

How Do Banks Respond to Regulatory Capital Requirements?

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October 2026

[\(most recent version\)](#)

Abstract

Banks allocate their portfolios across different types of loans and securities. Changes in capital requirements affect multiple assets' regulatory penalties simultaneously. Although a large literature finds that stronger capital requirements reduce lending, these bank-level studies generally estimate an aggregate lending elasticity that conflates the response of each asset to its own regulatory cost with portfolio substitution induced by the simultaneous changes in other assets' costs. Analyzing policies that change the regulatory penalties of individual assets, rather than individual banks, requires separating these quantities. I develop a new structural framework and empirical method to separate asset-level supply elasticities from portfolio substitution by using changes in bank-level requirements that affect multiple assets' regulatory penalties simultaneously, subject to a portfolio adding-up constraint. My method recovers a positive supply elasticity for every asset category and finds that banks' securities holdings respond more to regulatory costs than loans do. Its predictions match out-of-sample bank portfolio responses to changes in capital regulation. I ask whether stronger capital regulation explains banks' move away from lending since the financial crisis and argue that it accounts for about 28% of large banks' shift from lending to securities since 2011.

1 Introduction

Bank capital requirements are regulators’ principal tool for protecting financial stability. Capital requirements require banks to finance a minimum share of their assets with equity, reducing banks’ incentives to take risks and protecting the government’s deposit insurance fund against losses. But many studies find that stronger capital requirements reduce bank lending (e.g., Aiyar et al., 2014; Bridges et al., 2014; Gropp et al., 2019; Berrospide and Edge, 2019; Juelsrud and Wold, 2020; Favara et al., 2021; Blattner et al., 2023). Understanding the effect of capital requirements on bank lending is therefore central to assessing the costs and benefits of capital regulation.

Since the financial crisis, U.S. regulators have strengthened capital requirements for large banks, while these banks have simultaneously shifted their portfolios away from lending and toward securities (Hanson et al., 2024). The contribution of stronger capital requirements to this shift remains debated (Irani et al., 2021; Buchak et al., 2024).

Existing studies of the effects of capital regulation on lending generally estimate responses to changes in bank-level capital requirements that shift equity requirements for multiple assets at once. These estimates therefore capture the combined response of lending to changes in loans’ own regulatory costs and changes in other assets’ costs. For example, the supplementary leverage ratio (SLR) requires the largest banks to fund all assets with at least 5% equity regardless of the assets’ risk, raising banks’ required equity on securities and lowering it on loans compared to the risk-based capital rule. Research shows that banks subject to the SLR reduce their holdings and intermediation of securities (Duffie and Krishnamurthy, 2016; Favara et al., 2022; Bräuning and Stein, 2024), but this reflects a combination of securities becoming more expensive and loans becoming cheaper. Separating the effects of changes in securities’ and loans’ equity requirements would require distinguishing each asset’s own-cost supply elasticity from portfolio substitution. More generally, asset-level supply elasticities can be used to predict banks’ portfolio responses to changes to the equity requirements of individual assets, such as permanently exempting reserves and Treasuries from the SLR or raising risk weights on commercial real estate loans while leaving other assets’ equity requirements unchanged.

This paper develops a new structural framework and empirical method to separate banks’ asset supply elasticities from portfolio substitution. To separate these quantities, I model the bank’s portfolio allocation across multiple types of loans and securities. From the model, I derive a formula that decomposes an asset’s portfolio-share response to a change in capital regulation into its response to changes in its own regulatory cost and substitution induced by changes in other assets’ costs. Empirically, I use historical changes in bank-level capital

requirements that change regulatory costs across assets by different amounts. I estimate all assets’ portfolio-share equations jointly by nonlinear least squares because each asset’s substitution response depends on the supply elasticities of all assets in the portfolio.

My method recovers positive supply elasticities for every asset category and finds that securities respond more to regulatory costs than loans do, consistent with securities’ greater liquidity and homogeneity. The model’s predictions match out-of-sample bank responses to changes in capital requirements. Applying these elasticities to the post-crisis strengthening of bank capital requirements, I argue that stronger capital regulation accounts for about 28% of large banks’ shift from lending to securities since 2011.

Section 2 develops a model of bank portfolio allocation in which an asset’s portfolio share responds to its own funding cost relative to the supply-elasticity-weighted average funding cost across assets. For each asset, the model allows returns and costs to differ across banks but assumes a common local curvature of net return, and hence a common local supply elasticity. Proposition 1 shows that, holding asset returns and bank size fixed, an asset loses portfolio share when its equity requirement rises by more than the supply-elasticity-weighted average increase in equity requirements across the bank’s assets. Since portfolio shares sum to one, an expansion in one asset’s portfolio share requires a contraction in other assets’ shares. In the model, the supply elasticities determine how the bank distributes this reallocation across assets. The adding-up constraint therefore links each asset’s substitution response to the supply elasticities of all assets in the portfolio. These links allow me to estimate own-cost supply elasticities while accounting for substitution across assets.¹

In Section 3, I estimate asset supply elasticities using changes in bank-level capital requirements. I first construct a measure of the equity required for each asset at each bank. I match quarterly bank balance-sheet data from Form FR Y-9C to the standardized asset risk weights prescribed by U.S. capital regulation (12 CFR Part 217, Subpart D). The sample covers 2011–2025 and includes 28 domestic bank holding companies (“banks”) with more than \$100 billion in assets in at least one quarter during this period. I group banking-book assets into four risk-weight categories—0, 0.2, 0.5, and 1—where the reported line items permit a mapping to standardized risk weights. I measure each category’s portfolio share relative to total banking-book assets, excluding reserves and vault cash. The remaining banking-book assets, whose line items cannot be assigned to these risk-weight categories, constitute an outside good retained in the denominator. Trading assets enter neither the estimated asset categories nor the outside good. I combine the mapped risk weights with

¹The baseline model assumes that one capital requirement binds for each bank. Appendix Section A.1 allows banks to be uncertain about which capital requirement will bind and therefore place continuous weight on both RBC and SLR capital requirements.

bank-level capital requirements to construct a dataset of required equity—the share of an asset that must be funded by equity—for each bank, asset category, and quarter. Measuring regulatory changes in common units of required equity allows me to combine multiple policy changes in the estimation.

I identify asset supply elasticities from two sources of regulatory variation: increases in risk-based capital requirements and switches in banks’ binding capital rule. Asset risk weights determine how each change in a bank-level capital requirement translates into changes in the equity required for individual assets. Since 2013, the Fed has raised risk-based capital requirements by different amounts across banks and over time. The introduction of the SLR caused custodian and dealer banks to switch from being RBC-bound to SLR-bound, raising required equity on securities and lowering it on loans, while subsequent increases in risk-based capital requirements have caused several of these banks to switch back to being RBC-bound. I use this variation to compare portfolio-share growth over the following 4–5 years across assets facing different changes in required equity within the same bank, and to compare those growth differences across banks holding the same assets.

I estimate all assets’ supply elasticities jointly by nonlinear least squares, using bank-date and asset-date fixed effects to implement these comparisons. The fixed effects absorb portfolio-share changes common to all assets at a bank and changes common to all banks holding a given asset. Each candidate set of elasticities determines both the own-cost responses and the substitution responses across assets, subject to portfolio shares adding up to one. The estimation selects the elasticities that best explain the observed portfolio-share changes across all assets.² Identification requires that, absent the regulatory changes, differences in portfolio-share growth across assets at a given bank would have been the same as at other banks.

The substitution-corrected supply elasticities are positive for every asset category: increasing an asset’s equity requirement reduces the asset’s portfolio share, holding other assets’ equity requirements fixed. Securities respond more to their own regulatory costs than loans do, consistent with their greater liquidity and homogeneity. To illustrate the implied portfolio reallocation, consider imposing a 5% SLR equity requirement on a dealer or custodian bank previously bound by a 10% RBC equity requirement, so that the SLR becomes binding. The SLR raises required equity on securities and lowers it on unsecured loans relative to the previously binding RBC requirement. Applying the estimated supply elasticities to these asset-specific changes in required equity implies a decline in Treasury holdings of about 3.1 percentage points and an increase in unsecured-loan holdings (e.g., credit card loans and

²Pooling observations across banks recovers the common asset supply elasticities assumed in the model; with heterogeneous elasticities, the estimates recover a weighted average of bank-specific elasticities.

C&I) of about 1.8 percentage points.

Accounting for portfolio substitution changes both the magnitude and, for mortgages, the sign of the estimated response to required equity. Correcting for portfolio substitution makes the estimated portfolio-share response to required equity more negative for every asset and reverses the mortgage coefficient from positive to negative.³ Without a portfolio-substitution correction, the estimated mortgage coefficient has the wrong sign: it implies that raising the equity requirement on first-lien mortgages, with a risk weight of 0.5, increases mortgages' portfolio share.

The model correctly predicts the direction of portfolio-share responses in all four asset categories following the 2020 and 2021 Stress Capital Buffer changes, which were excluded from the estimation. For this out-of-sample test, I apply the previously estimated supply elasticities to the asset-level equity requirements implied by the new Stress Capital Buffers. Regressions using only the Stress Capital Buffer changes produce estimates similar to the model's predicted responses.

In addition to predicting banks' responses to changes in capital requirements, I use the estimated supply elasticities to explain why banks persistently specialize in different assets after accounting for differences in equity requirements. To infer the asset returns underlying this specialization, I assume that each asset's marginal supply cost increases at a constant rate with its portfolio share across all portfolio allocations. Under this assumption, persistent differences in portfolio shares after accounting for equity requirements identify bank-specific intercepts in asset returns. I interpret a higher intercept, after removing bank-wide and asset-wide return differences, as a comparative advantage in supplying that asset.⁴ American Express and Capital One, which specialize in credit-card lending, have estimated return intercepts in risk-weight-1 loans of about 8 and 3 percentage points per year, respectively. Goldman Sachs and Morgan Stanley, whose risk-weight-0 banking-book assets consist predominantly of reverse-repo lending, have estimated return intercepts in that category of about 3 percentage points per year each.

In Section 4, I examine the contribution of stronger capital requirements to large banks'

³The upward bias in the uncorrected regression's coefficients on required equity arises from switches between RBC and SLR in the sample. To understand this bias, consider the within-bank comparison induced by bank-date fixed effects: the regression compares portfolio-share growth across assets within the same bank. During these switches, securities' higher supply elasticities make their portfolio shares respond more strongly than loan shares to the common substitution term. Substitution therefore narrows the growth difference between securities and loans compared with what the same elasticities predict from changes in each asset's own equity requirement alone. Without controlling for substitution, the regression attributes this narrowing to weaker responses of portfolio shares to required equity. Other regulatory shocks can produce the opposite bias.

⁴I report each bank's return intercept for each asset after removing return differences common to all assets at that bank and return differences common to all banks holding that asset.

shift from lending toward securities since 2011. Using the estimated supply elasticities, I find that stronger capital requirements account for about 28% of this shift, holding bank sizes and asset payoffs fixed. The contribution of capital requirements to banks' shift toward securities bears on the debate over banks' declining role in credit provision (Irani et al., 2021; Davydiuk et al., 2024; Chernenko et al., 2025; Buchak et al., 2024; Hanson et al., 2024). I predict banks' portfolio reallocation from their 2011–2013 average to their 2022–2024 average in response to changes in capital requirements, holding bank sizes and asset payoffs fixed. In general equilibrium, an aggregate strengthening of capital requirements is likely to raise loan rates as well as reduce loan quantities, so banks are likely to reduce lending less than this partial-equilibrium exercise would predict. My cross-sectional estimates may also capture borrowers substituting away from banks facing larger increases in capital requirements toward banks facing smaller increases in capital requirements. Applying these estimates to a broad strengthening of capital requirements could therefore overstate the decline in aggregate lending, because fewer banks remain available to absorb displaced borrowers.

Beyond the aggregate shift from lending to securities, the model partly explains why banks' portfolio compositions have converged since 2011: risk-based capital requirements encourage loan specialists to expand securities holdings, while the leverage capital requirement encourages securities specialists to expand lending (Greenwood et al., 2017). Combining the regulatory changes with the estimated supply elasticities accounts for about one-third of the observed convergence in banks' average portfolio risk weights. Taken together, the estimates match the direction of both the aggregate shift toward securities and the convergence of portfolios across large banks, but explain only about one-third of each.

Contribution to the literature. My paper contributes to the literature on capital regulation and bank lending by using changes in bank capital requirements to provide separate estimates of asset-level supply elasticities and portfolio substitution, which bank-level studies generally estimate jointly. My framework also helps interpret evidence that balance-sheet constraints limit banks' market intermediation. Du et al. (2018) link persistent covered-interest-parity deviations to regulatory constraints. Duffie and Krishnamurthy (2016) explain how the SLR discourages repo intermediation and impairs monetary-policy pass-through, while Duffie et al. (2023) find that Treasury-market liquidity deteriorates when dealer balance-sheet utilization is high. He et al. (2022) model the role of regulatory balance-sheet constraints in limiting Treasury purchases and repo financing; Bräuning and Stein (2024) find that relaxing dealer constraints increases Treasury-market intermediation and improves liquidity. My estimates clarify the portfolio-allocation incentives behind the SLR evidence: when the SLR replaces the risk-based requirement as a bank's binding constraint, equity requirements rise on securities intermediation and fall on unsecured loans. The result-

ing incentive to substitute toward unsecured loans therefore contributes to the contraction in securities intermediation.

My estimation framework is related to that of Diamond et al. (2024), who estimate banks' joint choices of lending, securities holdings, and deposit funding, allowing the marginal cost of each activity to depend on the others. That paper uses natural-disaster exposure, regional deposit-growth shocks, and changes in Treasury General Account balances to identify interactions among these balance-sheet activities. My approach instead combines variation in regulatory costs with the portfolio adding-up constraint to separate supply elasticities from substitution across distinct securities and loan categories.

My framework studies how differences in asset risk weights shape allocation across a bank's portfolio as a whole, complementing studies of how loan-specific capital requirements shape allocation within corporate or mortgage lending (Behn et al., 2016; Mayordomo and Rodríguez-Moreno, 2018; Dietsch et al., 2020; Plosser and Santos, 2024). Fraisse et al. (2020) find that higher capital requirements reduce corporate lending, while Benetton et al. (2021) find that lower mortgage capital requirements reduce mortgage rates; Benetton (2021) estimates their effects on mortgage origination costs and lender competition. Across lending categories, Auer et al. (2022) find that additional mortgage capital requirements increase commercial lending by more exposed banks.

This paper also contributes to the debate over banks' declining role in credit provision by quantifying the contribution of stronger capital requirements to banks' shift from lending toward securities. Several studies find that regulatory restrictions on banks shift lending toward nonbanks (Buchak et al., 2018; Irani et al., 2021; Chernenko et al., 2022; Davydiuk et al., 2024; Lee et al., 2024). Other evidence challenges the view that higher capital requirements explain the growth of private credit, while identifying distinct incentives arising from bank supervision and the treatment of indirect lending (Chernenko et al., 2025). Technological change and shifts in borrower and saver demand also contribute to the decline of bank balance-sheet lending (Buchak et al., 2024), while rapid deposit growth helps explain the decline in loans as a share of bank assets (Hanson et al., 2024). My exercise holds bank size fixed and isolates the contribution of capital requirements to the change in portfolio composition, finding that stronger capital requirements explain about 28% of large banks' shift from lending to securities.

Finally, my estimation addresses a central identification problem in the asset-demand literature: distinguishing an asset's response to its own price or cost from substitution induced by changes in other assets' prices or costs. Koijen and Yogo (2019) develop an instrumental-variables approach to estimating a structural asset-demand system. Fuchs et al. (2023) show that misspecified cross-asset substitution can cause estimated elasticities to differ sharply

from structural own-price elasticities. Haddad et al. (2026) show that, with homogeneous substitution conditional on observables, cross-sectional designs identify relative asset-demand elasticities but leave substitution patterns needed for broader counterfactuals unidentified. In the setting of bank portfolio allocation, I use separable supply costs and the portfolio adding-up constraint to identify asset-level supply elasticities separately from portfolio substitution.

2 Model of Bank Portfolio Allocation

In this section, I model the bank's portfolio allocation and choice of equity ratio subject to the SLR and RBC capital requirements. The model allows asset supply elasticities to differ across types of loans and securities.

Bank b chooses portfolio shares s_{abt} in assets a (e.g., Treasury bonds or credit-card loans) and an equity funding ratio E_{bt} to maximize profit, taking asset returns as given and holding total assets fixed. The index a covers all assets in the bank's portfolio.⁵

$$\begin{aligned} \max_{\{s_{abt}\}, E_{bt}} \quad & \sum_a [r_{abt}s_{abt} - C_{ab}(s_{abt})] - c_E E_{bt}, \quad \sum_a s_{abt} = 1, \quad s_{abt} \geq 0, \\ \text{subject to} \quad & E_{bt} \geq \ell_{bt}^{RBC} \sum_a w_a s_{abt}, \quad E_{bt} \geq \ell_{bt}^{SLR} \sum_a s_{abt}. \end{aligned} \tag{1}$$

Returns. The return on asset a at bank b in period t is r_{abt} .

Costs. The function $C_{ab}(s_{abt})$ gives the cost of supplying asset a , measured per dollar of bank b 's total assets. Supply costs are separable across assets: the cost of supplying each asset depends only on that asset's portfolio share. Returns and marginal supply costs can differ across banks. For each asset, I assume that a small increase in portfolio share raises marginal supply cost by the same amount across banks. Formally, C_{ab} is twice continuously differentiable near a fixed portfolio share $\bar{s}_{ab}$, with $C''_{ab}(\bar{s}_{ab}) = 1/\tau_a > 0$. A larger τ_a means marginal supply costs rise more slowly as the bank expands the asset's portfolio share.

Equity funding. The ratio E_{bt} measures bank b 's equity relative to total assets in period t . Deposits and other safe, short-term bank debt provide liquidity services that investors value, allowing banks to issue these claims at lower financing costs. Replacing this debt with equity sacrifices that funding advantage (Gorton and Pennacchi, 1990; Stein, 2012; DeAngelo and Stulz, 2015; Gorton and Winton, 2017). The parameter c_E captures the

⁵In the empirical implementation, assets without an observed standardized risk weight are grouped into an outside good and retained in the portfolio-share denominator. They are included in the asset index here. The baseline estimation holds their combined portfolio share fixed, so changes in the shares of the remaining asset categories sum to zero; Appendix Section E.5 relaxes this restriction.

resulting additional cost per dollar financed with equity, so $c_E E_{bt}$ is the equity funding cost per dollar of total assets.

Equity requirements. The risk weight w_a determines asset a 's contribution to risk-weighted assets. The RBC requires bank b to hold Tier 1 capital equal to at least a fraction ℓ_{bt}^{RBC} of risk-weighted assets. The SLR instead imposes a requirement ℓ_{bt}^{SLR} per dollar of total assets, independent of the bank's asset composition.⁶ If $c_E = 0$, capital requirements do not affect the bank's asset allocation.

If equity is costly, the bank funds its portfolio with the minimum equity that satisfies both capital rules. The baseline analysis assumes that one capital requirement binds and the other is slack. The binding requirement determines the equity cost of expanding each asset.

For example, consider an economy with two banks and two assets: credit-card loans and Treasuries. A lender that specializes in credit-card lending (say, Capital One) holds only credit-card loans. A dealer that specializes in Treasury trading (say, Goldman Sachs) holds only Treasuries.⁷ Suppose both banks face a 10% RBC requirement and a 5% SLR requirement. A portfolio consisting entirely of credit-card loans, with a 100% risk weight, requires equity equal to 10% of assets under RBC and 5% under SLR. A portfolio consisting entirely of Treasuries requires zero equity under RBC but 5% under SLR. Each bank must satisfy the larger of its two equity requirements, so Capital One is constrained by the RBC and maintains equity equal to 10% of risk-weighted assets, while Goldman Sachs is constrained by the SLR and maintains equity equal to 5% of total assets. Each bank is therefore constrained by one capital requirement and has a buffer above the other.⁸

Each asset's marginal equity requirement is determined by the bank's binding rule:

$$k_{abt}^{Bind} = \mathbf{1}\{\text{RBC binds}\} \ell_{bt}^{RBC} w_a + \mathbf{1}\{\text{SLR binds}\} \ell_{bt}^{SLR}. \quad (2)$$

At an interior optimum for portfolio allocation, the marginal return on each asset equals its marginal cost, which is the sum of supply costs, equity costs, and the opportunity cost of displacing other assets in the portfolio: $r_{abt} = C'_{ab}(s_{abt}) + c_E k_{abt}^{Bind} + \eta_{bt}$.

A second-order Taylor expansion of supply costs around fixed portfolio shares $\bar{s}_{ab}$, with

⁶The statutory SLR measures Tier 1 capital as a share of total leverage exposure, which includes off-balance-sheet exposures. Here its required ratio is converted to a requirement per dollar of assets, holding leverage exposure relative to assets fixed.

⁷This example is adapted from Greenwood et al. (2017).

