

The Safe-Debt Laffer Curve

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Abstract

I study the long-run effects of public debt on net safe-asset supply. I construct a quarterly measure of marginal Treasury absorption cost that includes the premium on new debt and the cost of repricing the outstanding stock. Combining cash-Treasury and real-duration premia with estimates of their responses to supply, I estimate that this cost rose from 78 to 204 basis points between 2015Q1 and 2026Q2. In the model, absorption payments increase high-net-worth recipients' demand for safe assets when consumption out of their capitalized value falls short of the payments themselves. As debt expands relative to financial capacity, this induced demand can exceed new issuance, producing a safe-debt Laffer curve. In an illustrative household calculation, the estimated cost increase reduces the marginal net contribution of issuance from 69 to 18 cents per dollar.

JEL Codes: E43, E44, E52, E62, H63, G12, G23.

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1 Introduction

Safe public debt can alleviate safe-asset shortages and support aggregate demand (Caballero and Farhi, 2018). I study how this effectiveness declines as public debt expands relative to financial capacity. When the financial system requires compensation for supporting the stock of public debt, the households receiving these payments save part of them. Issuance therefore creates both safe assets and demand for them. As absorption costs rise, each additional dollar of debt contributes less to net safe-asset supply. At sufficiently high debt, this contribution can become negative, giving net supply the rise-and-fall pattern of a Laffer curve.

An additional dollar of debt requires compensation for the new claim and raises the compensation paid on the outstanding stock. I call the resulting increase in steady-state annual payments the marginal absorption cost. Because issuance reprices the existing stock, this cost can be substantial even when the premium on the new claim is small. The Treasury's all-in funding rate equals the safe return on households' financial wealth plus the absorption premium, defined as the annual absorption payment per dollar of debt.

I construct a quarterly measure of marginal Treasury absorption cost by combining cash-Treasury and real-duration premia with estimates of their responses to Treasury supply outside the Federal Reserve. I interpret Treasury-swap spreads as cash financing and warehousing compensation net of convenience, and use estimates of the real term premium for duration compensation. I estimate the cash-supply response from changes in Federal Reserve holdings across maturity buckets, allowing it to vary with dealer-parent financial capacity. I estimate the duration response from purchase and runoff announcements. Applying these responses to the stock held outside the Federal Reserve captures the additional annual payment associated with repricing existing debt.

Marginal Treasury absorption cost rose from approximately 78 to 204 basis points between 2015Q1 and 2026Q2, an increase of 126 basis points. Figure 1 reports its quarterly evolution and the contributions of the cash-Treasury and real-duration components.

To relate these costs to net safe-asset supply, I develop a stationary perpetual-youth endowment economy with two household groups. Both consume out of financial wealth and lifetime income and hold safe government debt. The financial system's compensation accrues to the high-net-worth group, whose low marginal propensity to consume out of wealth generates a large increase in desired safe holdings per dollar of additional annual income. I compare stationary equilibria with different debt stocks; in each equilibrium, the safe rate equates desired holdings with the outstanding stock.

On the financial side, institutions commit to rolling over debt without knowing how much capacity other institutions will supply. They require compensation for the risk that rollover needs exceed available capacity, with larger potential shortfalls requiring more compensation. Longer

