury security from t to $t + 1$ and a bank's AFS portfolio valued at market prices relative total assets at time t as an instrument. Column (iv) includes changes in net income, deposits, probabilities of default of banks term loan portfolios (weighted by used credit amounts), and provision for loan losses from t to $t + 1$ (all relative to assets). Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table H.4: AC Banks - Firm-time FE Extension.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ Value AFS	4.11*	5.60*	2.11	1.79	-3.70	-6.45
	(2.21)	(3.22)	(4.22)	(5.51)	(6.76)	(7.68)
Δ Value AFS \times AC	29.24	34.40*	30.96	37.66*	29.27	35.76**
	(18.23)	(16.92)	(19.59)	(19.05)	(17.59)	(17.16)
Δ Value AFS \times Size			-2.09	-3.82	-2.74	-4.59
			(2.79)	(3.43)	(4.96)	(5.87)
Fixed Effects						
Firm \times Time \times AC	✓		✓		✓	
Firm \times Time \times AC \times Purpose		✓		✓		✓
Bank	✓	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓	✓
Bank Controls \times Δ Value AFS					✓	✓
R-squared	0.61	0.6	0.61	0.6	0.61	0.6
Observations	7,115	5,738	7,115	5,738	7,115	5,738
Number of Firms	758	628	758	628	758	628
Number of Banks	27	25	27	25	27	25

Notes: Estimation results for regression (6.3). All specifications include firm-time-AC-bank fixed effects that additionally vary by the loan purpose in columns (ii), (iv), and (vi). Bank controls: bank size (natural log of assets), return on assets (net income/assets), deposit share (total deposits/assets), loan share (loans/assets), leverage (liabilities/assets), banks' income gap, and the ratio of unused credit lines to assets. Columns (v) and (vi) include interaction terms between the various demeaned bank controls and $\Delta Value_{j,t+1}^{AFS} / Assets_{j,t}$. All specifications include bank fixed effects. Standard errors in parentheses are clustered by bank. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

I Effects at the Firm Level

Table I.1: Firm Level Effects - Credit Line Access.

	<u>Δ Liabilities</u>		<u>Investment</u>		<u>Δ Cash</u>	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ Value AFS	4.14** (2.07)		5.30** (2.67)		10.45** (4.48)	
Δ Value AFS \times No CL		5.23** (2.05)		6.68** (2.65)		10.84** (4.54)
Δ Value AFS \times CL		-13.06** (6.16)		-16.50** (7.23)		4.39 (10.41)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓
R-squared	0.78	0.78	0.72	0.72	0.66	0.66
Observations	83,663	83,663	82,473	82,473	81,901	81,901
Number of Firms	22,499	22,499	22,162	22,162	22,116	22,116
Number of Banks	29	29	29	29	29	29

Notes: Estimation results for regression (6.5) where $y_{i,t}$ is either total liabilities in columns (i) and (ii), fixed assets in columns (iii) and (iv), or cash holdings in columns (v) and (vi). All specifications include firm fixed effects and the firm controls: cash holdings, fixed assets, liabilities, net income, sales (all scaled by total assets), firm size (natural logarithm of total assets), the ratio of observed debt to total debt, as well as the set of all bank controls used in previous regressions and deposit and net income changes from Column (iv) of Table H.3 aggregated to the firm level using debt shares across lenders. Columns (ii), (iv), and (vi) separate firms as to whether they have any unused credit line capacity in our data ("CL") or not ("No CL"). Standard errors in parentheses are clustered by firm. Sample: 2021:Q1 - 2023:Q1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.