⁸The remainder of this paper assumes that one rule binds for each bank and estimates asset supply elasticities under that model. Appendix Section A.1 allows banks to place continuous weight on both rules to reflect uncertainty about which rule will bind. The resulting estimates yield similar results.

cost curvature $1/\tau_a$ common across banks for each asset, gives

$$C_{ab}(s_{abt}) \approx C_{ab}(\bar{s}_{ab}) + C'_{ab}(\bar{s}_{ab})(s_{abt} - \bar{s}_{ab}) + \frac{(s_{abt} - \bar{s}_{ab})^2}{2\tau_a}.$$

Differentiating the Taylor expansion and subtracting marginal supply costs in period $t - 1$ from marginal supply costs in period t gives $\Delta C'_{ab} \approx \Delta s_{abt}/\tau_a$. Substituting this expression for the change in marginal supply costs into the first-order condition differenced between $t - 1$ and t yields:

$$\Delta s_{abt} \approx \tau_a (\Delta r_{abt} - c_E \Delta k_{abt}^{Bind} - \Delta \eta_{bt}). \quad (3)$$

The parameter τ_a measures the asset's local supply elasticity: holding asset returns and the portfolio opportunity cost η_{bt} fixed, a small increase in the asset's funding cost reduces its portfolio share by τ_a times that increase. The portfolio opportunity cost adjusts when equity requirements change, because the bank must reallocate the displaced portfolio share to other assets. The Lagrange multiplier η_{bt} ensures that portfolio shares sum to one. Holding asset returns and bank size fixed, an equal change in the binding equity requirement, k_{abt}^{Bind} , for every asset therefore leaves portfolio shares unchanged.

Proposition 1 (Portfolio substitution). Suppose asset returns and bank size are fixed. Consider small portfolio adjustments around fixed asset shares $\bar{s}_{ab}$. Assume the bank continues to hold a positive amount of every modeled asset and faces one binding capital constraint and one slack capital constraint. The change in an asset's portfolio share in response to changes in required equity across assets is

$$\Delta s_{abt} \approx -c_E \tau_a (\Delta k_{abt}^{Bind} - \Delta \bar{k}_{bt}^\tau), \quad \Delta \bar{k}_{bt}^\tau = \frac{\sum_j \tau_j \Delta k_{jbt}^{Bind}}{\sum_j \tau_j}. \quad (4)$$

Holding asset returns and bank size fixed, an asset loses portfolio share when its equity requirement rises by more than the supply-elasticity-weighted average increase in equity requirements across the bank's assets. Since portfolio shares sum to one, an expansion in one asset's portfolio share requires a contraction in other assets' shares. In equation (4), the own-cost component is $-c_E \tau_a \Delta k_{abt}^{Bind}$, and the substitution component is $c_E \tau_a \Delta \bar{k}_{bt}^\tau$. Each asset's substitution response depends on the supply elasticities of all assets in the portfolio. The adding-up constraint therefore links the own-cost and substitution responses across assets. I use these links to estimate the supply elasticities jointly while accounting for portfolio substitution. Equation (4) is a first-order approximation for general supply costs and is exact for quadratic supply costs when every modeled asset has a positive portfolio share. Appendix Section B.1 proves Proposition 1.

3 Estimating Asset Supply Responses

In this section, I estimate asset supply elasticities using changes in bank-level capital requirements, accounting for portfolio substitution through the model.

3.1 Data

Data and sample. I use quarterly FR Y-9C data on bank balance sheets and capital ratios for 28 domestic bank holding companies that exceed \$100 billion in assets in at least one quarter during the sample.⁹ The estimation sample covers 2011–2025.¹⁰ I combine bank-level capital requirements with asset risk weights to measure the equity required per dollar of each asset at each bank, and match these requirements to quarterly portfolio shares. I restrict the analysis to assets in a bank holding company’s (BHC’s) banking book and exclude trading assets from the portfolio-share denominator. I also exclude reserves and vault cash from the assets used to calculate portfolio shares to abstract from surges or contractions in bank reserves driven by quantitative easing or quantitative tightening.

Risk-weight mapping. I match banks’ banking-book assets reported on the FR Y-9C to four standardized risk-weight categories—0, 0.2, 0.5, and 1—using the weights prescribed by the U.S. capital rule implementing Basel III (12 CFR Part 217, Subpart D).¹¹ Table 1 summarizes the asset mapping. I use the labels RW0, RW0.2, RW0.5, and RW1 for these categories, respectively. Appendix Table 9 lists the FR Y-9C items, assigned risk weights, and legal provisions underlying the mapping. I calculate portfolio shares relative to total banking-book assets, excluding reserves and vault cash. Assets that cannot be assigned to these four risk-weight categories remain in the portfolio-share denominator. The baseline estimation holds their combined portfolio share fixed. Appendix Section E.5 allows substitution into these remaining assets and estimates their supply elasticity alongside those of the four categories. The estimates for the four categories remain similar to the baseline estimates on the same samples.¹²

⁹I treat banks before and after large mergers (those in which the target exceeds 25% of the acquirer’s assets at close) as separate entities so that within-bank changes do not span the acquisitions. Appendix Table 8 lists the acquisitions. In the estimation below, I cluster standard errors by bank rather than merger-split entity, giving 28 clusters.

¹⁰The dynamic response estimates use starting quarters from 2011:Q2 through 2024:Q4; the long-run estimates use starting quarters from 2011:Q2 through 2022:Q2. Portfolio outcomes are observed through 2025:Q4, with pre-period outcomes available from 2011:Q1.

¹¹As a check on the risk-weight mapping, I also use banks’ reported allocation of assets across risk weights within each asset category in Schedule HC-R, Part II, of the FR Y-9C. The estimated supply responses are similar when both mappings are evaluated on the same post-2015 sample.

¹²Loans to nondepository financial institutions (BHCKJ454) and loans for purchasing or carrying securities (BHCK1545) remain in total loans in the share denominator but are excluded from the modeled risk-weight categories. Other loans reported in BHCKJ451 are also excluded, except for American Express’s holdings,

Risk weight	Examples of assets
0	U.S. Treasuries; GNMA mortgage-backed securities
0.2	Federal funds; agency MBS; loans to U.S. banks
0.5	First-lien residential mortgages
1	C&I; credit cards; commercial real estate; other consumer loans

Table 1: Asset categories and standardized risk weights.

Notes: RW denotes standardized risk weight; MBS denotes mortgage-backed securities; GNMA denotes the Government National Mortgage Association; C&I denotes commercial and industrial loans. Portfolio shares divide FR Y-9C holdings by total banking-book assets excluding reserves and vault cash; unmodeled assets remain in the denominator. Appendix Table 9 provides item codes and legal sources.

Binding rule. A bank’s binding rule is the rule that requires the bank to hold the most Tier 1 capital given its portfolio composition and regulatory exposures. Equivalently, it is the rule against which the bank has the smallest Tier 1 capital buffer, measured as actual minus required Tier 1 capital.¹³ Before banks began reporting the SLR on the FR Y-9C in 2016:Q3, I use a proxy constructed from FR Y-9C data; Appendix Section C.4 describes its construction.

3.2 Regulatory changes and identifying variation

I identify asset supply elasticities from two sources of regulatory variation: increases in risk-based capital requirements and switches in banks’ binding capital rule. Asset risk weights determine how each change in a bank-level capital requirement translates into changes in the equity required for individual assets. An increase in a binding risk-based capital requirement raises required equity more for assets with higher risk weights. A change in which rule binds can instead raise required equity on some assets while lowering it on others.

Changes to risk-based capital requirements. Changes in the minimum risk-based Tier 1 capital ratio, required Tier 1 capital buffers above that minimum, and bank-specific surcharges generate variation in banks’ risk-based capital requirements over the sample period, as shown in Figure 1. Basel III raised the minimum Tier 1 capital requirement from 4% to 6% and introduced a Capital Conservation Buffer for all banks. Additional require-

which enter risk weight 1 to correct its charge-card reporting break in 2016:Q3.

¹³The Tier 1 leverage requirement occasionally binds instead of the RBC or SLR. I treat it as a separate binding requirement in all estimation. Observations bound by the Tier 1 leverage requirement are excluded from the illustrative figures. Banks also face separate risk-based requirements for common equity Tier 1 (CET1) and total capital; see 12 CFR 217.10. The binding-rule classification used here compares Tier 1 capital requirements and does not separately identify whether the CET1 or total-capital requirement is binding.

ments for the eight largest and most complex banks (G-SIBs) vary over time with their size and systemic importance. The Capital Conservation Buffer and G-SIB surcharges were phased in from 2016 through 2019. Since 2020, banks subject to the Federal Reserve’s stress tests must meet a Stress Capital Buffer that varies with each bank’s projected losses under stress.¹⁴ I exclude every bank-quarter with a change in the Stress Capital Buffer from the starting events used to estimate asset supply responses. Portfolio-share observations from those quarters remain available as outcomes for other starting events. Section 3.5 uses the 2020 and 2021 Stress Capital Buffer changes to evaluate the estimated supply elasticities.

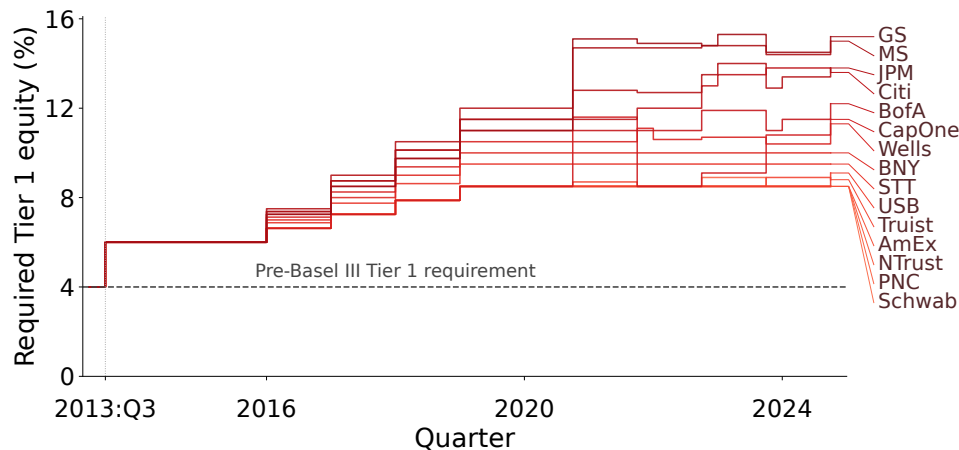


Figure 1: Bank-level RBC requirements over time.

Notes: Each line shows a bank's required Tier 1 capital as a percentage of risk-weighted assets, including the minimum ratio, buffers, and surcharges. The dashed horizontal line marks the pre-Basel III minimum. RBC denotes risk-based capital.

Changes in banks’ binding rule. The introduction of the SLR caused custodian and dealer banks to switch from being constrained by risk-based capital requirements to being constrained by the SLR. Subsequent increases in risk-based requirements and the temporary pandemic SLR exemption caused some banks to switch back. Figure 2 shows that custodians such as State Street and dealers such as Goldman Sachs are usually SLR-bound, while lenders such as Capital One are usually RBC-bound. Custodians and dealers hold large amounts of assets with low risk weights, for which the SLR generally requires more equity than RBC. Lenders hold more high-risk-weight loans, making RBC the tighter requirement. During the pandemic, the temporary exclusion of reserves and Treasuries from the SLR reduced the equity required under the SLR, making even BNY Mellon and State Street RBC-constrained.

¹⁴I date the increase in the minimum ratio to the Basel III announcement in 2013:Q3. The capital conservation buffer rose by 0.625 percentage points annually from 2016 to 2019, reaching 2.5%; G-SIB surcharges were phased in over the same period. In 2020:Q4, the Stress Capital Buffer replaced the fixed conservation buffer for covered banks, subject to a 2.5% floor. See the Federal Reserve’s 2013 Basel III rule, buffer transition provisions, 2015 G-SIB surcharge rule, and 2020 SCB rule.

Goldman Sachs also became RBC-constrained during the later part of the sample as its RBC requirement rose substantially, as shown in Figure 1. A sufficiently large increase in the RBC ratio can make RBC the stricter rule even for a bank whose portfolio is usually SLR-bound.

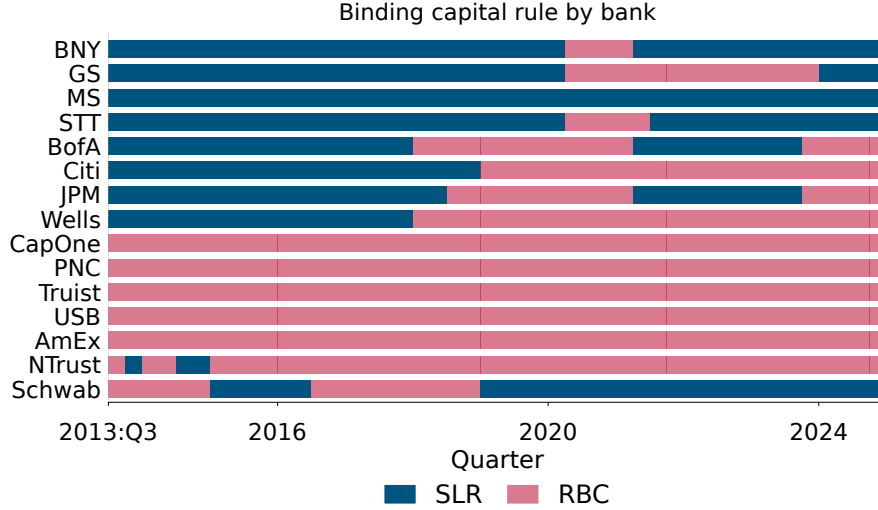


Figure 2: Binding capital rule by bank.

Notes: Each row represents a bank; colors indicate its binding risk-based capital (RBC) or Supplementary Leverage Ratio (SLR) requirement in each quarter. The binding rule requires the bank to hold the most Tier 1 capital given its portfolio composition and regulatory exposures. Quarters bound by the separate Tier 1 leverage requirement are omitted. Before 2016:Q3, SLR exposures use the proxy described in Appendix Section C.4. Source: FR Y-9C and regulatory requirements.

Asset-level required equity. I combine each bank’s binding capital requirement with asset risk weights to construct the equity required per dollar of each asset, k_{abt}^{Bind} , as defined in equation (2). Expressing the regulatory changes in these common units allows me to combine increases in risk-based requirements and switches in the binding rule in the estimation. For an RBC-bound bank, required equity equals the bank’s required RBC ratio multiplied by the asset’s risk weight. For an SLR-bound bank, the requirement is uniform across assets, except for assets covered by the temporary pandemic exemption.¹⁵ Table 2 reports these asset-specific requirements by bank in 2024:Q4. RBC-bound Capital One faced requirements of 11.5% for credit-card loans, 2.3% for agency mortgage-backed securities, and 0% for Treasuries, while SLR-bound Goldman Sachs faced 5% for every asset.

¹⁵I convert the SLR requirement from a leverage-exposure basis to an asset basis. During the temporary exemption, I apply the SLR charge only to the nonexempt portion of RW0 holdings; Treasuries are exempt, while other RW0 assets remain subject to the requirement. Reserves are excluded from the portfolio-share denominator but enter the calculation of the bank’s binding capital rule.

	Binding rule	C&I loans RW 1	Credit cards RW 1	Residential mortgages RW 0.5	Agency MBS RW 0.2	Treasuries RW 0
G-SIBs						
BNY Mellon	SLR	5	5	5	5	5
Goldman Sachs	SLR	5	5	5	5	5
Morgan Stanley	SLR	5	5	5	5	5
State Street	SLR	5	5	5	5	5
Bank of America	RBC	12.2	12.2	6.1	2.4	0
Citigroup	RBC	13.6	13.6	6.8	2.7	0
JPMorgan Chase	RBC	13.8	13.8	6.9	2.8	0
Wells Fargo	RBC	11.3	11.3	5.7	2.3	0
Other large bank holding companies						
Capital One	RBC	11.5	11.5	5.8	2.3	0
PNC Financial	RBC	8.5	8.5	4.2	1.7	0
Truist Financial	RBC	8.8	8.8	4.4	1.8	0
U.S. Bancorp	RBC	9.1	9.1	4.6	1.8	0

Table 2: Required equity by bank and asset, 2024:Q4 (percent).

Notes: Entries report required Tier 1 capital per dollar of the indicated asset, in percent. RBC denotes risk-based capital; SLR denotes the Supplementary Leverage Ratio. For RBC-bound banks, required equity equals the required Tier 1 capital ratio times the standardized asset risk weight. For SLR-bound banks, it equals the SLR requirement converted to an asset basis. The binding rule requires the most Tier 1 capital for the bank's portfolio and regulatory exposures.

Figure 3 plots these asset-specific equity requirements over time for a lender, Capital One, and a dealer, Goldman Sachs. I compare portfolio-share growth across assets facing different changes in required equity within the same bank, and compare those growth differences across banks holding the same assets. Section 3.3 describes how the estimating equation implements these comparisons while accounting for portfolio substitution.

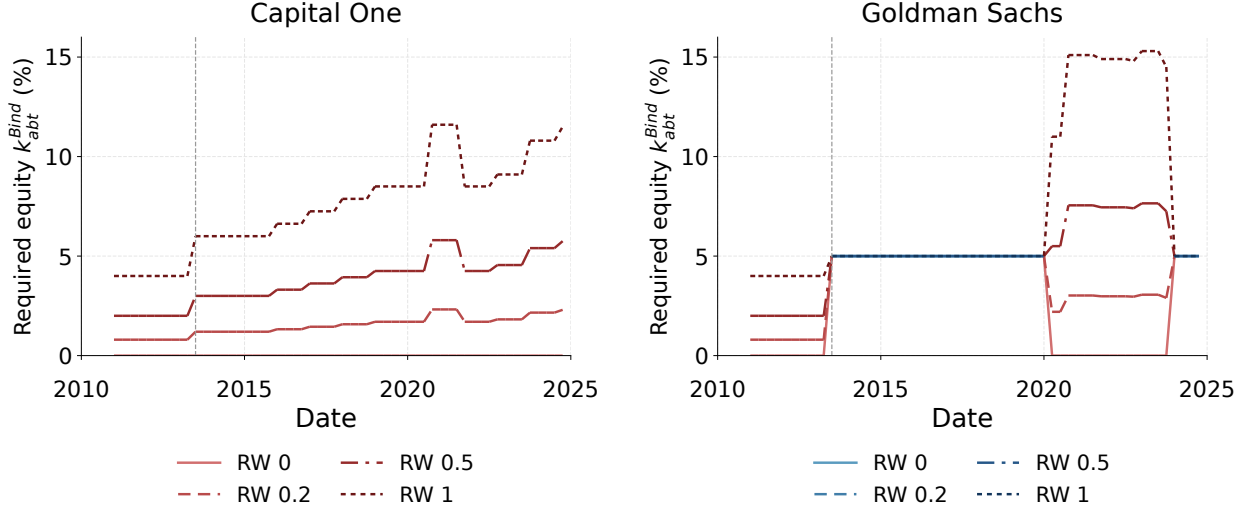


Figure 3: Required equity by asset over time: Capital One and Goldman Sachs.

Notes: Lines show required equity per dollar of assets in each risk-weight (RW) category. Under a binding risk-based capital requirement, required equity equals the bank-level required ratio times RW. Under a binding Supplementary Leverage Ratio, required equity is equal across the four asset categories. Required equity is expressed as a percentage of the asset amount. The binding rule requires the most Tier 1 capital for the bank's portfolio and regulatory exposures. Sources: FR Y-9C and regulatory requirements.

3.3 Estimating equation and correction for portfolio substitution

Changes in bank-level capital requirements change the equity required for several assets at once. I use the model's portfolio-substitution correction to distinguish each asset's own-cost supply elasticity from its response to changes in other assets' equity requirements.

Portfolio-substitution correction. The linearized first-order condition in equation (3) relates portfolio-share changes to changes in asset returns, required equity, and the bank's portfolio multiplier:

$$\Delta s_{abt} \approx \tau_a \left(\Delta r_{abt} - c_E \Delta k_{abt}^{Bind} - \Delta \eta_{bt} \right).$$

Holding returns fixed, Proposition 1 implies that the multiplier adjusts by $\Delta \eta_{bt} \approx -c_E \Delta \bar{k}_{bt}^\tau$, where $\Delta \bar{k}_{bt}^\tau$ is the supply-elasticity-weighted average change in equity requirements across the bank's assets. Substituting for the multiplier gives

$$\Delta s_{abt} \approx -c_E \tau_a \left(\Delta k_{abt}^{Bind} - \Delta \bar{k}_{bt}^\tau \right), \quad \Delta \bar{k}_{bt}^\tau = \frac{\sum_j \tau_j \Delta k_{jbt}^{Bind}}{\sum_j \tau_j}.$$

An asset loses portfolio share when its equity requirement rises more than this weighted average. The weights are supply elasticities, because substitution toward an asset depends on how readily the bank can expand its holdings of that asset.

A change in bank-level regulation changes equity requirements on several assets at once. Figure 4 illustrates how an RBC increase and a switch in a bank's binding rule both change

equity requirements across assets. On the left, for an RBC-bound bank, a one-percentage-point increase in the RBC ratio raises required equity by 1 percentage point for RW1 assets, 0.5 for RW0.5 assets, and 0.2 for RW0.2 assets, while leaving the requirement on RW0 assets unchanged. On the right, when a 5% SLR replaces a 10% RBC requirement as the binding constraint, required equity rises on low-risk-weight assets and falls on RW1 assets. In both cases, each asset’s portfolio share responds simultaneously to the change in its own equity requirement and changes in other assets’ requirements.