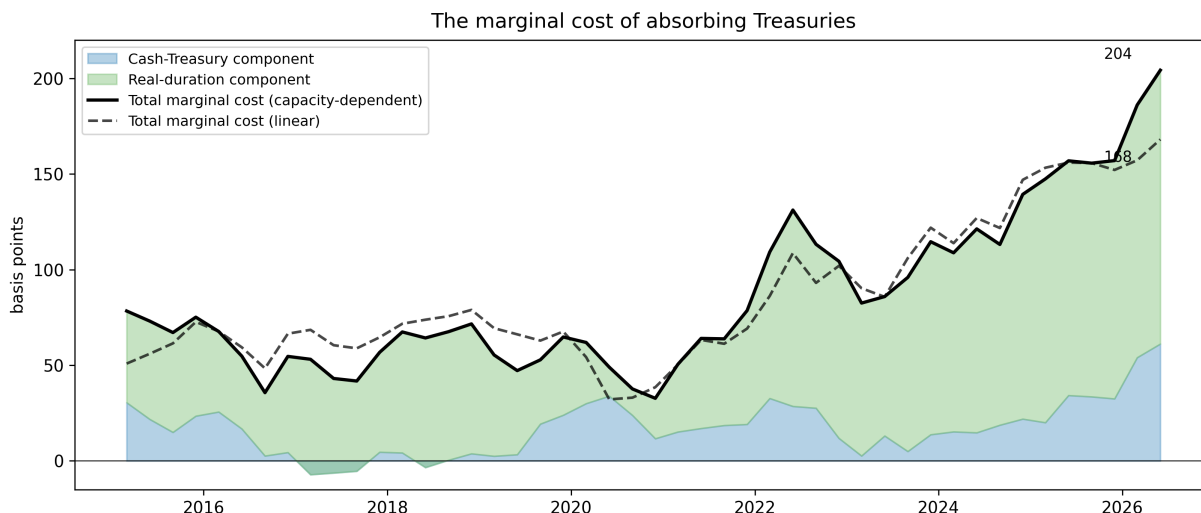


Figure 1: Marginal Treasury absorption cost. The solid line allows the cash-supply response to vary with dealer-parent capacity; the dashed line uses the constant cash-supply response estimated from the sample beginning in 2015. Both series end in 2026Q2. Shading separates the cash-Treasury component, the cash premium plus its stock-repricing term, from the real-duration component, the real term premium plus its stock-repricing term. Entries are annualized basis points. Section 2 describes the construction.

maturity reduces rollover needs but increases bond-price sensitivity to changes in yields. Institutions reserve additional capital against this price exposure, adding a duration premium.

I define net safe-asset supply as the debt stock less the desired holdings induced by absorption income; in equilibrium, this balance equals the holdings generated by households' endowment income. Another dollar of debt contributes to net supply when its absorption payments generate less than a dollar of desired holdings. At the Laffer peak, these holdings absorb the marginal dollar in full, so the marginal net contribution is zero and equilibrium net safe-asset supply reaches its maximum.

The market-clearing safe rate reaches its maximum at the same debt stock as net safe-asset supply. Greater financial capacity raises the maximum net safe-asset supply attainable through public debt by reducing the payments required at a given debt stock and the associated demand for safe holdings.

In an illustrative calculation with an annual marginal propensity to consume (MPC) out of wealth of 2 percent for high-net-worth recipients, the estimated 2015Q1–2026Q2 increase in marginal absorption cost reduces the marginal net contribution of issuance from approximately 69 to 18 cents per dollar.

The saving out of absorption payments that offsets new safe-asset supply also has an aggregate-demand interpretation (Caballero and Farhi, 2018). Additional debt raises private wealth and

consumption, while its debt service and absorption payments require lower government purchases. Recipients consume part of the additional absorption income, partially offsetting the associated fiscal contraction. At sufficiently high debt, the contraction exceeds the consumption generated by additional wealth and income. A lower safe rate restores goods-market clearing, just as it reduces desired holdings to clear the asset market.

Literature Review. In *The Safety Trap*, [Caballero and Farhi \(2018\)](#) show how issuing safe public debt can alleviate safe-asset shortages and support economic activity. [Caballero, Farhi, and Gourinchas \(2008, 2016, 2017, 2021\)](#) study how safe-asset scarcity depresses safe rates and contributes to global imbalances and recessions. Related work studies Treasury safety and liquidity premia ([Krishnamurthy and Vissing-Jorgensen, 2012](#)), the supply and maturity of short safe claims ([Greenwood, Hanson, and Stein, 2015](#); [D'Avernas and Vandeweyer, 2024](#)), and reserve-currency supply under limited intermediary capacity ([Maggiori, 2017](#); [Farhi and Maggiori, 2018](#)). [Itskhoki and Mukhin \(2026\)](#) examine global asset supply and demand, and [Jiang, Krishnamurthy, Lustig, and Richmond \(2026\)](#) study the macroeconomic consequences of declining reserve-currency demand. [Brunnermeier, Merkel, and Sannikov \(2024\)](#) derive debt-capacity limits from the fiscal value of convenience yields. Here, scarce financial capacity generates payments in excess of safe-rate debt service. Saving out of these payments creates demand for safe assets that can exceed the additional supply.