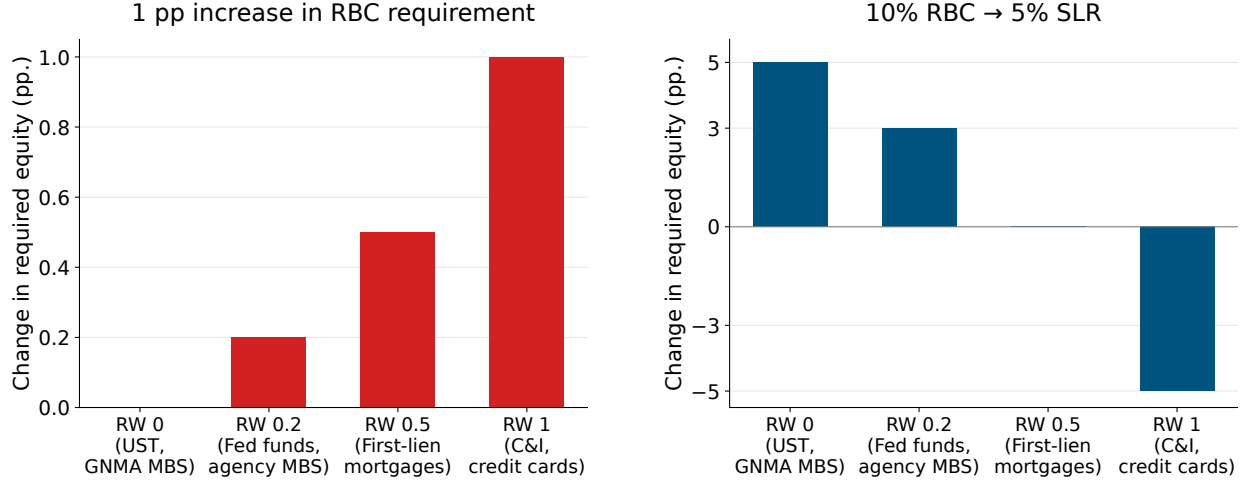


Figure 4: Changes in required equity across assets under an RBC increase and an RBC-to-SLR switch.

Notes: Bars show percentage-point changes in required equity for each risk-weight (RW) category. The left panel raises the RBC requirement by one percentage point. The right panel replaces a binding 10% RBC requirement with a binding 5% SLR requirement. RBC denotes risk-based capital; SLR denotes the Supplementary Leverage Ratio. These are illustrative regulatory changes, holding the binding rule fixed in the left panel.

Regressing an asset’s portfolio-share change on the change in its own required equity without controlling for portfolio substitution would combine an asset’s direct supply response with portfolio substitution caused by changes in other assets’ requirements. For example, when the SLR replaces the risk-based requirement as a bank’s binding constraint, required equity rises on securities and falls on unsecured loans. The resulting decline in securities holdings reflects a combination of securities becoming more expensive and loans becoming cheaper. Subtracting $\Delta \bar{k}_{bt}^{\tau}$ accounts for these relative incentives and separates the asset’s supply elasticity from portfolio substitution. A bank-date fixed effect does not generally absorb portfolio substitution: although the weighted-average requirement change is common across assets at a bank, its effect on portfolio shares differs with each asset’s supply elasticity.

The substitution correction depends on the same unknown supply elasticities that determine assets’ own-cost responses. I therefore estimate all assets’ supply elasticities jointly by

nonlinear least squares. Each candidate set of elasticities determines how the bank reallocates portfolio shares across assets while satisfying the adding-up constraint. The estimation selects the elasticities that best explain the observed portfolio-share changes.

To allow portfolio shares to adjust over time, I estimate local projections of portfolio-share changes from quarter t to quarter $t + h$ on the change in the asset's equity requirement from quarter $t - 1$ to quarter t , net of the supply-elasticity-weighted average change across assets:

$$s_{ab,t+h} - s_{abt} = \alpha_{bt} + \delta_{ath} + \beta_a (\Delta k_{abt}^{Bind} - \Delta \bar{k}_{bt}^{\tau}) + u_{abt}^{(h)}. \quad (5)$$

Here $\Delta k_{abt}^{Bind} = k_{abt}^{Bind} - k_{ab,t-1}^{Bind}$, and h is the number of quarters after the requirement change. Bank-date fixed effects, α_{bt} , absorb changes common across assets within a bank and date. Asset-date-horizon fixed effects, δ_{ath} , absorb changes common across banks for a given asset, date, and horizon. The residual includes bank-asset-specific return changes and the approximation error from linearizing marginal costs. The local projection traces the adjustment of portfolio shares after the requirement change; interpreting its long-horizon response as the model's supply response requires that this adjustment be substantially complete.¹⁶

Once portfolio adjustment is substantially complete, the model implies $\beta_a = -c_E \tau_a$. I therefore recover the asset supply elasticity as

$$\tau_a = -\frac{\beta_a}{c_E}, \quad c_E = 0.05.$$

I calibrate the equity funding premium to $c_E = 0.05$ using estimates from the literature. Appendix Table 15 summarizes the range of published estimates; the calibration implies 5 basis points of additional funding cost per percentage point of required equity, within that range. The same elasticities determine the weights in the portfolio-substitution correction, so the response coefficients and substitution weights are estimated jointly.

Identifying assumption. I identify supply elasticities by comparing portfolio-share growth over the following 4–5 years across assets facing different changes in required equity within the same bank, and comparing those growth differences across banks holding the same assets. Identification requires that, absent the regulatory changes, differences in portfolio-share growth across assets at a given bank would have been the same as at other banks.¹⁷ It rules out bank-specific changes in demand or supply for particular assets that are correlated with changes in equity requirements. For example, a bank might expand commercial lending

¹⁶Appendix Section D.1 shows that smooth adjustment costs leave the long-run supply response unchanged once portfolio adjustment is complete.

¹⁷The assumption allows bank-wide changes in portfolio-share growth and asset-specific changes common across banks, absorbed by bank-date and asset-date-horizon fixed effects. It concerns relative growth across assets, rather than requiring each asset to follow an identical growth path across banks.

more than its peers for non-regulatory reasons. That expansion could switch the bank from SLR-bound to RBC-bound and raise the equity requirement on its commercial loans. The lending expansion would then change both the portfolio share and the measured equity requirement, violating the identifying assumption. If lending expands before the measured requirement change, however, this mechanism would tend to produce differential pre-trends in portfolio shares. Appendix Figure 22 examines portfolio-share responses before changes in assets' equity requirements.

The model assumes a common supply elasticity across banks for each asset. To improve precision, the baseline specification additionally imposes a common elasticity for RW0 and RW0.2 securities, $\tau_0 = \tau_{0.2}$, while estimating separate elasticities for RW0.5 mortgages and RW1 loans. Appendix Table 16 reports two alternatives as robustness checks: one estimates a common elasticity for risk-weight-0 and risk-weight-0.2 assets and another for risk-weight-0.5 and risk-weight-1 assets; the other allows the elasticity to vary linearly with the asset's risk weight.

3.4 Results: Asset supply elasticity estimates

Correcting for portfolio substitution yields negative long-run portfolio-share responses to required equity for every asset category. The correction changes both the magnitude of the estimated responses and, for mortgages, their sign. The implied supply elasticities are positive and larger for securities than for loans, although the differences are not statistically significant at the 5% level in the baseline specification.

Long-run portfolio-share responses. Figure 5 reports portfolio-share responses to a one-percentage-point increase in required equity, estimated by pooling quarters 16–20. The regression estimates a common response coefficient for each asset across these quarters, with bank–date and asset–date–horizon fixed effects.¹⁸ Correcting for portfolio substitution makes the estimated response more negative for every asset and reverses the mortgage coefficient from positive to negative. Without the correction, the mortgage coefficient has the wrong sign: it implies that higher equity requirements increase mortgages' portfolio share. The response of risk-weight-1 assets remains negative and changes relatively little with the correction. Appendix Table 19 reports the regression coefficients and standard errors for the plotted estimates and alternative specifications.

The upward bias in the uncorrected regression's coefficients on required equity arises from switches between RBC and SLR in the sample. To understand this bias, consider the within-

¹⁸Pooling estimates a single long-run response from the underlying observations rather than averaging separately estimated coefficients for each quarter. Asset–date–horizon fixed effects allow each asset's average response across banks to differ for every starting date and horizon.

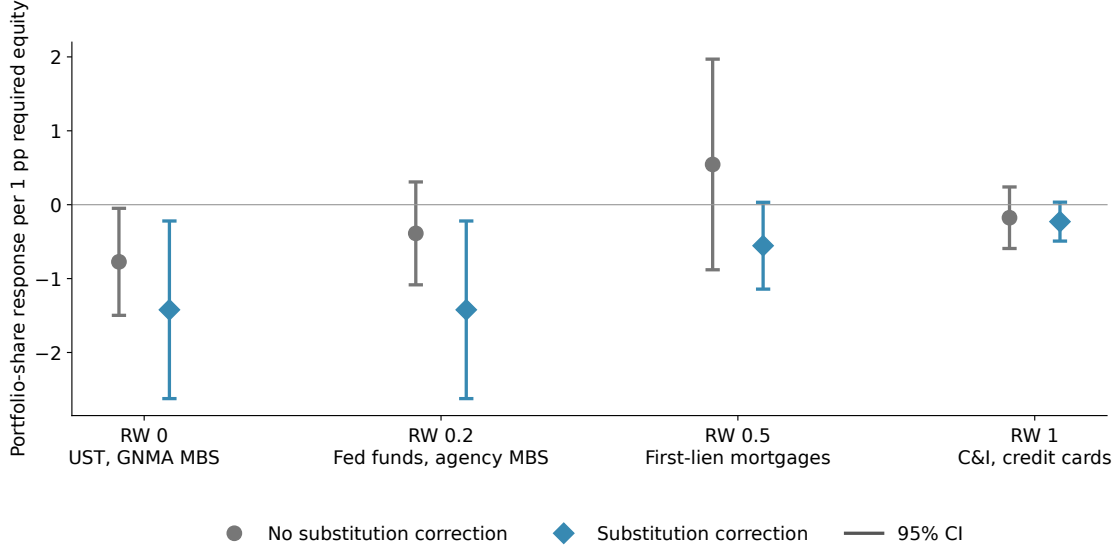


Figure 5: Long-run portfolio-share responses to higher required equity.

Notes: Points show portfolio-share responses, in percentage points, to a one-percentage-point increase in required equity, pooling quarters 16–20. Gray circles omit substitution correction; blue diamonds include the correction and impose a common elasticity for RW0 and RW0.2. RW denotes risk weight. Error bars give 95% confidence intervals clustered by bank. Appendix Table 19 reports the regression coefficients and standard errors; the plotted estimates correspond to the no-substitution-correction and three-group columns. Estimates use FR Y-9C portfolio shares for 28 banks, excluding trading assets, reserves, and vault cash from the denominator, and control for bank-date and asset-date-horizon fixed effects.

bank comparison induced by bank-date fixed effects: the regression compares portfolio-share growth across assets within the same bank. During these switches, securities’ higher supply elasticities make their portfolio shares respond more strongly than loan shares to the common substitution term. Substitution therefore narrows the growth difference between securities and loans compared with what the same elasticities predict from changes in each asset’s own equity requirement alone. Without controlling for substitution, the regression attributes this narrowing to weaker responses of portfolio shares to required equity. Other regulatory shocks can produce the opposite bias. Appendix Table 18 compares the direction of the correction that the model predicts for switches between binding RBC and SLR requirements with the observed coefficient changes. Both the model’s prediction and the estimated correction imply more negative portfolio-share responses to required equity in every asset category.

Adjustment over time. Figure 6 traces the portfolio-share responses over the quarters following a change in required equity. The substitution-corrected estimates show how the negative long-run responses develop over time. For most asset categories, the responses flatten over quarters 16–20, supporting the interpretation of the pooled estimates as long-run responses.

Implied supply elasticities. I convert the long-run response coefficients into supply elasticities using $\hat{\tau}_a = -\hat{\beta}_a/c_E$ and the equity funding premium $c_E = 0.05$ calibrated in

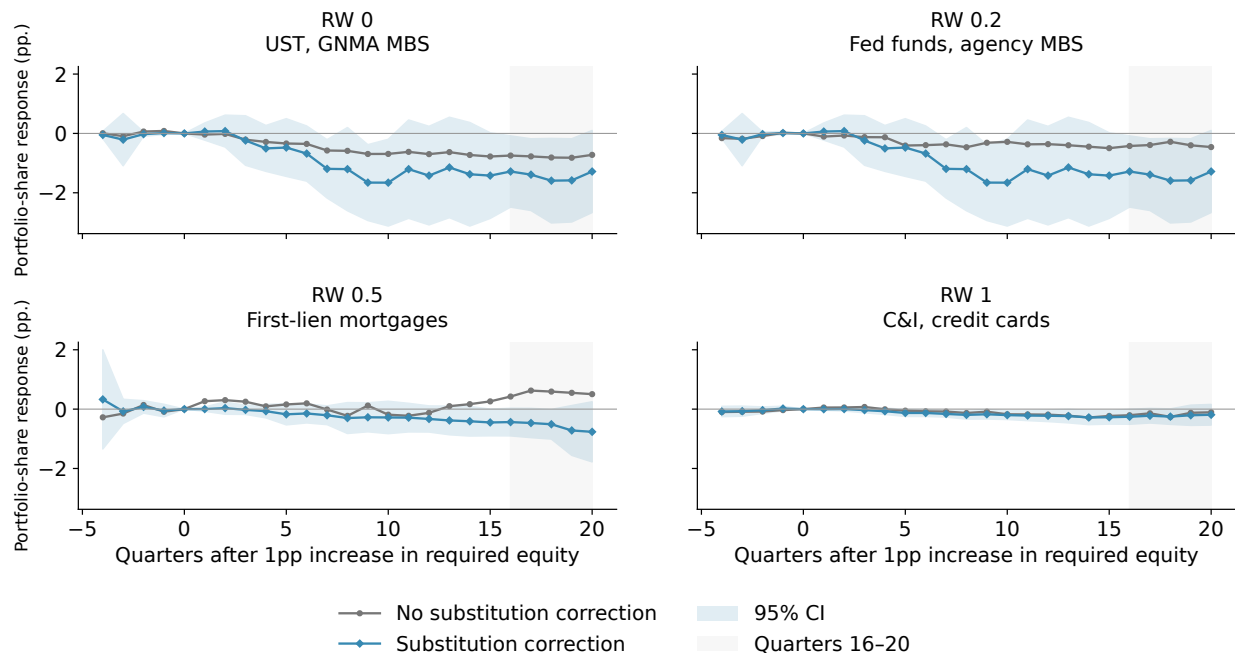


Figure 6: Dynamic asset-share responses with and without portfolio-substitution correction.

Notes: Lines show portfolio-share responses, in percentage points, to a one-percentage-point increase in required equity. Gray circles show estimates without substitution correction; blue diamonds show estimates with portfolio-substitution correction that impose a common supply elasticity for RW0 and RW0.2 assets. RW denotes risk weight. Blue shading gives 95% confidence intervals clustered by bank. Responses at quarter zero are normalized to zero. Light-gray shading marks quarters 16–20, pooled in the long-run estimates. Estimates use FR Y-9C portfolio shares for 28 banks, excluding trading assets, reserves, and vault cash from the denominator, and control for bank-date and asset-date-horizon fixed effects.

Section 3.3. Figure 7 and Table 3 report the resulting estimates. The implied supply elasticities are larger for securities than for loans. However, the differences between securities’ and loans’ supply elasticities are not statistically significant at the 5% level in the baseline specification (Appendix Table 17). Appendix Table 16 reports alternative specifications that pool assets differently. Appendix Table 20 allows substitution into the remaining banking-book assets using measured proxies for their risk weights. Appendix Figure 22 shows pre-period portfolio-share responses. Appendix Table 21 reports specifications controlling for lagged asset shares, and Appendix Table 22 reports specifications controlling for leads and lags of required-equity changes; Appendix Figure 23 shows sensitivity to alternative equity funding premia.

Table 3 compares supply elasticities estimated without portfolio-substitution correction with estimates that include the correction.

Implied portfolio response when the SLR becomes binding. Consider a bank switching from a binding 10% RBC requirement to a binding 5% SLR requirement, holding asset returns and total assets fixed. Under RBC, required equity equals the 10% bank-

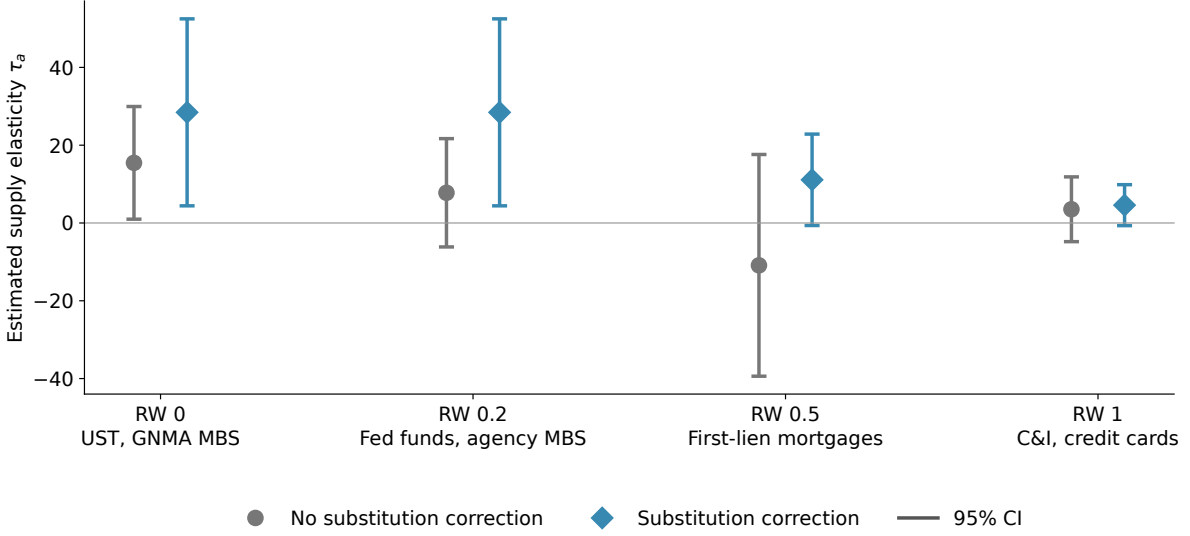


Figure 7: Long-run implied asset-supply elasticities.

Notes: Points show supply elasticities, $\hat{\tau}_a = -\hat{\beta}_a/c_E$, where $\hat{\beta}_a$ is the long-run portfolio-share response to required equity and $c_E = 0.05$ is the equity funding premium. Gray circles omit substitution correction; blue diamonds include the correction and impose a common supply elasticity for RW0 and RW0.2 assets. RW denotes risk weight. Error bars give 95% confidence intervals clustered by bank, treating c_E as fixed. Appendix Table 16 reports the elasticities and standard errors. Estimates use FR Y-9C portfolio shares for 28 banks, excluding trading assets, reserves, and vault cash from the denominator, and control for bank-date and asset-date-horizon fixed effects. Long-run estimates pool quarters 16–20 after the change in required equity.

level requirement multiplied by the asset’s risk weight; under SLR, required equity is 5% for every asset. Using the risk weights in Table 1, required equity changes by 5, 3, 0, and –5 percentage points for RW0, RW0.2, RW0.5, and RW1, respectively. The substitution-corrected elasticities in Table 3 are 28.4 for each securities category, 11.1 for mortgages, and 4.6 for RW1 assets. These elasticities weight the requirement changes in the portfolio-substitution benchmark:

$$\Delta \bar{k}^\tau = \frac{(28.4 \times 5) + (28.4 \times 3) + (11.1 \times 0) + (4.6 \times (-5))}{28.4 + 28.4 + 11.1 + 4.6} \approx 2.8.$$

For government-backed securities (RW0), subtracting the benchmark gives a relative requirement increase of $5 - 2.8 = 2.2$ percentage points. Applying the calibrated equity premium, $c_E = 5\%$ (Appendix Table 15), and the RW0 elasticity gives

$$\Delta s_0 \approx -\frac{5}{100} \times 28.4 \times (5 - 2.8) \approx -3.1 \text{ percentage points.}$$

For C&I, credit cards, and other unsecured loans (RW1), the relative requirement change is

	No substitution correction	Pooled RW 0/0.2 with substitution correction
RW 0	15.46** (7.06)	28.45** (11.71)
RW 0.2	7.76 (6.79)	28.45** (11.71)
RW 0.5	−10.89 (13.89)	11.10* (5.73)
RW 1	3.53 (4.06)	4.58* (2.57)
N. Banks	28	28
N. Quarters	42	42
SE clustering	Bank	Bank
Adjusted R^2	0.1257	0.1256
Adjusted within R^2	0.0023	0.0022
Bank–date FE	Yes	Yes
Asset–date–horizon FE	Yes	Yes

Table 3: Long-run supply elasticities with and without portfolio-substitution correction.

Notes: RW denotes the standardized risk weight. The corrected specification imposes a common elasticity for RW 0 and RW 0.2 and separate elasticities for RW 0.5 and RW 1; the uncorrected specification estimates all four separately. Estimates pool quarters 16–20 for 28 banks and include bank–date and asset–date–horizon fixed effects. Elasticities are recovered as $\hat{\tau}_a = -\hat{\beta}_a/c_E$, where $\hat{\beta}_a$ is the portfolio-share response to required equity and $c_E = 0.05$ is the equity funding premium. Standard errors clustered by bank are in parentheses. Stars denote two-sided bank-clustered tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Inference treats c_E as fixed: $\text{SE}(\hat{\tau}_a) = \text{SE}(\hat{\beta}_a)/c_E$.

−5 − 2.8 = −7.8 percentage points. Using the RW1 elasticity gives

$$\Delta s_1 \approx -\frac{5}{100} \times 4.6 \times (-5 - 2.8) \approx +1.8 \text{ percentage points.}$$

Mortgages gain portfolio share through substitution because their required equity is unchanged while the benchmark rises. Calculations use unrounded estimates; displayed inputs and results are rounded to at most one decimal place.

3.5 Out-of-sample validation

The estimated supply elasticities predict the direction of portfolio-share responses to the 2020 and 2021 Stress Capital Buffer (SCB) changes in all four asset categories. Bank-quarters with SCB changes are excluded as starting events from the baseline estimation. I evaluate

the baseline estimates by comparing their predictions with responses estimated using SCB changes alone.¹⁹

Regulatory changes used for validation. The Stress Capital Buffer is a bank-specific risk-based capital buffer determined by supervisory stress-test losses and planned dividends, subject to a minimum of 2.5%. Figure 8 shows changes in required buffers associated with its introduction in 2020:Q4 and update in 2021:Q4. These changes provide a separate source of regulatory variation with which to evaluate the estimated supply elasticities. I hold other regulatory requirements and pre-event regulatory ratios fixed, change the capital buffer, and recompute each bank's binding rule and required equity across assets. The resulting predictions incorporate both changes in each asset's own required equity and substitution across the bank's portfolio.²⁰

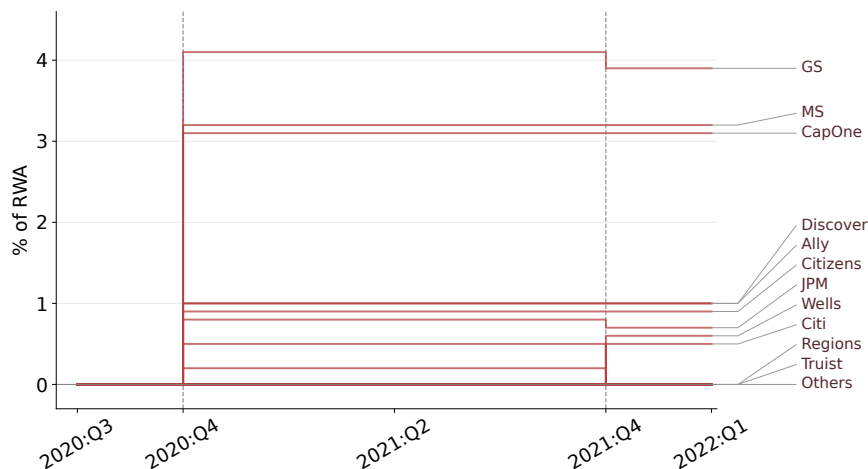


Figure 8: Stress Capital Buffer by bank in 2020 and 2021.

Notes: Lines cumulate each bank's Stress Capital Buffer changes in 2020 and 2021, in percentage points of risk-weighted assets (RWA). Bank abbreviations label the lines at the right; Others denotes banks with no buffer change. Dashed vertical lines mark 2020:Q4 and 2021:Q4, when the new buffers took effect.

Appendix Figure 24 reports the dynamic responses estimated from SCB changes; Appendix Section E.9 describes the available quarters pooled between quarters 16–20 for the comparison below.

¹⁹Portfolio-share observations from SCB-change quarters remain available as outcomes for other starting events. The validation therefore uses excluded regulatory events, while its outcome periods can overlap with those used in the baseline estimation.

²⁰The calculation retains the temporary SLR exemption in effect at the 2020 event. For Morgan Stanley, the exemption reduces the SLR charge on the exempt portion of RW0 holdings, so the SCB-induced requirement changes are not an affine function of risk weights across all four categories. The resulting RW0.2 prediction therefore need not be a fixed fraction of the RW0 prediction based solely on the baseline elasticities and risk weights.

Predicted vs. estimated responses of portfolio shares to SCB. Figure 9 compares two predictions for the same SCB-induced changes in required equity: one uses the baseline supply elasticities, and the other uses elasticities estimated from SCB changes alone. Both incorporate portfolio substitution and average responses over the same bank–event–quarter observations with a nonzero buffer change, pooling available quarters between 16 and 20 after each event. Banks without buffer changes remain in the regression comparison group.

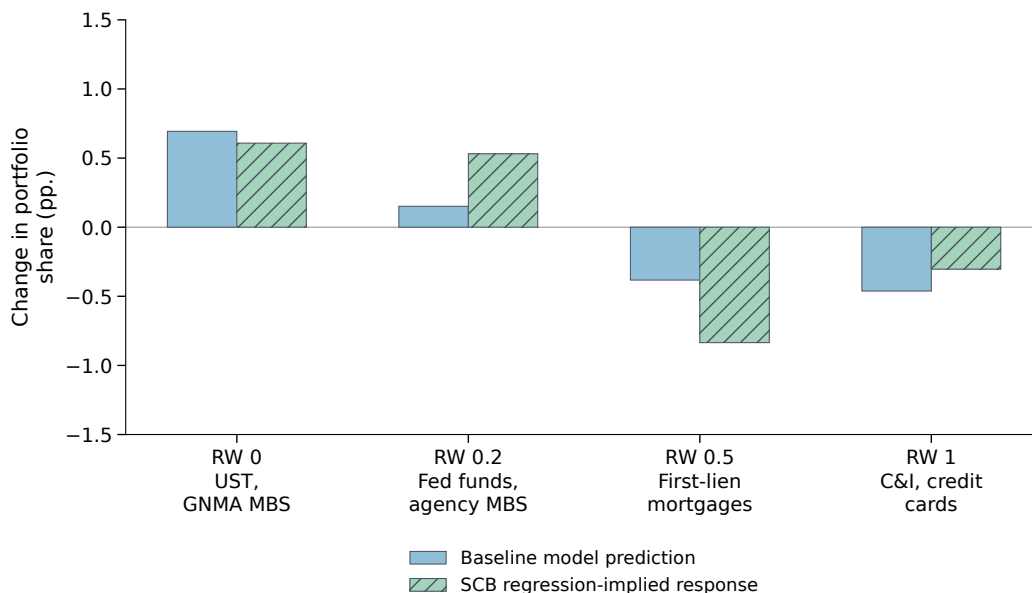


Figure 9: Predicted and estimated portfolio-share responses to SCB changes.

Notes: Blue bars (Baseline model prediction) apply the supply elasticities estimated in Section 3.4 to changes in required equity caused by Stress Capital Buffer (SCB) changes. Hatched bars (SCB regression-implied response) apply elasticities estimated from SCB changes to the same requirement changes. Bars show percentage-point changes in the portfolio share of each risk-weight (RW) category. The SCB regression pools available horizons between quarters 16 and 20. Responses are averaged over bank–event–horizon observations with nonzero SCB changes in 2020 and 2021; banks with no change remain in the regression comparison group. Both calculations account for portfolio substitution. The figure reports point estimates; confidence intervals are not plotted.

The baseline model predicts a 0.7-percentage-point increase in the portfolio share of government-backed securities (RW0), compared with a response estimated using SCB changes alone of 0.6 percentage points. For agency securities and interbank assets (RW0.2), the corresponding increases are 0.2 and 0.5 percentage points. Both sets of estimates imply a decline in mortgage shares: 0.4 percentage points under the baseline model and 0.8 percentage points using SCB changes alone. For RW1 assets, the corresponding declines are 0.5 and 0.3 percentage points.

Estimates using SCB changes alone reproduce the predicted direction of portfolio reallocation in all four asset categories. Their confidence intervals include the baseline predictions, although the estimates are too imprecise to distinguish the predicted magnitudes sharply.

3.6 Model-implied comparative advantage

In addition to predicting banks' responses to changes in capital requirements, I use the estimated supply elasticities to explain why banks persistently specialize in different assets after accounting for differences in equity requirements. I infer bank-specific intercepts in asset returns from portfolio allocations and equity requirements. A higher intercept, after removing bank-wide and asset-wide return differences, represents a comparative advantage in supplying that asset. The estimates align with credit-card lenders' specialization in consumer lending, dealers' specialization in reverse-repo lending, and custodians' specialization in government-backed securities.

To recover these intercepts from portfolio-share levels, I assume that each asset's marginal supply cost rises at a constant rate across portfolio allocations. Under this assumption, a bank holding a larger share of an asset despite a higher equity requirement must earn a higher return on that asset, holding the bank's portfolio opportunity cost fixed. I specify $C_a(s) = s^2/(2\tau_a)$ and decompose asset returns as $r_{abt} = \mu_{at} + \xi_{ab} + \varepsilon_{abt}$. The common asset-date return μ_{at} captures variation in asset a 's return shared by all banks. The intercept ξ_{ab} is the persistent bank-specific component of the return on asset a . Differences in these intercepts across banks capture comparative advantages in supplying the asset.²¹ I assume that the remaining return shock ε_{abt} has zero time mean for each bank-asset pair. Substituting the quadratic marginal cost and return decomposition into the bank's first-order condition gives

$$\frac{s_{abt}}{\widehat{\tau}_a} + c_E k_{abt}^{Bind} = \mu_{at} + \xi_{ab} - \eta_{bt} + \varepsilon_{abt},$$

where η_{bt} is the bank's portfolio-constraint multiplier.

I recover the return intercepts ξ_{ab} by estimating bank-asset fixed effects in a regression of $s_{abt}/\widehat{\tau}_a + c_E k_{abt}^{Bind}$ on bank-asset, asset-date, and bank-date fixed effects. Asset-date fixed effects absorb common asset returns, while bank-date fixed effects absorb the portfolio-constraint multiplier. I normalize the intercepts to average zero across banks within each asset and across assets within each bank. A positive intercept indicates a comparatively high return on that asset after removing bank-wide and asset-wide return differences.

The estimated comparative advantages align with banks' business models. Goldman Sachs and Morgan Stanley, whose risk-weight-0 banking-book assets consist predominantly of reverse-repo lending, have estimated return intercepts in that category of about 3 percentage points per year each. State Street and BNY Mellon, which specialize in custody services,

²¹The estimated intercept absorbs persistent differences in both asset returns and marginal supply-cost levels across banks. A bank-specific linear term in supply costs is observationally equivalent to an offsetting return component.

have estimated return intercepts of about 2.5 percentage points per year in both RW0 and RW0.2 assets. Figure 10 reports these estimates alongside those for other banks. Charles Schwab has the highest estimate in agency securities and interbank lending, while Capital One and American Express have negative estimates in both securities categories.

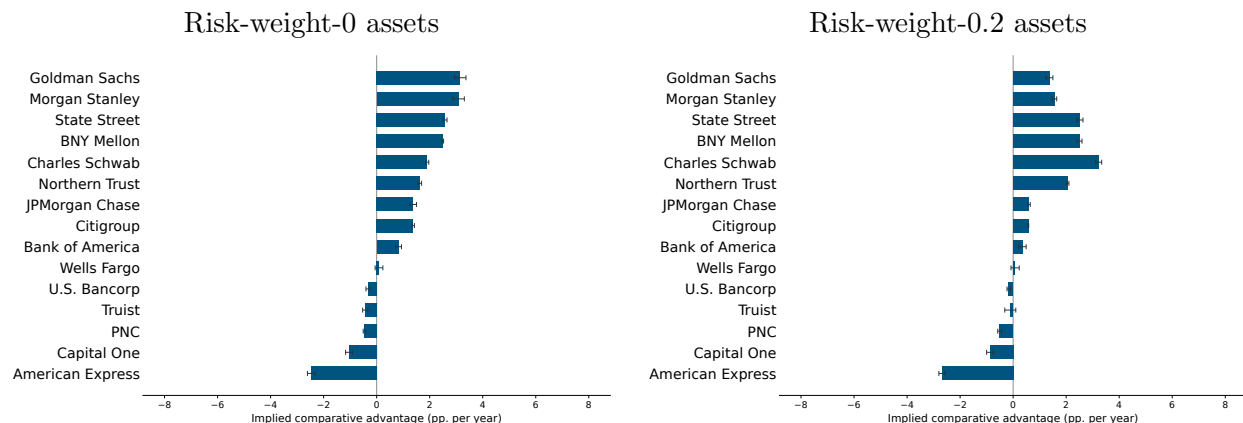


Figure 10: Implied comparative advantage in risk-weight-0 and risk-weight-0.2 assets.

Notes: Bars show estimated bank-specific intercepts in asset returns, in percentage points per year, after accounting for equity requirements. The intercepts are normalized to average zero across banks within each asset and across assets within each bank. Error bars are 95% confidence intervals using calendar-quarter aggregated scores and a Bartlett correction with four quarterly lags, conditional on the equity funding premium and estimated supply elasticities.

American Express and Capital One, which specialize in credit-card lending, have estimated return intercepts in RW1 loans of about 8 and 3 percentage points per year, respectively. Positive mortgage return intercepts appear across a broader group of banks, including Northern Trust, BNY Mellon, State Street, Wells Fargo, and JPMorgan Chase (Figure 11).

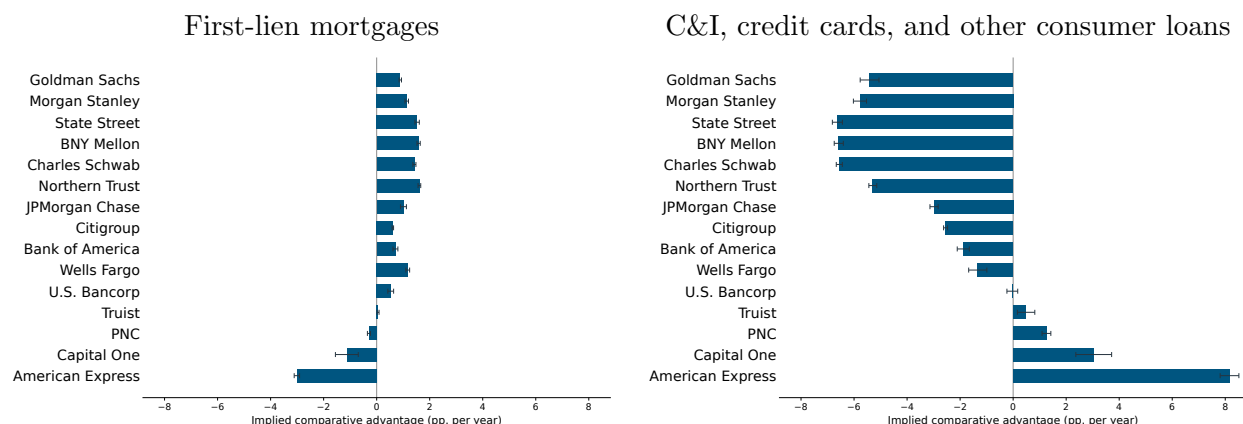


Figure 11: Implied comparative advantage in loans.

Notes: Bars show estimated bank-specific intercepts in asset returns, in percentage points per year, after accounting for equity requirements. The intercepts are normalized to average zero across banks within each asset and across assets within each bank. Error bars are 95% confidence intervals using calendar-quarter aggregated scores and a Bartlett correction with four quarterly lags, conditional on the equity funding premium and estimated supply elasticities.

4 Application to Post-Crisis Capital Requirements

Stronger capital requirements account for about 28% of large banks' shift from lending toward securities since 2011, holding bank sizes and asset payoffs fixed. The model also partly explains why banks' average portfolio risk weights have become more similar since 2011: risk-based capital requirements encourage loan specialists to expand their securities portfolios, while the SLR encourages securities specialists to expand lending.

4.1 Aggregate portfolio composition

Post-crisis reforms raised risk-based capital requirements and introduced the SLR, changing the equity required for different assets across banks. Figure 12 summarizes these regulatory changes. Higher buffers and bank-specific surcharges increased RBC requirements, while the SLR became the binding requirement for banks whose portfolios were concentrated in low-risk-weight assets.

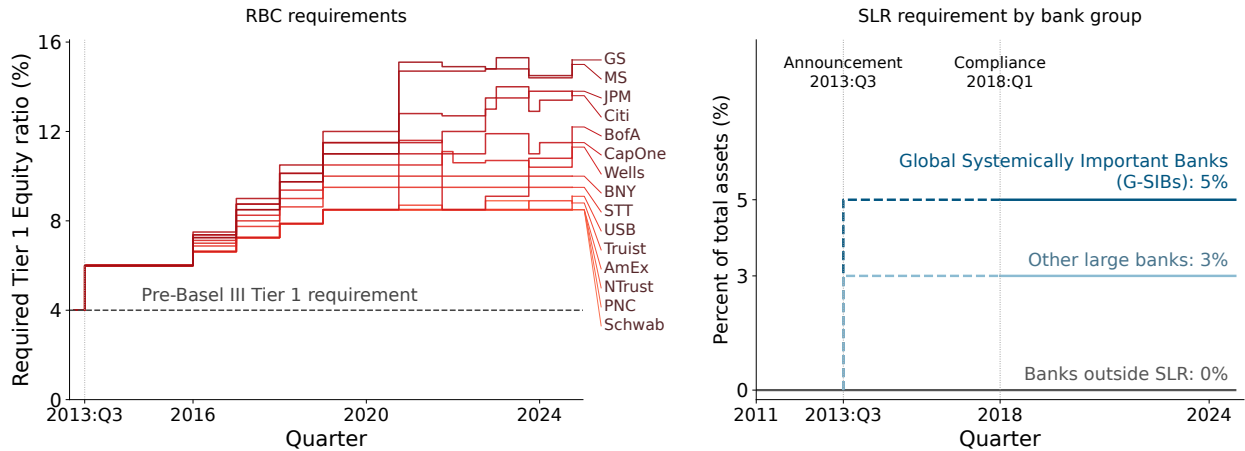


Figure 12: Historical bank-level RBC and SLR requirements.

Notes: The left panel shows each bank's required Tier 1 capital as a percentage of risk-weighted assets under risk-based capital (RBC) requirements. The right panel shows Supplementary Leverage Ratio (SLR) requirements by bank group; G-SIB denotes a global systemically important bank. Vertical lines mark the SLR announcement and compliance dates.

For each bank and quarter, I determine the binding capital rule and calculate the equity required for each asset. I compare these requirements with a counterfactual that retains each bank's average RBC requirement over 2011:Q1–2013:Q2 and excludes the SLR. I apply the estimated supply elasticities to the resulting asset-level requirement changes, accounting for portfolio substitution as in Proposition 1. Predicted and observed changes use the same available quarters within each bank and fixed bank aggregation weights. The calculation holds bank sizes and asset payoffs fixed.

In general equilibrium, an aggregate strengthening of capital requirements is likely to raise loan rates as well as reduce loan quantities, so banks may shift their portfolios away from lending less than this partial-equilibrium exercise predicts. My cross-sectional estimates may also capture borrowers substituting away from banks facing larger increases in capital requirements toward banks facing smaller increases in capital requirements. Applying these estimates to a broad strengthening of capital requirements could therefore overstate the aggregate portfolio shift away from lending, because fewer banks remain available to absorb displaced borrowers than when requirements rise at only some banks.

My estimates predict that the post-crisis strengthening of bank capital requirements induced banks to reallocate their portfolios from lending toward securities, as observed in the data. Figure 13 compares predicted and observed changes in large banks' portfolio composition between 2011–2013 and 2022–2024. I measure the total shift from lending toward securities as the change in securities' portfolio share minus the change in loans' portfolio share between 2011–2013 and 2022–2024. The model-predicted shift due to stronger capital requirements is about 28% of the observed shift over the same period.²²

The SLR partly offsets the shift toward securities induced by stronger risk-based capital requirements. Higher RBC requirements raise the equity cost of high-risk-weight loans relative to securities. When the SLR becomes binding instead, it raises required equity on low-risk-weight securities and can lower it on loans relative to the RBC requirement. Without the SLR, the model predicts a larger shift from lending toward securities (Figure 13).

²²They explain a larger share of the increase in securities shares (37%) than of the decline in loan shares (22%) because the observed increase in securities shares is smaller than the observed decline in loan shares, whereas the model predicts equal and opposite changes.

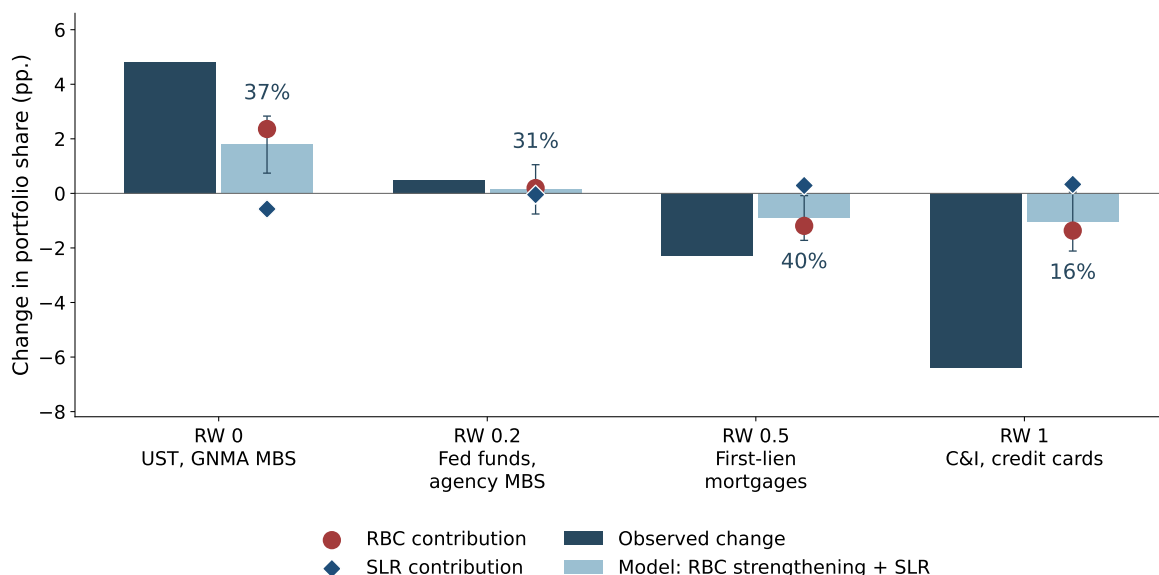


Figure 13: Observed aggregate portfolio shifts and predicted effects of RBC strengthening and SLR introduction.

Notes: Bars show observed (dark blue) and predicted (light blue) changes in portfolio shares between the 2011:Q1–2013:Q2 and 2022–2024 averages, in percentage points. Shares exclude trading assets, reserves, and vault cash; bank weights are fixed at pre-period average portfolio sizes. Observed and predicted changes use the same available quarters within each bank. Predictions hold portfolio sizes fixed and compare actual requirements with each bank's pre-period risk-based capital (RBC) requirement and no Supplementary Leverage Ratio (SLR). Red circles show the RBC contribution and blue diamonds the additional SLR contribution; these sum to the predicted bar. Percentage labels divide predicted by observed changes. Error bars are 95% delta-method confidence intervals using the estimated parameter covariance matrix. RW denotes risk weight. Source: FR Y-9C.