In convenience-yield models, safety and liquidity services enter preferences or constraints, generating downward-sloping Treasury demand and a convenience yield that falls with supply ([Krishnamurthy and Vissing-Jorgensen, 2012](#)). In fiscal applications, dilution of the premium on outstanding debt can produce an interior revenue or debt-capacity peak ([Brunnermeier, Merkel, and Sannikov, 2024](#); [Mian, Straub, and Sufi, 2025](#); [Li and Merkel, 2026](#)). The peak studied here concerns debt net of the safe holdings induced by absorption income. Convenience dilution also enters my marginal absorption cost through the loss of services on the outstanding stock. Rising balance-sheet costs add a second source of stock repricing. The mechanism is related to models in which a shortage of stores of value leads to low real rates, high valuations, bubbles, and macroeconomic fragility ([Caballero, 2006, 2015](#)). [Auclert, Malmberg, Rognlie, and Straub \(2025\)](#) connect asset supply, U.S. wealth, real rates, and fiscal sustainability.

On the demand side, [Barro \(1974\)](#) provides the Ricardian benchmark, while [Blanchard \(1985\)](#) and [Weil \(1989\)](#) show how finite horizons shape private wealth demand. [Straub \(2019\)](#) uses non-homothetic preferences to explain why permanently richer households save a larger fraction of income. The aggregate-demand interpretation connects to [Mian, Straub, and Sufi \(2021\)](#), who link payments to high savers to lower aggregate demand and interest rates, including when public debt is financed through lower government spending. Their intermediation extension also assigns spread income to savers. In this paper, absorption payments rise with debt relative to financial capacity,

and additional issuance raises the payments on outstanding debt. [Mian, Straub, and Sufi \(2025\)](#) further connect saving behavior, public debt, and low rates. Work on self-financing fiscal expansions ([Angeletos, Lian, and Wolf, 2024](#)), feedback among debt, distortions, and productivity ([Fornaro and Wolf, 2025](#)), and expansionary fiscal adjustment ([Giavazzi and Pagano, 1990](#); [Alesina and Perotti, 1997](#)) studies other channels through which fiscal policy affects aggregate demand.

[Caballero \(2010\)](#) emphasizes the financial system’s role in accommodating demand for safe assets. [Du, Hébert, and Li \(2023\)](#) show how dealer balance-sheet and financing costs shape Treasury yields, while [He, Nagel, and Song \(2022\)](#) connect the March 2020 Treasury inconvenience yield to supply pressure on constrained dealer balance sheets. [Kashyap, Stein, Wallen, and Younger \(2025\)](#) study how growing Treasury supply and leveraged intermediation increase market fragility. These costs enter the model’s cash-Treasury absorption premium, net of convenience benefits. The payments they require generate demand for safe assets through recipients’ saving.

[He, Krishnamurthy, and Milbradt \(2019\)](#) show how investors’ rollover decisions, debt size, and demand for safe assets jointly determine sovereign debt safety. In my model, participation determines each institution’s exposure to rollover shortfalls and hence the compensation required to commit capacity.

[Greenwood, Hanson, and Stein \(2015\)](#) study the tradeoff between the monetary services of short government debt and the fiscal risk from rolling it over at uncertain future interest rates. [Vayanos and Vila \(2021\)](#) show how maturity-specific demand and risk-averse arbitrageurs determine bond risk premia. For institutions absorbing debt, longer maturity reduces rollover needs but increases exposure to bond-price changes; their required compensation reflects both effects.

The measurement relates to estimates of the effect of debt and fiscal positions on government yields ([Laubach, 2009](#); [Gruber and Kamin, 2012](#); [Gamber and Seliski, 2019](#); [World Bank, 2026](#)) and to high-frequency evidence on fiscal news, Treasury supply, term premia, inflation, and convenience yields ([Gómez-Cram, Kung, and Lustig, 2024, 2025](#)). I combine supply-response estimates with observed premium levels to measure the marginal absorption cost of additional debt. Recent evidence points to a decline in the convenience of Treasury securities, particularly at medium and long maturities. [Jiang, Richmond, and Zhang \(2025\)](#) connect this decline to the expansion of Treasury supply. [Krishnamurthy and Chumbo \(2026\)](#) find that dollar repo has high convenience, while the global richness of dollar safe assets, particularly Treasuries, has fallen.