Capital requirements therefore account for part of the observed shift away from lending. Other forces, including changes in nonbank lending technology, may also have contributed (Hanson et al., 2024; Buchak et al., 2024).

4.2 Portfolio convergence across banks

The coexistence of RBC and SLR requirements partly explains the convergence in banks' portfolio compositions: the two rules encourage loan specialists to expand their securities portfolios and securities specialists to expand lending (Greenwood et al., 2017). Post-crisis capital requirements explain 34% of the observed convergence, according to the model evaluated at the estimated supply elasticities.

Consider again the two-bank example in Section 2, with Capital One specializing in credit-card loans and Goldman Sachs specializing in Treasuries.²³ With a 10% RBC requirement and a 5% SLR, Capital One is RBC-bound and Goldman Sachs is SLR-bound. Capital

²³This example is adapted from Greenwood et al. (2017, pp. 499–500).

One must fund each additional \$100 of credit-card loans with \$10 of equity, compared with \$5 for Goldman Sachs. Conversely, Goldman Sachs must fund each additional \$100 of Treasuries with \$5 of equity, while Capital One faces no equity requirement on Treasuries. Each bank therefore faces a higher equity requirement on its specialty than the other bank does, encouraging both to expand outside their specialties.

I measure portfolio composition as the average risk weight across the four asset categories, weighted by each category’s share of the assets in those categories. Convergence means that banks with higher initial average risk weights subsequently reduced them more—or increased them less—than banks with lower initial average risk weights.

Banks’ ratios of risk-weighted assets to assets converged between 2011–2013 and 2022–2024, consistent with the earlier evidence in Greenwood et al. (2017). Figure 14 plots changes in RWA/assets against banks’ initial RWA/assets. Goldman Sachs and Morgan Stanley began with low RWA/assets and subsequently increased their ratios. Wells Fargo, PNC, and U.S. Bancorp began with higher RWA/assets and subsequently reduced their ratios. These portfolio shifts are consistent with the incentives of SLR-bound dealers to expand lending and RBC-bound lenders to expand their securities portfolios. Regressing the observed change in RWA/assets on initial RWA/assets gives a slope of -0.137. The model predicts a slope of -0.047 under post-crisis capital requirements. This is 34% of the observed slope, so capital requirements explain about one-third of the observed convergence.

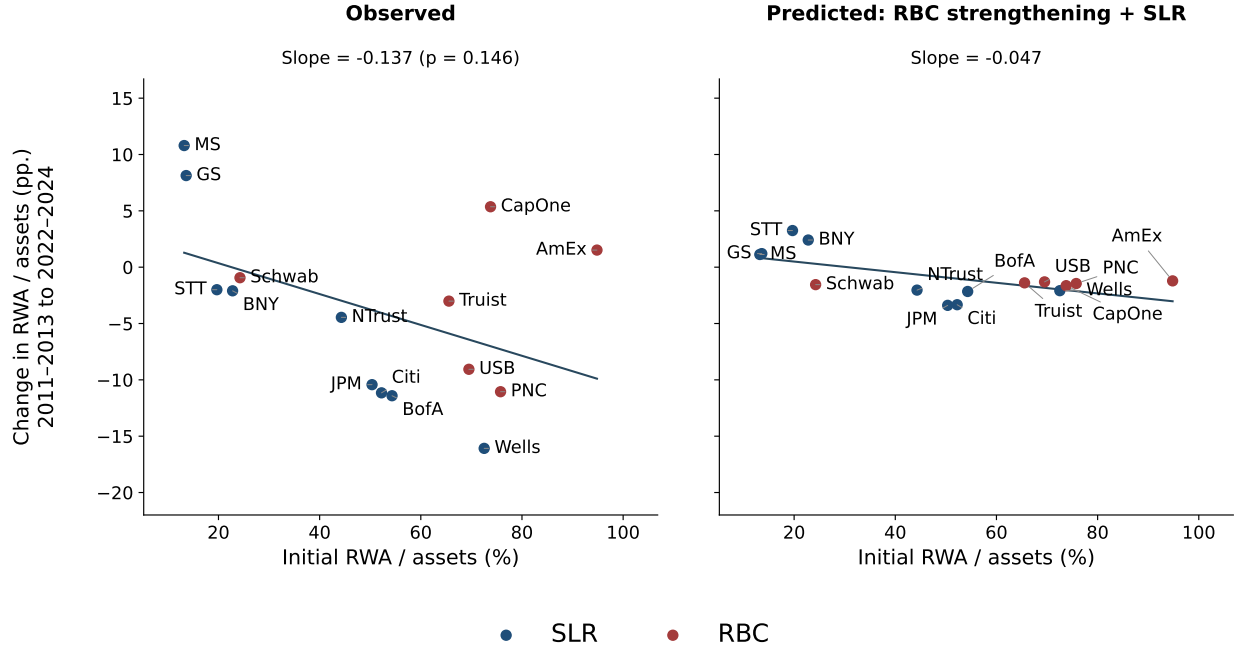


Figure 14: Observed and predicted convergence in banks' ratios of risk-weighted assets to assets.

Notes: Each point represents a bank. RWA/assets is the average risk weight across RW0, RW0.2, RW0.5, and RW1 assets, weighted by dollar holdings and excluding reserves and vault cash. Initial ratios are averaged over 2011–2013; changes subtract those averages from the 2022–2024 averages. The predicted panel applies the estimated portfolio-share responses to the same four categories and holds total holdings fixed. Blue points identify SLR-bound banks and red points RBC-bound banks in 2013:Q4. Fitted lines give equal weight to each bank. The observed-slope p -value uses heteroskedasticity-robust standard errors. RWA denotes risk-weighted assets; RW denotes standardized risk weight; RBC denotes risk-based capital; SLR denotes the Supplementary Leverage Ratio. Source: FR Y-9C.

5 Conclusion

Bank capital requirements are regulators' principal tool for protecting financial stability. Capital requirements require banks to finance a minimum share of their assets with equity, reducing banks' incentives to take risks and protecting the government's deposit insurance fund against losses. But many studies find that stronger capital requirements reduce bank lending. Since the financial crisis, U.S. regulators have strengthened capital requirements for large banks, while these banks have simultaneously shifted their portfolios away from lending and toward securities. The contribution of stronger capital requirements to this shift remains debated.

This paper develops a structural framework and empirical method to separate banks' asset supply elasticities from portfolio substitution. In the model, the adding-up constraint links each asset's substitution response to the supply elasticities of all assets in the portfolio. I use increases in risk-based capital requirements and switches in banks' binding capital rule

to estimate how banks reallocate their portfolios when equity requirements change across assets. The substitution-corrected supply elasticities are positive for every asset category, and securities respond more to their own regulatory costs than loans do, consistent with securities' greater liquidity and homogeneity. The estimated elasticities correctly predict the direction of portfolio-share responses to the 2020 and 2021 Stress Capital Buffer changes, which were excluded from estimation.

The framework can be used to evaluate policies such as permanently exempting reserves and Treasuries from the SLR or raising risk weights on commercial real estate loans while leaving other assets' equity requirements unchanged. In this paper, I use it to ask whether stronger capital regulation explains banks' move away from lending since the financial crisis. Holding bank sizes and asset payoffs fixed, I argue that stronger capital requirements account for about 28% of large banks' shift from lending to securities since 2011. The model also partly explains why banks' portfolio compositions have converged since 2011: risk-based capital requirements encourage loan specialists to expand securities holdings, while the leverage capital requirement encourages securities specialists to expand lending. Capital regulation thus affects both the banking sector's allocation between lending and securities and the extent to which individual banks specialize in supplying particular assets.

A Continuous weights on RBC and SLR requirements

A.1 Continuous weights on RBC and SLR requirements

Back

Banks may put weight on both capital rules when they are uncertain which will bind. Replace the single-rule requirement with

$$k_{abt}^{Bind} = p_{bt} \ell_{bt}^{RBC} w_a + (1 - p_{bt}) \ell_{bt}^{SLR}, \quad p_{bt} = \Phi(\Delta_{bt}/\sigma_{\Delta}).$$

Here Δ_{bt} is the SLR buffer minus the RBC buffer, with both buffers measured as excess equity per dollar of risk-weighted assets, and Φ is the standard normal CDF. Estimate σ_{Δ} jointly with the supply elasticities. A larger buffer under SLR relative to RBC puts more weight on RBC; a larger σ_{Δ} makes the weights less sensitive to the difference between buffers.

The continuous-weight estimates preserve the main ranking: securities respond more to required equity than loans. The three-group elasticity is 45.4 for RW0 and RW0.2, 14.0 for RW0.5, and 5.0 for RW1, compared with 28.4, 11.1, and 4.6 under discrete binding rules. The continuous-weight estimates are less precise.

The continuous-weight estimates also distinguish securities specialists from credit-card lenders. The following figures quantify banks' comparative advantages in supplying different assets using the same normalization and asset categories as Figures 10 and 11.

The continuous-weight predictions explain 23% of the observed decline in loan shares and 40% of the observed convergence in RWA/assets. As under discrete binding rules, higher RBC requirements shift portfolios toward securities, and the SLR partly offsets that shift.

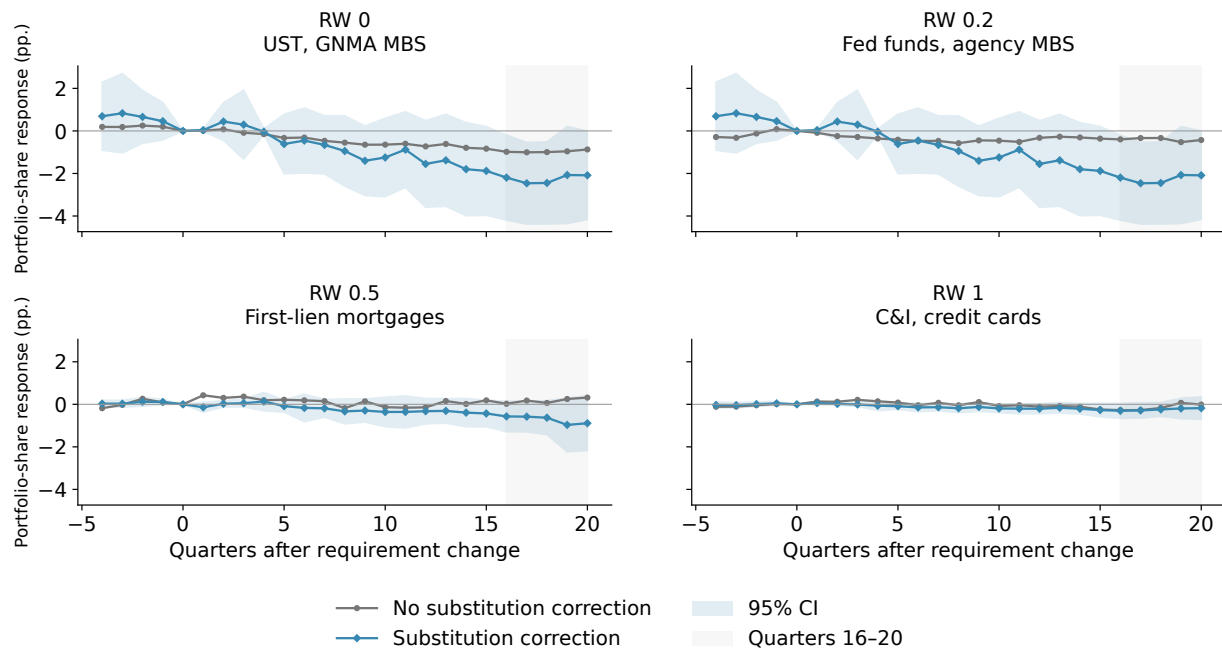


Figure 15: Dynamic asset-share responses with continuous rule weights.

Notes: Lines show portfolio-share responses, in percentage points, to a one-percentage-point increase in required equity. Gray circles show estimates without substitution correction; blue diamonds show estimates with portfolio-substitution correction that impose a common supply elasticity for RW0 and RW0.2 assets. RW denotes risk weight. Blue shading gives 95% confidence intervals clustered by bank. Responses at quarter zero are normalized to zero. Light-gray shading marks quarters 16–20, pooled in the long-run estimates. Required equity weights the RBC and SLR requirements using the difference between the bank’s buffers under the two rules. Estimates use FR Y-9C portfolio shares for 28 banks, excluding trading assets, reserves, and vault cash from the denominator, and control for bank–date and asset–date–horizon fixed effects.

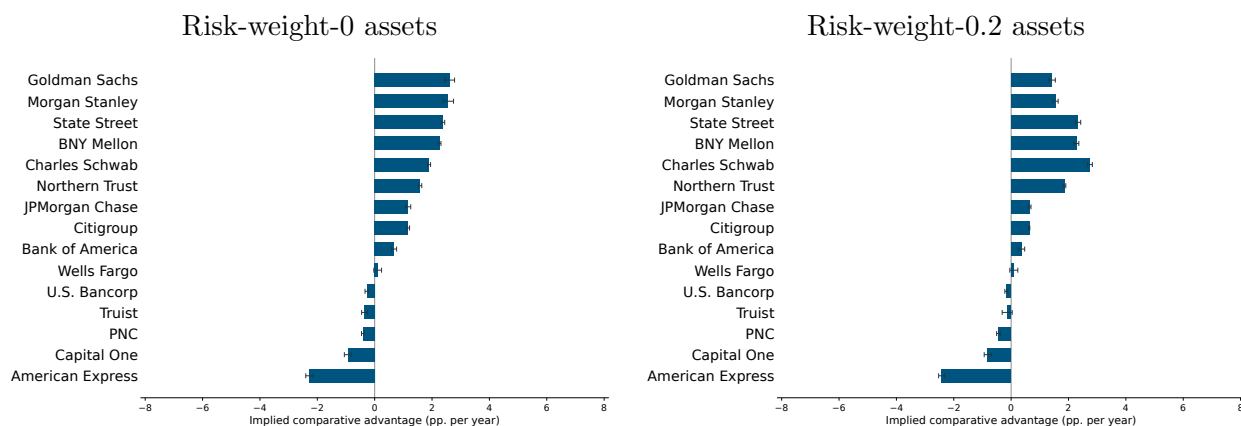


Figure 16: Implied comparative advantage in securities and interbank lending with continuous rule weights.

Notes: Bars show estimated bank-specific intercepts in asset returns, in percentage points per year, after accounting for equity requirements. The intercepts are normalized to average zero across banks within each asset and across assets within each bank. Error bars are 95% confidence intervals using calendar-quarter aggregated scores and a Bartlett correction with four quarterly lags, conditional on the equity funding premium, estimated supply elasticities and rule weights.

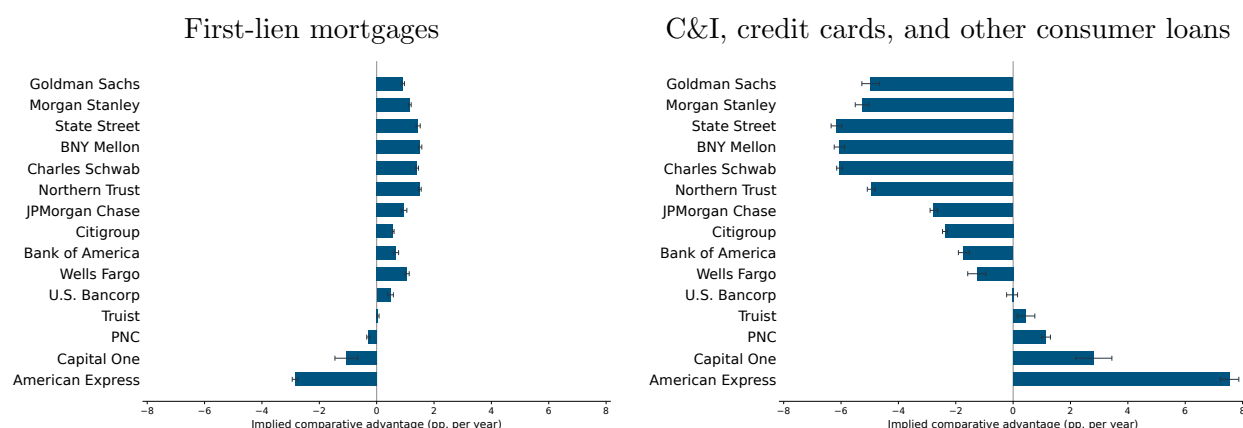


Figure 17: Implied comparative advantage in loans with continuous rule weights.

Notes: Bars show estimated bank-specific intercepts in asset returns, in percentage points per year, after accounting for equity requirements. The intercepts are normalized to average zero across banks within each asset and across assets within each bank. Error bars are 95% confidence intervals using calendar-quarter aggregated scores and a Bartlett correction with four quarterly lags, conditional on the equity funding premium, estimated supply elasticities and rule weights.

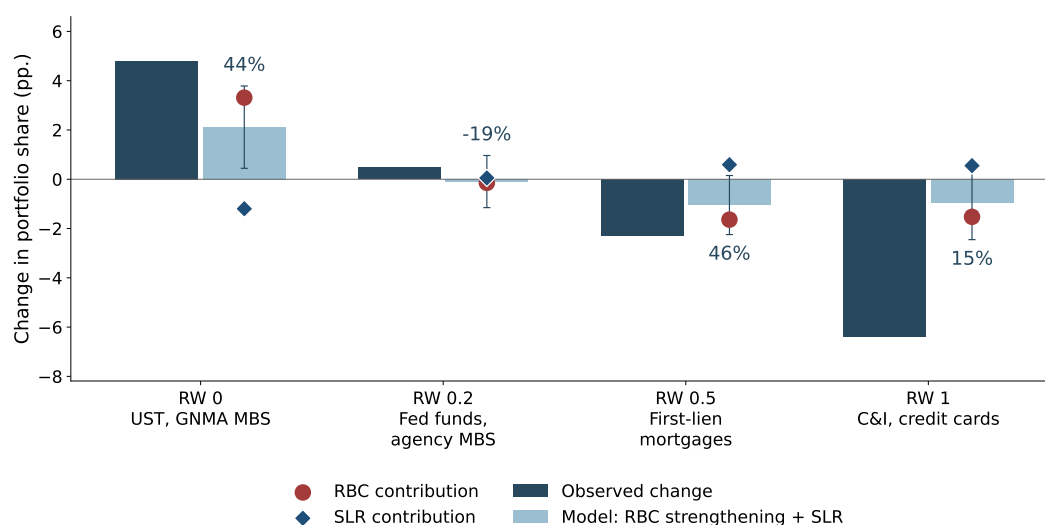


Figure 18: Observed aggregate portfolio shifts and predicted effects of RBC strengthening and the SLR with continuous rule weights.

Notes: Bars show observed (dark blue) and predicted (light blue) changes in portfolio shares between the 2011:Q1–2013:Q2 and 2022–2024 averages, in percentage points. Shares exclude trading assets, reserves, and vault cash; bank weights are fixed at pre-period average portfolio sizes. Observed and predicted changes use the same available quarters within each bank. Predictions hold portfolio sizes fixed and compare actual requirements with each bank's pre-period risk-based capital (RBC) requirement and no Supplementary Leverage Ratio (SLR). Red circles show the RBC contribution and blue diamonds the additional SLR contribution; these sum to the predicted bar. Percentage labels divide predicted by observed changes. Error bars are 95% delta-method confidence intervals using the estimated parameter covariance matrix. RW denotes risk weight. Source: FR Y-9C. Predictions weight RBC and SLR requirements by the difference between the bank's capital buffers under the two rules.

	Portfolio-share change (pp.)			
	No substitution correction	Pooled RW 0/0.2	Pooled RW 0/0.2 and RW 0.5/1	Linear $\beta_0 + \beta_1 RW$
Equity requirement k^{Bind} (pp.)	–	–	–	–1.742* (0.856)
Equity requirement k^{Bind} (pp.) $\times$ RW	–	–	–	1.498* (0.776)
Equity requirement k^{Bind} (pp.), RW 0	–0.962* (0.475)	–2.272** (1.105)	–2.334** (1.130)	
Equity requirement k^{Bind} (pp.), RW 0.2	–0.398 (0.435)	–2.272** (1.105)	–2.334** (1.130)	
Equity requirement k^{Bind} (pp.), RW 0.5	0.172 (0.722)	–0.698 (0.509)	–0.332 (0.228)	
Equity requirement k^{Bind} (pp.), RW 1	–0.168 (0.260)	–0.248 (0.207)	–0.332 (0.228)	
N. Banks	28	28	28	28
N. Quarters	42	42	42	42
SE clustering	Bank	Bank	Bank	Bank
Adjusted R^2	0.1255	0.1257	0.1256	0.1256
Adjusted within R^2	0.0021	0.0023	0.0022	0.0022
Bank–date FE	Yes	Yes	Yes	Yes
Asset–date–horizon FE	Yes	Yes	Yes	Yes

Portfolio-share change: $s_{ab,t+h} - s_{ab,t}$, horizons $h = 16-20$.

Bank-clustered SEs in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$.

Linear column: estimated intercept and slope in $\beta_a = \beta^{(0)} + \beta^{(1)} RW_a$.

Table 4: Required-equity response coefficients with continuous rule weights.

Notes: Estimates pool responses 16–20 quarters after a change in required equity. Required equity is a weighted average of the risk-based capital (RBC) and Supplementary Leverage Ratio (SLR) requirements, with weights determined by the difference between the bank’s capital buffers under the two rules. RW denotes risk weight. Coefficients measure percentage points of portfolio share per percentage-point increase in required equity. The no-correction column omits portfolio substitution; other columns impose the indicated pooling restrictions.

	No substitution correction	Pooled RW 0/0.2	Pooled RW 0/0.2 and RW 0.5/1	Linear $\beta_0 + \beta_1 RW$
RW 0	19.24* (9.50)	45.45** (22.10)	46.67** (22.60)	34.84* (17.12)
RW 0.2	7.96 (8.71)	45.45** (22.10)	46.67** (22.60)	28.84* (14.13)
RW 0.5	-3.45 (14.44)	13.97 (10.18)	6.64 (4.57)	19.85* (9.77)
RW 1	3.37 (5.21)	4.96 (4.15)	6.64 (4.57)	4.87 (4.25)
N. Banks	28	28	28	28
N. Quarters	42	42	42	42
SE clustering	Bank	Bank	Bank	Bank
Adjusted R^2	0.1255	0.1257	0.1256	0.1256
Adjusted within R^2	0.0021	0.0023	0.0022	0.0022
Bank-date FE	Yes	Yes	Yes	Yes
Asset-date-horizon FE	Yes	Yes	Yes	Yes

Bank-clustered SEs in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$.

Horizons 16–20. $\tau = -\beta/0.05$.

Table 5: Supply elasticities with continuous rule weights.

Notes: Supply elasticities are recovered from long-run response coefficients as $\hat{\tau}_a = -\hat{\beta}_a/c_E$, where $\hat{\beta}_a$ is the portfolio-share response coefficient and $c_E = 0.05$ is the equity funding premium. Required equity is a weighted average of the risk-based capital (RBC) and Supplementary Leverage Ratio (SLR) requirements, with weights determined by the difference between the bank's capital buffers under the two rules. RW denotes risk weight. The no-correction column omits portfolio substitution; other columns impose the indicated pooling restrictions. Inference conditions on the equity funding premium.

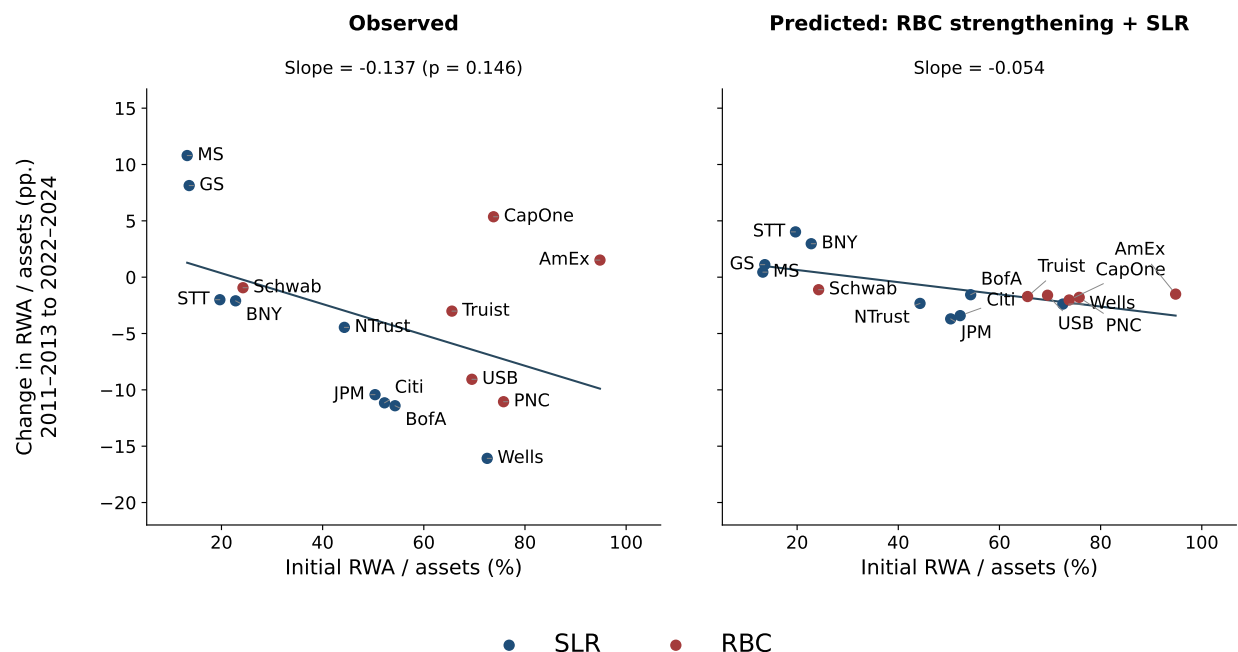


Figure 19: Observed and predicted convergence in banks' RWA/assets with continuous rule weights.

Notes: Each point represents a bank. RWA/assets is the average risk weight across RW0, RW0.2, RW0.5, and RW1 assets, weighted by dollar holdings and excluding reserves and vault cash. Initial ratios are averaged over 2011–2013; changes subtract those averages from the 2022–2024 averages. The predicted panel applies the estimated portfolio-share responses to the same four categories and holds total holdings fixed. Blue points identify SLR-bound banks and red points RBC-bound banks in 2013:Q4. Fitted lines give equal weight to each bank. The observed-slope p -value uses heteroskedasticity-robust standard errors. Predictions use continuous rule weights. RWA denotes risk-weighted assets; RW denotes standardized risk weight; RBC denotes risk-based capital; SLR denotes the Supplementary Leverage Ratio. Source: FR Y-9C.

Additional estimation checks. The following exhibits repeat the pre-period, lagged-share, required-equity lead/lag, and equity-funding-premium checks with continuous rule weights. The required-equity lead/lag comparison holds the weighting parameter σ_{Δ} fixed at its baseline three-group estimate, so each column uses the same mapping from capital buffers to required equity.

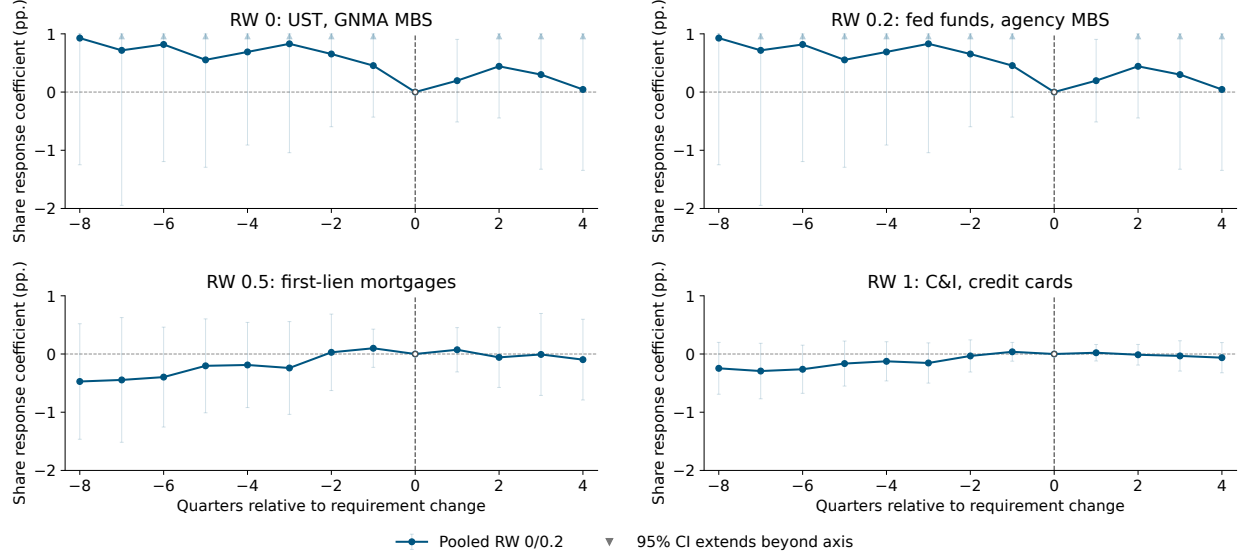


Figure 20: Pre-period portfolio-share responses with continuous rule weights.

Notes: Points show portfolio-share response coefficients for each risk-weight category at the indicated horizons before and after a change in required equity. The substitution correction pools RW0 and RW0.2. Error bars show 95% confidence intervals clustered by bank; triangles mark intervals extending beyond the vertical axis. Required equity uses continuous weights on the RBC and SLR. RW denotes risk weight; RBC denotes risk-based capital; SLR denotes the Supplementary Leverage Ratio. Coefficients measure percentage points of portfolio share per percentage-point increase in required equity; negative horizons precede the change.

Asset	No lagged-share controls	Four lagged-share controls
RW0 / RW0.2	42.5* (21.3)	22.4 (17.5)
RW0.5	15.5 (11.2)	9.6 (8.5)
RW1	5.5 (4.2)	3.8 (3.8)

Table 6: Supply elasticities with lagged portfolio-share controls and continuous rule weights.

Notes: The columns compare three-group estimates with and without four lags of the asset's own portfolio share. Lag coefficients vary by asset. Both columns use the sample with all four lagged shares available. RW denotes risk weight. Parentheses report standard errors clustered by bank. Stars denote two-sided bank-clustered tests: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. The three-group specification pools RW0 and RW0.2 and estimates separate elasticities for RW0.5 and RW1. Required equity uses continuous weights on risk-based capital and Supplementary Leverage Ratio requirements.

Asset	Main	8 lags only	Leads	Leads 4 lags	Leads 8 lags	Leads 16 lags
RW0 / RW0.2	45.4** (18.8)	45.5** (20.8)	41.3 (32.8)	51.1 (36.6)	46.8 (39.9)	45.4 (48.1)
RW0.5	14.0 (8.5)	15.5* (9.1)	18.8* (9.7)	24.8** (11.0)	24.0* (12.7)	30.7 (22.1)
RW1	5.0 (3.7)	8.2* (4.4)	6.1 (4.4)	8.3* (4.8)	9.4* (5.3)	13.1** (5.9)

Table 7: Supply elasticities controlling for other required-equity changes with continuous rule weights.

Notes: Columns add required-equity changes from $t + 1$ through $t + h$ (Leads) and from $t - L$ through $t - 1$ (Lags). All use the three-group specification and continuous rule weights with σ_Δ fixed at its baseline estimate. The Main column uses no additional requirement-change controls. Parentheses report standard errors clustered by bank, conditional on σ_Δ . RW denotes risk weight. Stars denote two-sided bank-clustered tests: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Here h is the response horizon, L is the number of lags, and σ_Δ controls the sensitivity of rule weights to capital-buffer differences. The three-group specification pools RW0 and RW0.2 and estimates separate elasticities for RW0.5 and RW1.

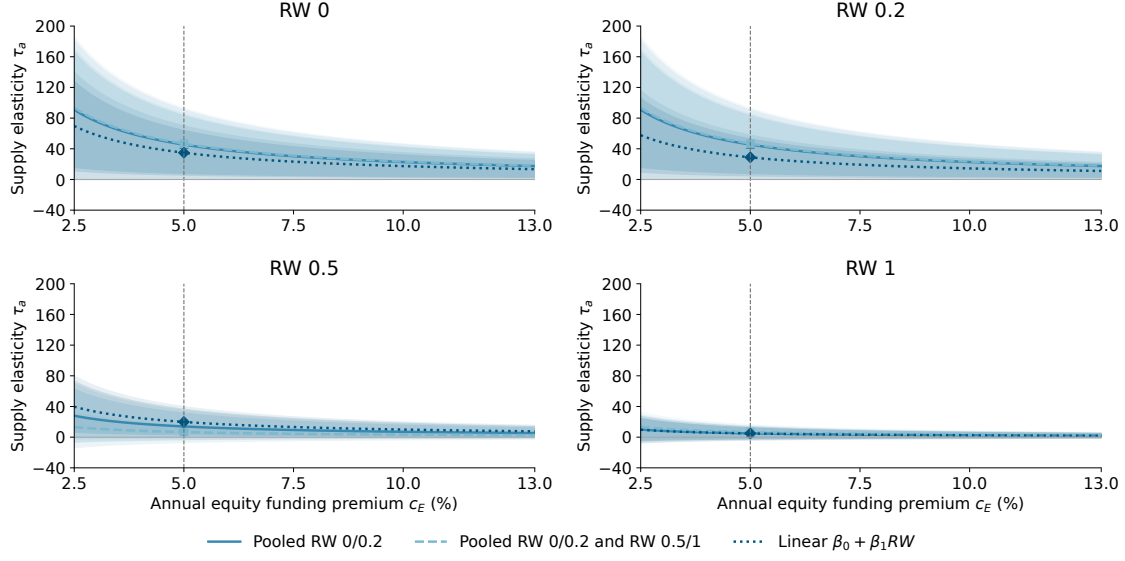


Figure 21: Supply elasticities under alternative equity funding premia with continuous rule weights.

Notes: This figure reports $\hat{\tau}_a = -\hat{\beta}_a/c_E$ across alternative equity funding premia c_E . The horizontal axis expresses the equity funding premium c_E in percent; the baseline value is 5%. RW denotes risk weight. The three-group curves impose a common supply elasticity for RW0 and RW0.2 and separate elasticities for RW0.5 and RW1; the two-group curves also impose a common elasticity for RW0.5 and RW1. The linear curves restrict elasticity to be linear in risk weight. Shaded bands show 90% and 95% confidence intervals clustered by bank, conditional on c_E . Required equity uses continuous weights on the RBC and SLR.

B Proof of portfolio substitution

B.1 Proof of Proposition 1

Back

For an interior portfolio, let λ_{bt}^{RBC} and λ_{bt}^{SLR} be the capital-constraint multipliers. The equity FOC and complementary slackness give

$$\begin{aligned}\lambda_{bt}^{RBC} + \lambda_{bt}^{SLR} &= c_E, \\ \lambda_{bt}^{RBC} \left(E_{bt} - \ell_{bt}^{RBC} \sum_a w_a s_{abt} \right) &= 0, \\ \lambda_{bt}^{SLR} \left(E_{bt} - \ell_{bt}^{SLR} \sum_a s_{abt} \right) &= 0.\end{aligned}$$

When the RBC and SLR require different amounts of Tier 1 capital, the slack rule has multiplier zero and the binding rule has multiplier c_E . Differentiating the share choice in the constrained problem therefore gives the marginal-return condition stated in the main text, with marginal required equity defined in equation (2).

The second-order cost approximation around the fixed reference share is

$$C_{ab}(s) \approx C_{ab}(\bar{s}_{ab}) + C'_{ab}(\bar{s}_{ab})(s - \bar{s}_{ab}) + \frac{(s - \bar{s}_{ab})^2}{2\tau_a}.$$

Differentiating this displayed quadratic polynomial with respect to s gives

$$C'_{ab}(s) \approx C'_{ab}(\bar{s}_{ab}) + \frac{s - \bar{s}_{ab}}{\tau_a}.$$

Taking differences between nearby portfolio choices cancels the time-invariant marginal-cost term. Subtracting their exact FOCs then yields

$$\Delta s_{abt} \approx \tau_a (\Delta r_{abt} - c_E \Delta k_{abt}^{Bind} - \Delta \eta_{bt}).$$

Holding returns fixed and summing across assets, the fixed portfolio total implies

$$0 = \sum_a \Delta s_{abt} \approx -c_E \sum_a \tau_a \Delta k_{abt}^{Bind} - \Delta \eta_{bt} \sum_a \tau_a, \quad \Delta \eta_{bt} \approx -c_E \frac{\sum_a \tau_a \Delta k_{abt}^{Bind}}{\sum_a \tau_a}.$$

Substituting this multiplier change into the share response gives equation (4). Approximation errors vanish to first order near the reference portfolio. Globally quadratic costs make the

marginal-cost approximation exact.

C Data construction

C.1 Mergers

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Acquirer	Target	Close	Asset jump at close (%)
BB&T / Truist	SunTrust	2019:Q4	100
M&T	Hudson City	2015:Q4	26
M&T	People's United	2022:Q2	36
First Citizens	First Citizens Bcp	2014:Q4	37
First Citizens	CIT	2022:Q1	86
First Citizens	SVB	2023:Q1	96
BMO	M&I	2011:Q3	57
BMO	Bank of the West	2023:Q1	44
Huntington	FirstMerit	2016:Q3	36
Huntington	TCF Financial	2021:Q2	39
KeyCorp	First Niagara	2016:Q3	34
Charles Schwab	TD Ameritrade	2020:Q4	31
NYCB / Flagstar	Flagstar	2022:Q4	43
NYCB / Flagstar	Signature (deposits)	2023:Q1	37
Capital One	ING Direct USA	2012:Q1	43
Capital One	Discover	2025:Q2	34

Table 8: Acquisitions triggering a bank-entity split

Notes: This table lists acquisitions for which banks are split into separate entities when the target exceeds 25% of the acquirer's assets at close. Asset jump at close is the acquirer's change in total assets from the preceding quarter to the closing quarter, as a percentage of preceding-quarter assets (FR Y-9C item BHCK2170). It measures the balance-sheet discontinuity removed by the split, not the target-to-acquirer size ratio.

C.2 Risk-weight mapping

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Asset	FR Y-9C mnemonic	w_a	12 CFR 217
<i>Risk weight 0</i>			
U.S. Treasury securities	BHCK0211, 1286	0	§32(a)(1)(i)
GNMA pass-through MBS	BHCKG300, G302	0	§32(a)(1)(i)
<i>Risk weight 0.2</i>			
Agency and GSE MBS and CMOs	BHCKG304, G306, G312, G314, G316, G318, K142, K144, K150, K152	0.2	§32(c)(1), §43
Agency and GSE non-MBS debt	BHCK1289, 1291, 1294, 1297, HT50, HT52	0.2	§32(c)(1)
Federal funds sold	BHDMB987	0.2	§32(d)(1)
Loans to U.S. depository institutions	BHCK1292	0.2	§32(d)(1)
<i>Risk weight 0.5</i>			
First-lien closed-end 1–4 family residential mortgages	BHDM5367	0.5	§32(g)(1)
<i>Risk weight 1</i>			
Commercial and industrial loans	BHCK1763, 1764, KX56	1	§32(f)(1)
Nonfarm nonresidential real-estate loans	BHCKF160, F161	1	§32(f)(1)
Junior-lien residential mortgages and home-equity lines	BHDM1797, 5368	1	§32(g)(2)
American Express charge-card reporting component	BHCKJ451 (Amex only)	1	§32(l)(5)
Credit-card loans	BHCKB538	1	§32(l)(5)
Other consumer loans	BHCKB539, K137, K207	1	§32(l)(5)
Agricultural loans	BHCK1590	1	§32(f)(1), (l)(5)
Finance lease receivables	BHDM2165	1	§32(l)(5)
<i>Split across the classes by the bank's reported allocation</i>			
Cash and depository balances (excluding the zero-weight portion)	BHCK0081, 0395	0.2, 0.5, 1	§32(d)
Securities purchased under agreements to resell	BHCKB989	0, 0.2, 1	§37

Table 9: FR Y-9C items, standardized risk weights, and legal sources

Notes: Securities use amortized cost. FR Y-9C denotes the Consolidated Financial Statements for Holding Companies; RW denotes standardized risk weight. Legal references are to 12 CFR Part 217; the text below explains mixed-weight categories and reporting changes.

Securities are measured at amortized cost, combining held-to-maturity and available-for-sale holdings. Legal references in Table 9 refer to 12 CFR Part 217.

Mixed-weight categories. Agency non-MBS debt combines full-faith-and-credit obli-

gations with GSE obligations, reported jointly from 2018:Q2; the category is assigned a weight of 0.2 throughout. Federal funds sold are assigned 0.2. Private-label CMOs backed by agency collateral are assigned the 0.2 securitization floor (§217.43). First-lien residential mortgages are assigned 0.5, although Schedule HC-C does not identify all underwriting and performance conditions required for that weight.

Reverse repos. The 2015 revision to Schedule HC-R removed the risk-weight breakdown used to allocate reverse repos across asset categories. Before 2015, the reported breakdown combined reverse repos and federal funds sold. I use this breakdown to approximate the reverse-repo allocation. To construct a consistent series across the reporting change, I apply each bank’s mean risk-weight fractions from 2011–2014 to its reverse-repo holdings in every quarter. For banks without usable historical reports, I use the sample’s repo-weighted allocation. Holding these fractions fixed prevents the change in reporting from generating portfolio reallocation in the measured asset shares. The constructed series captures changes in total reverse-repo holdings while holding their risk-weight composition fixed. The regulatory treatment depends on collateral and counterparty characteristics (§217.37).

Cash and trading assets. I exclude Federal Reserve balances, vault cash, and trading Treasuries from both modeled asset holdings and the total assets used to calculate portfolio shares. Trading Treasuries have a zero specific-risk weight and are subject to the general market-risk capital requirement assessed on the trading portfolio (§§217.205, 217.210).

Loan coverage. Loans to nondepository financial institutions (BHCKJ454) and loans for purchasing or carrying securities (BHCK1545) enter the share denominator through total loans (BHCK2122) but are not assigned to a modeled risk-weight category. Other loans reported in BHCKJ451 also remain outside the modeled categories, with an exception for the American Express reporting correction described in Appendix Section C.3.

Cash and depository balances. Cash and balances at depository institutions can receive different risk weights. I use the fractions reported in Schedule HC-R for each bank and quarter to allocate its cash and U.S. depository balances (BHCK0081 and BHCK0395) across risk-weight categories. When a quarter’s allocation is missing, I use the bank’s mean fractions over quarters with reported allocations. If the bank has no usable reported allocation, I use the average fractions across reporting banks and quarters, weighted by cash and U.S. depository balances. I exclude the zero-weight portion from modeled holdings and from the total assets used to calculate portfolio shares. The portions assigned weights of 0.2, 0.5, and 1 enter the corresponding modeled categories. The portion assigned a weight of 1.5 remains in the total assets used to calculate portfolio shares but outside the modeled categories.

C.3 Data cleaning

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American Express. In 2016:Q3, American Express’s charge-card receivables moved from HC-C item 9.b.(2), BHCKJ451 (“All other loans, excluding consumer loans”), into loan categories already included in risk weight 1. I include Amex’s J451 holdings in risk weight 1 throughout the sample as a separate component to maintain consistent coverage across this reporting change. Including these holdings reduces the apparent discontinuity in C&I and other consumer loans from approximately \$45.6 billion to \$0.36 billion. Total loans already include these holdings, so the correction leaves the total assets used to calculate portfolio shares unchanged. The Federal Reserve’s June 2017 FR Y-14 reporting notice documents updated guidance moving consumer charge cards from item 9.b.(2) to item 6.d; the corporate component of the reclassification is inferred from the reported balances. J451 holdings at other banks remain outside the modeled risk-weight categories.

Discover. Discover reported \$10.7 billion of borrowed mortgage-backed securities in 2020:Q3 from a temporary securities-lending transaction that matured in November 2020. I subtract this amount from Discover’s agency MBS holdings and from the total assets used to calculate its portfolio shares in 2020:Q3. The amount is the rounded carrying value and fair value of the collateral reported in Discover’s 2020:Q3 Form 10-Q, Note 2, Investments.

C.4 Estimating banks’ SLRs before reporting began

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Leverage exposure. Banks began reporting the SLR on the FR Y-9C in 2016:Q3. For 2013:Q1–2016:Q2, I construct a proxy by dividing reported Tier 1 capital by estimated total leverage exposure. Estimated exposure is the sum of on-balance-sheet assets used for the leverage ratio, credit-equivalent derivatives exposures, other off-balance-sheet credit-equivalent exposures, repo-style counterparty exposures, and an allowance for commitments omitted from the risk-based exposure measure. Tables 10 and 11 list the reporting items and their construction. Missing component amounts are treated as zero when summed. The proxy is available for banks with reported SLRs in the calibration period.

Repo-style exposure. Before 2015, I impute repo-style counterparty exposure by multiplying gross repo-style balances by the bank’s mean ratio of BHCKS516 to those balances over 2015:Q1–2016:Q2. Gross balances include federal funds sold and purchased, reverse repos, and repos. If the bank lacks a usable ratio, I use BHCE3433. From 2015:Q1 onward, I use BHCKS516 directly. In 224 bank-quarters over 2016:Q3–2019:Q4, the imputed and reported exposures have a correlation of 0.967; their aggregate ratio is 0.881.

Reporting changes. The derivatives exposure definition changes in 2015:Q1. I rescale the pre-2015 derivatives series by the ratio of mean derivative exposure relative to on-balance-sheet assets in 2015:Q1–Q2 to the corresponding mean in 2014:Q3–Q4. I also check new-format off-balance-sheet items for reporting breaks during 2015:Q2–2016:Q2. A break must exceed 5% of the preceding quarter’s constructed leverage exposure both in the quarterly change and in the difference between the available four-quarter means before and after the break. This procedure identifies Morgan Stanley’s BHCKG619 in 2016:Q1. For its earlier new-format quarters, I replace that item with its mean ratio to on-balance-sheet assets in 2016:Q1–Q2, multiplied by contemporaneous on-balance-sheet assets.

Calibration. I infer reported leverage exposure from Tier 1 capital divided by the reported SLR. For each bank, I average the ratio of reported to constructed exposure over 2016:Q3–2019:Q4 and multiply constructed exposure by this factor in every quarter. The proxy omits a separate adjustment for written credit derivatives because purchased protection needed to calculate the net exposure is unavailable in the extract. The bank-specific calibration factor allows for average differences between constructed and reported exposure. Table 12 reports fit over the calibration period and a held-out comparison that estimates the factor over 2016:Q3–2017:Q4 and evaluates it over 2018:Q1–2019:Q4.

FR Y-9C inputs. Reporting codes below identify the inputs used to construct the SLR proxy. Dollar amounts are in the FR Y-9C reporting units; the proxy SLR is 100 times Tier 1 capital divided by calibrated leverage exposure.

Commitments. The commitment adjustment uses Schedule HC-L before 2015 and the revised Schedule HC-R from 2015 onward. The pre-2015 calculation treats credit-card commitments as unconditionally cancelable and applies a larger conversion factor to the remaining short-term commitments.

Capital basis in earnings-call transcripts. I use disclosures from earnings-call transcripts identified as applying the final SLR rule. For each bank with overlapping disclosures, I estimate the fully phased-in capital adjustment by dividing the difference between the reported FR Y-9C SLR and the earnings-call SLR by the fraction of deductions not yet phased in, then averaging across overlap quarters. The remaining fractions are 0.8 in 2014, 0.6 in 2015, 0.4 in 2016, and 0.2 in 2017. I add the estimated adjustment times the remaining fraction to the earnings-call SLR. Disclosures already on a transitional basis enter unchanged; comparisons requiring an unavailable adjustment are omitted.

Goldman Sachs and Morgan Stanley. Before 2016:Q3, I multiply these banks’ calibrated FR Y-9C proxies by the ratio of the adjusted earnings-call SLR to the proxy in quarters with usable earnings-call disclosures. I interpolate the factor linearly between quarters with earnings-call disclosures. Before the first quarter with an earnings-call disclosure, I

Component	Reporting items and treatment
Tier 1 capital	BHCK8274 through 2013:Q4; BHCA8274 from 2014:Q1.
On-balance-sheet assets	BHCKA224 through 2013:Q4; BHCAA224 from 2014:Q1.
Reported SLR	BHCAH036; positive reported values provide the calibration benchmark.
Derivatives	BHCEA167 through 2014:Q4; BHCKS542 + BHCKS549 from 2015:Q1. The earlier series is rescaled at the reporting change.
Other off-balance-sheet exposures, through 2014:Q4	Sum of BHCEB546, BHCE6570, BHCE3411, BHCE3429, BHCEA250, BHCEB541, BHCEB675, BHCEB681, BHCE6572, and BHCEG591.
Other off-balance-sheet exposures, from 2015:Q1	Sum of BHCKD992, BHCKD998, BHCKG607, BHCKG613, BHCKG619, BHCKS526, and BHCKG625. Morgan Stanley's BHCKG619 is adjusted as described above.
Repo-style gross balances	Sum of BHDMB987, BHCKB989, BHDMB993, and BHCKB995.
Repo-style counter-party exposure	BHCKS516 from 2015:Q1. Earlier exposure is imputed using the 2015:Q1–2016:Q2 mean exposure-to-gross-balances ratio; BHCE3433 is the fallback.

Table 10: FR Y-9C inputs for Tier 1 capital and leverage exposure.

Notes: The SLR divides Tier 1 capital by leverage exposure; item codes refer to FR Y-9C reports.

Component	Reporting items and treatment
Total unused commitments, U	Sum of BHCK3814, BHCKJ455, BHCKJ456, BHCK3816, BHCK6550, BHCK3817, BHCKJ457, BHCKJ458, and BHCKJ459.
Short-term and cancelable commitments, S	$\max\{U - \text{BHCK6572} - \text{BHCKG591}, 0\}$. The subtracted items cover commitments over one year and commitments to ABCP conduits.
Cancelable portion, C	$\min\{\text{BHCKJ455} + \text{BHCKJ456}, S\}$.
Addition through 2014:Q4	$0.1C + 0.2(S - C)$.
Addition from 2015:Q1	$0.1 \times \text{BHCKS540}$. Other reported credit-equivalent commitments enter the off-balance-sheet sum in Table 10.

Table 11: Commitment adjustment in the SLR exposure proxy.

Notes: Reported commitments from the FR Y-9C are converted to leverage-exposure amounts using the indicated conversion factors. The adjustment enters the denominator of the Supplementary Leverage Ratio proxy.

use the mean factor from the first two quarters with earnings-call disclosures; after the final quarter with an earnings-call disclosure and before 2016:Q3, I retain the last factor. From 2016:Q3 onward, the binding-rule calculation uses the reported SLR. Table 14 reports the factors.

Fit to reported SLRs. The calibrated proxy has a mean absolute error of 0.06 percentage points over 2016:Q3–2019:Q4. Calibrating only on 2016:Q3–2017:Q4 gives a mean absolute error of 0.07 percentage points in the held-out 2018:Q1–2019:Q4 observations.

	Obs.	Mean difference (pp.)	Mean absolute difference (pp.)	Correlation
Uncalibrated, 2016:Q3–2019:Q4	245	-0.30	0.32	0.999
Calibrated, 2016:Q3–2019:Q4	245	-0.00	0.06	1.000
Calibrated on 2016:Q3–2017:Q4, compared in 2018:Q1–2019:Q4	120	-0.03	0.07	0.998

Table 12: Fit of the SLR proxy to reported FR Y-9C ratios.

Notes: Differences are the SLR calculated from FR Y-9C inputs minus the reported SLR, in percentage points. Observations are bank-quarters. The final row compares the proxy with reported SLRs in 2018:Q1–2019:Q4 after estimating calibration factors using 2016:Q3–2017:Q4 observations. SLR denotes the Supplementary Leverage Ratio. Calibration multiplies constructed leverage exposure by a bank-specific factor fitted to reported exposure; the final row uses a separate held-out period.

Comparison with earnings calls. Table 13 compares calibrated FR Y-9C proxies with final-rule earnings-call disclosures on the transitional capital basis. The table reports differences before and after the reporting-break adjustments, but before rescaling Goldman Sachs and Morgan Stanley to their earnings-call disclosures. Their earnings-call observations subsequently enter calibration through the factors in Table 14.

Rescaling to earnings-call disclosures. The factor equals the transitional-basis earnings-call SLR divided by the calibrated FR Y-9C proxy. Multiplying the proxy by this factor matches the adjusted earnings-call disclosure in the listed quarter.

Bank	Before splice			After splice			Quarters	Rescaled to calls
	2014:Q3–Q4	2015	2016:Q1–Q2	2014:Q3–Q4	2015	2016:Q1–Q2		
BNY Mellon	0.19	0.11	0.11	0.11	0.11	0.11	8	No
Citigroup	0.38	0.09	0.01	0.01	0.09	0.01	8	No
Goldman Sachs	0.46	0.36	0.09	0.32	0.36	0.09	8	Yes
JPMorgan Chase	0.20	0.06	-0.04	-0.02	0.06	-0.04	8	No
Morgan Stanley	0.92	0.91	0.14	0.75	0.43	0.14	8	Yes
Northern Trust		0.03	0.10		0.03	0.10	6	No
State Street	0.06			0.08			2	No

Table 13: Proxy minus earnings-call SLR before rescaling to earnings-call disclosures (percentage points).

Notes: Cells report the mean FR Y-9C SLR proxy minus the SLR disclosed in earnings calls, in percentage points, within the indicated periods. Blank cells indicate no usable comparison. “Before splice” and “After splice” refer to the derivatives and off-balance-sheet reporting-break adjustments. Both proxies use the 2016:Q3–2019:Q4 exposure calibration. Sources: FR Y-9C and banks’ quarterly earnings-call disclosures. SLR denotes the Supplementary Leverage Ratio.

Bank	Quarter	Earnings-call SLR (%)	Adjusted earnings-call SLR (%)	FR Y-9C proxy (%)	Factor
Morgan Stanley	2014:Q3	4.9	5.18	6.09	0.850
	2014:Q4	5.0	5.28	5.88	0.898
	2015:Q1	5.1	5.31	5.78	0.919
	2015:Q2	5.3	5.51	5.94	0.927
	2015:Q3	5.5	5.71	6.13	0.931
	2015:Q4	5.8	6.01	6.41	0.938
	2016:Q1	6.0	6.14	6.28	0.977
	2016:Q2	6.1	6.24	6.38	0.977
Goldman Sachs	2014:Q3	4.9	5.03	5.40	0.931
	2014:Q4	5.0	5.13	5.40	0.950
	2015:Q1	5.3	5.40	5.93	0.910
	2015:Q2	5.7	5.80	6.14	0.944
	2015:Q3	5.8	5.90	6.15	0.959
	2015:Q4	5.9	6.00	6.29	0.953
	2016:Q1	6.0	6.06	6.22	0.975
	2016:Q2	6.1	6.16	6.18	0.997

Table 14: Earnings-call inputs and rescaling factors for Morgan Stanley and Goldman Sachs.

Notes: SLRs are percentages. “earnings-call SLR” is the disclosed ratio; “Adjusted earnings-call SLR” incorporates the estimated capital phase-in adjustment. “FR Y-9C proxy” is calibrated to reported ratios and adjusted for reporting breaks, before rescaling to earnings-call disclosures. Sources: FR Y-9C and quarterly earnings-call disclosures, 2014:Q3–2016:Q2. SLR denotes the Supplementary Leverage Ratio. The rescaling factor is the adjusted earnings-call SLR divided by the FR Y-9C proxy.

D Adjustment costs

D.1 Adjustment costs and long-run portfolio responses

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Portfolio adjustment costs can delay banks' responses to required equity without changing their long-run portfolio choices. Let $\mathbf{s}_{bt}$ collect bank b 's asset shares and let $G_b(\mathbf{s}_{bt} - \mathbf{s}_{b,t-1})$ be the cost of changing those shares, per dollar of total assets. Assume G_b is convex and continuously differentiable, with $G_b(\mathbf{0}) = 0$ and $\nabla G_b(\mathbf{0}) = \mathbf{0}$. These conditions allow adjustment costs to differ across assets and to depend jointly on their share changes, without specifying a quadratic or other parametric form.

The bank maximizes the discounted sum of the period profits in Section 2, less G_b , subject to the same capital constraints and a fixed portfolio total in each period. Let $0 < \rho < 1$ be its discount factor, and write $G_{b,a}$ for the partial derivative with respect to asset a 's share change. At an interior optimum with one binding capital rule, the asset-share first-order condition is

$$r_{abt} - C'_{ab}(s_{abt}) - c_E k_{abt}^{Bind} - \eta_{bt} = G_{b,a}(\Delta \mathbf{s}_{bt}) - \rho \mathbb{E}_t[G_{b,a}(\Delta \mathbf{s}_{b,t+1})]. \quad (6)$$

Increasing the current share incurs a marginal adjustment cost today and reduces the change needed to reach a given share next period. The right-hand side records these two effects.

Consider an unanticipated, permanent change in capital requirements from an initial stationary portfolio, holding asset returns and total portfolio size fixed. Suppose the optimal portfolio converges to an interior stationary portfolio and the expected marginal adjustment cost converges to zero. Continuity of ∇G_b and $\nabla G_b(\mathbf{0}) = \mathbf{0}$ imply that the right-hand side of equation (6) vanishes as adjustment ends. The limiting first-order condition is therefore the static condition used in Proposition 1. Linearizing marginal supply costs around the initial portfolio gives the long-run response

$$\Delta s_{ab}^{LR} \approx -c_E \tau_a \left(\Delta k_{ab}^{Bind} - \frac{\sum_j \tau_j \Delta k_{jb}^{Bind}}{\sum_j \tau_j} \right).$$

Thus, a local projection at a horizon when adjustment is substantially complete recovers the static supply response without specifying the shape of adjustment costs. At shorter horizons, its coefficient also reflects the marginal adjustment costs in equation (6). The dynamic estimates indicate whether the response has stabilized over the horizons pooled for estimation.

E Asset supply estimation

E.1 Equity funding cost calibration

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Table 15 summarizes the literature used to calibrate c_E . The assumed funding premium of $c_E = 0.05$ implies 5 basis points of additional funding cost per percentage point of required equity. Published loan-rate estimates range from 2.5 to 13 basis points and differ in assumptions about Modigliani–Miller offsets, taxes, and pass-through to loan rates. Loan-rate effects equal funding-cost effects under full pass-through; the estimates therefore provide calibration evidence rather than estimates of an identical parameter across studies.

Source	Loan-rate increase (basis points per pp of capital)	Assumptions
Kashyap et al. (2010)	2.5–4.5	Partial Modigliani–Miller offset; tax wedge
This paper ($c_E = 0.05$)	5	Funding cost before pass-through to loan rates
Miles et al. (2013)	≈ 5.5	45% Modigliani–Miller offset
Firestone et al. (2017)	3.9–7.8	50%–100% pass-through to loan rates
Brooke et al. (2015)	5–10	$\approx 53\%$ Modigliani–Miller offset
BCBS (2010)	13	No Modigliani–Miller offset

Table 15: Published estimates used to calibrate the equity funding premium.

Notes: The assumed equity funding premium $c_E = 0.05$ implies 5 basis points of additional funding cost per percentage point of required equity. Loan-rate effects equal funding-cost effects under full pass-through; estimates differ in assumptions about taxes, Modigliani–Miller offsets, and pass-through.

E.2 Alternative asset-pooling specifications

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The substitution-corrected estimates in Table 16 use three alternative restrictions on the asset-specific response coefficients β_a . Since $\tau_a = -\beta_a/c_E$, each restriction also applies to the supply elasticities.

Pooling securities only. The specification used in the main results assigns a common coefficient to RW0 and RW0.2 assets and estimates separate coefficients for RW0.5 and RW1 assets:

$$\beta_{\text{RW } 0} = \beta_{\text{RW } 0.2} = \beta_L, \quad \beta_{\text{RW } 0.5} = \beta_M, \quad \beta_{\text{RW } 1} = \beta_H.$$

The three estimated coefficients correspond to securities, first-lien mortgages, and RW1 assets, respectively.

Pooling securities and pooling loans. The two-coefficient specification retains the common coefficient for RW0 and RW0.2 assets and also assigns a common coefficient to RW0.5 and RW1 assets:

$$\beta_{\text{RW } 0} = \beta_{\text{RW } 0.2} = \beta_L, \quad \beta_{\text{RW } 0.5} = \beta_{\text{RW } 1} = \beta_H.$$

Linear in risk weight. The linear specification estimates an intercept and a slope relating the response coefficient to the asset's risk weight w_a :

$$\beta_a = \beta_0 + \beta_1 w_a.$$

I report the converged solution with the lowest residual sum of squares among solutions with a positive sum of supply elasticities. Table 16 compares supply elasticities under these three restrictions with estimates that omit the portfolio-substitution correction and allow a separate coefficient for each risk-weight category.

	No substitution correction	Pooled RW 0/0.2	Pooled RW 0/0.2 and RW 0.5/1	Linear $\beta_0 + \beta_1 RW$
RW 0	15.46** (7.06)	28.45** (11.71)	29.31** (11.98)	23.87*** (8.11)
RW 0.2	7.76 (6.79)	28.45** (11.71)	29.31** (11.98)	20.03*** (6.50)
RW 0.5	-10.89 (13.89)	11.10* (5.73)	5.57** (2.44)	14.28*** (4.26)
RW 1	3.53 (4.06)	4.58* (2.57)	5.57** (2.44)	4.69* (2.73)
N. Banks	28	28	28	28
N. Quarters	42	42	42	42
SE clustering	Bank	Bank	Bank	Bank
Adjusted R^2	0.1257	0.1256	0.1256	0.1257
Adjusted within R^2	0.0023	0.0022	0.0022	0.0023
Bank-date FE	Yes	Yes	Yes	Yes
Asset-date-horizon FE	Yes	Yes	Yes	Yes

Bank-clustered SEs in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$.

Horizons 16–20. $\tau = -\beta/0.05$.

Table 16: Supply elasticities under alternative asset-pooling specifications.

Notes: RW denotes risk weight. The three-group specification imposes a common supply elasticity for RW0 and RW0.2 and separate elasticities for RW0.5 and RW1; the two-group specification also imposes a common elasticity for RW0.5 and RW1. The linear alternative restricts elasticity to be linear in RW. Elasticities equal $-\hat{\beta}_a/c_E$, with $c_E = 0.05$.

Null hypothesis	Baseline p -value
All three elasticities are equal	0.116
Securities = mortgages	0.193
Securities = RW1 loans	0.065
Mortgages = RW1 loans	0.243

Table 17: Tests of equality of asset supply elasticities.

Notes: Tests use the baseline substitution-corrected specification, which pools RW0 and RW0.2 securities and estimates separate elasticities for RW0.5 mortgages and RW1 loans. RW denotes risk weight. Estimates pool horizons 16–20 and include bank-date and asset-date-horizon fixed effects. The joint test imposes equality of all three elasticities; each pairwise test imposes equality of the two named elasticities. Tests use bank-clustered inference with 28 banks. Pairwise p -values are unadjusted for multiple testing. None of the tests rejects equality at the 5% level; securities versus RW1 loans rejects at the 10% level.

E.3 Predicted and observed substitution-correction signs

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The predicted correction signs use the covariance between changes in an asset’s required equity and the modeled substitution response, after removing the baseline regression controls and the other asset-specific requirement regressors. Positive covariance implies that omitting substitution shifts the required-equity coefficient upward. Binding-rule switches account for most of this covariance in every category. The prediction below sets substitution shocks outside binding-rule switches to zero before removing the controls. Observed changes compare the three-group estimates with estimates that omit substitution and therefore also reflect the common-elasticity restriction on RW0 and RW0.2.

RW	$\Delta k_a^{Bind} - \overline{\Delta k}^{Bind}$	$(\tau_a - \bar{\tau})\Delta \bar{k}^\tau$	Sign of sub. correction to τ_a
0	+	+	↑
0.2	+	+	↑
0.5	—	—	↑
1	—	—	↑

Table 18: Predicted and observed changes in required-equity response coefficients after correcting for portfolio substitution.

Notes: $\widehat{\Delta\beta}$ is the portfolio-share response coefficient estimated with portfolio-substitution correction minus the coefficient estimated without the correction. Downward arrows predict that the correction reduces the coefficient; check marks indicate agreement with the estimated change. Rule flips are switches between binding RBC and SLR requirements. Corrected estimates impose a common supply elasticity for risk weights 0 and 0.2. Coefficients measure percentage points of portfolio share per percentage-point increase in required equity and pool quarters 16–20. The comparison also reflects the common-elasticity restriction on risk weights 0 and 0.2.

E.4 Long-run portfolio-share response coefficients

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Table 19 reports the portfolio-share response coefficients $\hat{\beta}_a$. Its no-substitution-correction and three-group columns correspond to Figure 5. Table 16 reports the implied supply elasticities $\hat{\tau}_a = -\hat{\beta}_a/c_E$.

	Portfolio-share change (pp.)			
	No substitution correction	Pooled RW 0/0.2	Pooled RW 0/0.2 and RW 0.5/1	Linear $\beta_0 + \beta_1 RW$
Equity requirement k^{Bind} (pp.)	–	–	–	–1.194*** (0.405)
Equity requirement k^{Bind} (pp.) $\times$ RW	–	–	–	0.959** (0.429)
Equity requirement k^{Bind} (pp.), RW 0	–0.773** (0.353)	–1.422** (0.586)	–1.465** (0.599)	
Equity requirement k^{Bind} (pp.), RW 0.2	–0.388 (0.339)	–1.422** (0.586)	–1.465** (0.599)	
Equity requirement k^{Bind} (pp.), RW 0.5	0.545 (0.695)	–0.555* (0.286)	–0.279** (0.122)	
Equity requirement k^{Bind} (pp.), RW 1	–0.176 (0.203)	–0.229* (0.128)	–0.279** (0.122)	
N. Banks	28	28	28	28
N. Quarters	42	42	42	42
SE clustering	Bank	Bank	Bank	Bank
Adjusted R^2	0.1257	0.1256	0.1256	0.1257
Adjusted within R^2	0.0023	0.0022	0.0022	0.0023
Bank–date FE	Yes	Yes	Yes	Yes
Asset–date–horizon FE	Yes	Yes	Yes	Yes

Portfolio-share change: $s_{ab,t+h} - s_{ab,t}$, horizons $h = 16$ –20.

Bank-clustered SEs in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$.

Linear column: estimated intercept and slope in $\beta_a = \beta^{(0)} + \beta^{(1)}RW_a$.

Table 19: Long-run portfolio-share response coefficients ($\hat{\beta}_a$) under alternative asset-pooling specifications.

Notes: Estimates pool responses 16–20 quarters after a change in required equity. RW denotes risk weight. The three-group specification imposes a common supply elasticity for RW0 and RW0.2 and separate elasticities for RW0.5 and RW1. The two-group specification also imposes a common elasticity for RW0.5 and RW1. The linear specification restricts elasticity to be linear in RW. The no-correction specification omits portfolio substitution from the regression. Coefficients measure percentage points of portfolio share per percentage-point increase in required equity.

E.5 Substitution into assets outside the four categories

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The four asset categories do not exhaust the banking-book denominator. The baseline substitution correction treats the remaining assets as having a zero supply response. Table 20 checks whether the estimated elasticities depend on this restriction by adding those remaining

assets as a fifth category, the outside good, and estimating its supply elasticity. All columns retain the baseline holdings in the four categories and the same banking-book denominator, including its exclusion of reserves and vault cash. The four categories and the outside good therefore exhaust that denominator.

The first column reports the baseline. The two outside-good specifications measure a proxy for the outside good’s average risk weight from FR Y-9C Schedule HC-R and allow its portfolio share to respond to regulatory costs. Both divide outside risk-weighted assets by outside holdings, measure this weight before the regulatory-change quarter, and hold it fixed when computing the change in required equity under the bank’s binding rule. The substitution correction then includes the estimated outside elasticity. Treating the heterogeneous outside assets as one category remains an aggregation assumption: their average risk weight need not capture differences in supply responses across those assets.

Outside risk weight from asset components. I divide outside holdings into loans, securities, and cash balances. For omitted loans, I use the ratio of reported risk-weighted assets to carrying values in HC-R’s two ordinary “all other loans” rows as a proxy for their average risk weight. For omitted securities, I subtract the estimated risk-weighted assets of the included securities from reported securities risk-weighted assets, including separately reported securitizations when available. The remaining cash balances use HC-R cash risk-weight allocations. Before 2015, I apply each bank’s median component risk weights over 2015:Q4–2017:Q4 to its earlier component holdings, requiring at least four valid calibration quarters. This permits earlier composition changes but assumes that the component risk weights can be carried backward across the reporting change. From 2015 onward, I use the available lagged measurements directly.

Outside risk weight from reported RWA residual. I instead measure outside-loan risk-weighted assets by subtracting the estimated risk-weighted assets of the included loans from total reconstructed loan risk-weighted assets. Securities and cash follow the same approach as in the asset-component specification. This specification uses the available HC-R measurements in each reporting regime rather than carrying later component weights backward. It relies more directly on the accuracy of the included-loan mapping and on the coverage of earlier HC-R reports. Observations with negative loan or securities residuals are excluded. Both checks retain approximations in the securities mapping and, where necessary, the allocation of jointly reported securitization risk-weighted assets.

The estimates for the four asset categories remain close to the baseline re-estimated on the same observations in Panel B. The outside elasticities are positive but imprecisely estimated. The samples differ because the checks require usable outside-asset measurements. Relative to the baseline, the asset-component specification excludes SVB Financial Group,

KeyCorp, and Huntington; the reported-RWA-residual specification excludes SVB Financial Group and KeyCorp. The securities residuals exclude the first two banks, while Huntington lacks enough valid calibration quarters for the backward bridge and has no usable later observations in the asset-component specification.

	Baseline: fixed outside good	Outside RW from asset components	Outside RW from reported RWA residual
<i>A. Supply elasticities</i>			
RW0 and RW0.2	28.45** (11.71)	28.00** (13.07)	29.92** (13.00)
RW0.5	11.10* (5.73)	11.06* (6.41)	11.56* (6.17)
RW1	4.58* (2.57)	5.86** (2.34)	4.95** (2.20)
Outside good	0 (fixed)	2.09 (7.41)	7.80 (12.40)
Bank-quarter-horizon observations	4,399	3,656	3,468
Banks	28	25	26
<i>B. Baseline on each column's sample</i>			
RW0 and RW0.2	28.45** (11.71)	27.88** (12.86)	31.19** (12.52)
RW0.5	11.10* (5.73)	11.63* (6.75)	11.93* (6.09)
RW1	4.58* (2.57)	6.01** (2.69)	5.21** (2.47)

Table 20: Supply elasticities allowing substitution into the outside good.

Notes: RW denotes risk weight; RWA denotes risk-weighted assets. The outside good comprises banking-book assets outside the four modeled risk-weight categories. All columns use the banking-book denominator, pool horizons 16–20, impose a common elasticity for RW0 and RW0.2, and include bank-date and asset-date-horizon fixed effects. Panel A fixes the outside elasticity at zero in the baseline and estimates it in the two outside-good specifications. Panel B re-estimates the original baseline on each column's sample. Observations count bank-quarter-horizon combinations, before stacking asset categories. Standard errors clustered by bank are reported in parentheses below estimates; inference treats the measured risk-weight proxies and equity funding premium as fixed. *, **, and *** denote significance at the 10%, 5%, and 1% levels.

E.6 Pre-period portfolio-share responses

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The figure extends the dynamic-response window into the pre-period. These coefficients are diagnostics of pre-period responses, not proof of the identifying assumption.

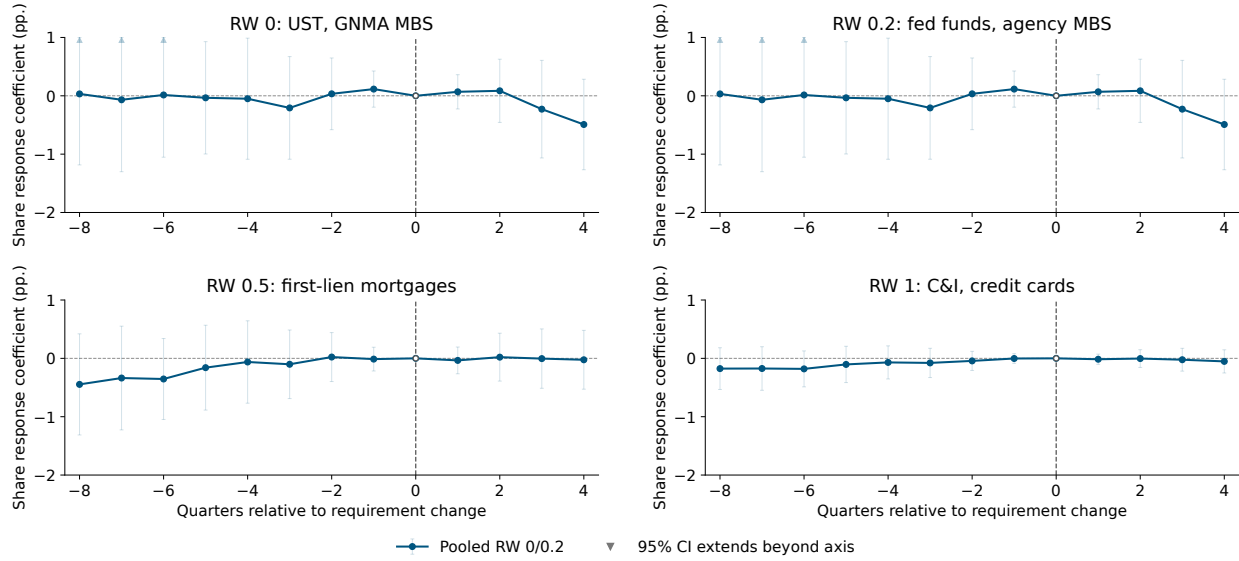


Figure 22: Pre-period portfolio-share responses under discrete binding rules.

Notes: Points show portfolio-share response coefficients in each risk-weight category before and after a change in required equity. The substitution-corrected specification pools elasticities for risk weights 0 and 0.2. The horizontal axis measures quarters relative to the requirement change; negative values precede the change. Coefficients measure percentage points of portfolio share per percentage-point increase in required equity. Error bars show 95% confidence intervals clustered by bank; triangles mark intervals extending beyond the axis.

E.7 Lagged asset shares and other required-equity changes

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The first check adds four lags of the asset's own portfolio share, at $t - 1$ through $t - 4$, with asset-specific coefficients. Both columns use the sample with all four lagged shares available, separating the effect of the controls from the change in sample. The second check

Asset	No lagged-share controls	Four lagged-share controls
RW0/RW0.2	25.99** (11.64)	18.10 (11.16)
RW0.5	12.38* (6.48)	10.19 (6.29)
RW1	5.05* (2.64)	4.39 (2.66)

Table 21: Substitution-corrected supply elasticities with lagged portfolio-share controls.

Notes: This table compares estimates with and without four lags of the asset's own portfolio share. Lag coefficients vary by asset. Both columns use the sample with all four lagged shares available. The substitution correction pools elasticities for risk weights 0 and 0.2. Standard errors clustered by bank are in parentheses. Stars denote two-sided bank-clustered tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

controls for other changes in required equity: leads from $t + 1$ through $t + h$ and lags from $t - L$ through $t - 1$, with $L = 4, 8$, or 16 . These are controls for regulatory changes, not leads of asset shares. The table also reports specifications with eight lags alone and with leads alone. All columns use the three-group specification.

	No policy controls	No leads 8 lags	Lead window 16–20q No lags	Lead window 16–20q 4 lags	Lead window 16–20q 8 lags	Lead window 16–20q 16 lags
RW 0 / 0.2	28.45** (11.71)	25.36* (12.91)	43.77** (20.51)	48.35** (21.28)	45.89* (23.74)	42.71 (28.81)
RW 0.5	11.10* (5.73)	11.57* (6.02)	13.11* (7.12)	14.76** (7.16)	14.32* (7.39)	19.06* (10.43)
RW 1	4.58* (2.57)	7.11** (2.92)	5.83* (3.04)	7.39** (3.26)	8.88** (3.58)	11.05*** (3.95)
Bank clusters	28	28	28	28	28	26
Observations	17596	16660	17596	17072	16660	16116

Table 22: Substitution-corrected supply elasticities controlling for leads and lags of required-equity changes.

Notes: This table adds required-equity changes from $t + 1$ through $t + h$ and from $t - L$ through $t - 1$, where h is the response horizon and L is the number of lags. Columns vary these controls; all account for portfolio substitution and impose a common supply elasticity for risk weights 0 and 0.2. Standard errors clustered by bank are in parentheses. Stars denote two-sided bank-clustered tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E.8 Sensitivity to the equity funding premium

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Figure 23 reports implied supply elasticities over alternative values of c_E . A larger equity funding premium implies a smaller supply elasticity for a given estimated portfolio-share response, since $\hat{\tau}_a = -\hat{\beta}_a/c_E$.

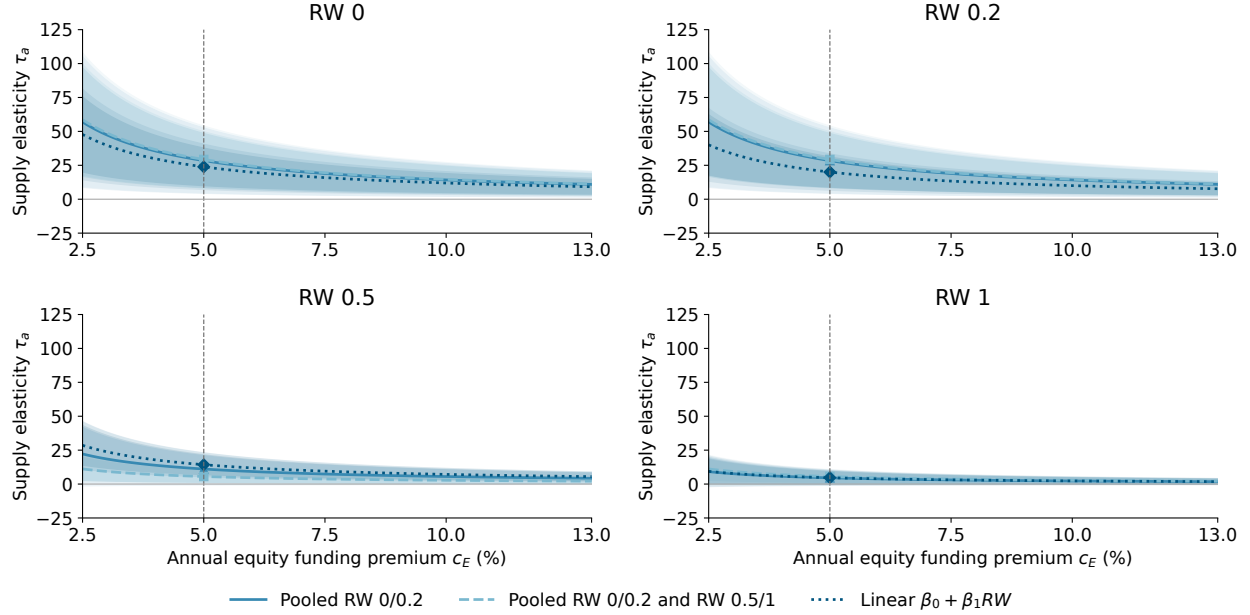


Figure 23: Long-run supply elasticities under alternative equity funding premia.

Notes: This figure reports $\hat{\tau}_a = -\hat{\beta}_a/c_E$ across alternative equity funding premia c_E . The horizontal axis expresses the equity funding premium c_E in percent; the baseline value is 5%. RW denotes risk weight. The three-group curves impose a common supply elasticity for RW0 and RW0.2 and separate elasticities for RW0.5 and RW1; the two-group curves also impose a common elasticity for RW0.5 and RW1. The linear curves restrict elasticity to be linear in risk weight. Shaded bands show 90% and 95% confidence intervals clustered by bank, conditional on c_E .

E.9 Dynamic responses to Stress Capital Buffer changes

Portfolio-share responses. Figure 24 plots dynamic portfolio-share responses estimated using the held-out SCB changes. I use the same portfolio-substitution correction as in the baseline estimation. To compare long-run responses, I pool the available observations over quarters 16–20, with bank–date and asset–date–horizon fixed effects. Outcomes through 2025:Q4 provide horizons 16–20 for the 2020 event and horizon 16 for the 2021 event. Later SCB changes do not provide the required long-run follow-up. For RW1 assets, the response coefficient is positive in quarters 16–17 and negative in quarters 18–20. The pooled estimate therefore averages across a reversal in the response.

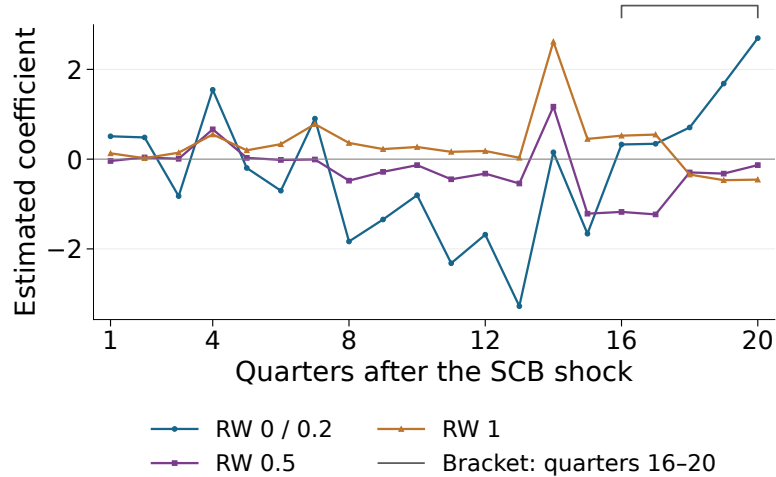


Figure 24: Portfolio-share responses to Stress Capital Buffer changes.

Notes: Lines show portfolio-share response coefficients estimated from Stress Capital Buffer (SCB) changes, by risk weight (RW). Coefficients measure percentage points of portfolio share per percentage-point increase in required equity net of the elasticity-weighted average change in required equity across the bank's assets. RW0 and RW0.2 share a coefficient. The bracket marks quarters 16–20, pooled for the long-run estimates. The SCB changes occur in 2020:Q4 and 2021:Q4. Portfolio shares exclude trading assets, reserves, and vault cash from the denominator.

E.10 Pandemic SLR exemption events

Tables 23 and 24 compare estimates including and excluding the introduction and expiration of the temporary SLR exemption, in 2020:Q2 and 2021:Q2. The exclusion removes these quarters as requirement-change dates; it retains other dates and their subsequent outcomes. Both tables report the three-group, two-group, linear, and no-substitution-correction specifications. The substitution-corrected elasticities remain positive in every asset category and are larger when the exemption events are excluded.

Asset	Three groups		Two groups		Linear		No substitution correction	
	Include	Exclude	Include	Exclude	Include	Exclude	Include	Exclude
RW 0	28.4** (11.7)	39.7** (18.8)	29.3** (12.0)	41.2** (19.1)	23.9*** (8.1)	33.8** (13.3)	15.5** (7.1)	18.9** (9.1)
RW 0.2	28.4** (11.7)	39.7** (18.8)	29.3** (12.0)	41.2** (19.1)	20.0*** (6.5)	28.2** (10.9)	7.8 (6.8)	11.8 (8.5)
RW 0.5	11.1* (5.7)	16.3* (9.5)	5.6** (2.4)	7.2* (3.7)	14.3*** (4.3)	19.7** (7.4)	−10.9 (13.9)	−3.7 (14.9)
RW 1	4.6* (2.6)	5.6 (3.6)	5.6** (2.4)	7.2* (3.7)	4.7* (2.7)	5.7 (3.8)	3.5 (4.1)	3.9 (6.2)

Table 23: Supply elasticities with and without pandemic SLR exemption events: discrete binding rules.

Notes: Estimates pool quarters 16–20. Include retains 2020:Q2 and 2021:Q2 as requirement-change dates; Exclude removes those two dates. Outcomes are retained. All specifications exclude reserves and vault cash. Three groups pools RW0 and RW0.2; two groups also pools RW0.5 and RW1; linear restricts elasticity to be linear in risk weight. The last specification omits substitution correction. Parentheses report standard errors clustered by bank. RW denotes risk weight. Stars denote two-sided bank-clustered tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Asset	Three groups		Two groups		Linear		No substitution correction	
	Include	Exclude	Include	Exclude	Include	Exclude	Include	Exclude
RW 0	45.4** (22.1)	65.0* (32.6)	46.7** (22.6)	66.9* (33.3)	34.8* (17.1)	49.1* (25.3)	19.2* (9.5)	22.2* (11.9)
RW 0.2	45.4** (22.1)	65.0* (32.6)	46.7** (22.6)	66.9* (33.3)	28.8* (14.1)	40.8* (20.8)	8.0 (8.7)	12.3 (10.7)
RW 0.5	14.0 (10.2)	20.4 (14.5)	6.6 (4.6)	9.9 (5.9)	19.9* (9.8)	28.4* (14.3)	−3.4 (14.4)	0.6 (16.4)
RW 1	5.0 (4.1)	7.7 (5.4)	6.6 (4.6)	9.9 (5.9)	4.9 (4.2)	7.7 (5.6)	3.4 (5.2)	10.3 (11.5)

Table 24: Supply elasticities with and without pandemic SLR exemption events: continuous rule weights.

Notes: Estimates pool quarters 16–20. Include retains 2020:Q2 and 2021:Q2 as requirement-change dates; Exclude removes those two dates. Outcomes are retained. All specifications exclude reserves and vault cash. Three groups pools RW0 and RW0.2; two groups also pools RW0.5 and RW1; linear restricts elasticity to be linear in risk weight. The last specification omits substitution correction. Parentheses report standard errors clustered by bank. RW denotes risk weight. Continuous weights and their sensitivity to capital buffers are reestimated for each substitution-corrected specification and event sample. Stars denote two-sided bank-clustered tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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