Section 2 defines and measures marginal Treasury absorption cost. Section 3 develops household demand and the financial system’s absorption schedule. Section 4 derives the safe-debt Laffer curve, studies financial capacity and maturity, and presents the aggregate-demand interpretation. Section 5 combines the measured costs and household response to quantify the net contribution of issuance. The appendices provide detailed proofs, data construction, and supporting results.

2 Measuring U.S. Treasury Absorption Costs

Financing and warehousing Treasury debt require balance-sheet and funding resources, and holders also bear bond-price risk. As issuance expands relative to financial capacity, compensation can rise on both the new claim and the outstanding stock. I measure the resulting marginal annual payment as the sum of cash-Treasury and real-duration components.

2.1 The marginal absorption cost

Let b denote outstanding safe government debt, r the real safe interest rate, and s the net annualized Treasury absorption premium per unit of debt. Treasury liquidity, collateral, and transaction services lower the required premium. The all-in Treasury funding rate is $r + s$. Once the outstanding stock has been rolled over at current terms, the annualized absorption payment is

$$S = bs. \quad (1)$$

Holding the safe rate, financial capacity, and maturity composition fixed, the marginal absorption cost is

$$S_b = s + bs_b, \quad (2)$$

where subscripts denote partial derivatives. The first term is the premium on the additional claim. The second is the increase in the annual payment on the outstanding stock once it has been rolled over at the new terms.

A low premium on the marginal claim can coexist with a substantial marginal absorption cost when issuance reprices a large stock.

2.2 Components of the measured cost

Let s^R denote the cash-Treasury component of the premium and s^D its real-duration component. With maturity composition held fixed, $S = b(s^R + s^D)$, so

$$S_b = (s^R + bs_b^R) + (s^D + bs_b^D). \quad (3)$$

Let t index observation dates. The measured Treasury absorption premium is

$$s_t = s_t^R + s_t^D. \quad (4)$$

Let $\mathcal{M}_t^R$ and $\mathcal{M}_t^D$ denote the empirical counterparts of bs_b^R and bs_b^D . Denote the measured marginal absorption cost at date t by $S_{b,t}$. Substituting the estimates into (3) gives

$$S_{b,t} = s_t^R + s_t^D + \mathcal{M}_t^R + \mathcal{M}_t^D. \quad (5)$$

Premium levels and stock-repricing terms are measured in annualized basis points. The latter apply each supply response to nominal Treasury notes and bonds held outside the Federal Reserve, including foreign official holdings; I refer to this stock as private float. Summing all four terms gives marginal annual absorption cost per dollar of additional debt in this stock.

2.3 The two premium levels

The cash-Treasury component, s_t^R , is the Treasury par yield minus the maturity-matched par swap rate. An interest-rate swap provides duration exposure without requiring an investor to finance and warehouse a cash Treasury security. I interpret the spread as compensation for cash-Treasury financing and warehousing, net of convenience relative to the swap benchmark (Du, Hébert, and Li, 2023; Krishnamurthy and Chumbo, 2026). This interpretation draws on the role of intermediary balance-sheet costs in Treasury pricing; the model represents these absorption services through commitments to roll over debt.

The spreads use a consistent London Interbank Offered Rate (LIBOR) basis, with the Secured Overnight Financing Rate (SOFR) plus the contractual fallback after June 2023. For the premium level, I interpolate quarterly-average spreads at two, five, ten, and thirty years to each security's remaining maturity and weight by quarter-end nominal notes and bonds held outside the Federal Reserve. Appendix A gives the market-series and maturity conventions. The resulting cash-Treasury premium rises from -18.3 basis points in 2015Q1 to 2.0 basis points in 2026Q2. Under this interpretation, the negative initial spread means that convenience benefits exceeded financing and warehousing compensation.

The duration-price component, s_t^D , is the D'Amico–Kim–Wei (DKW) real term premium (D'Amico, Kim, and Wei, 2018). DKW jointly prices nominal and inflation-indexed Treasuries and separates compensation for real-duration risk from inflation-risk compensation. I map its five- and ten-year estimates to the private-float-weighted remaining maturity of nominal Treasury notes and bonds, clipping each security's maturity to the one- to fifteen-year range, and average the daily mapped premium within each quarter. The DKW real term premium measures compensation for real-duration exposure arising through balance-sheet constraints and other channels. I treat it and the cash-Treasury spread as separate absorption components. The real term premium rises from 7.3 basis points in 2015Q1 to 46.3 basis points in 2026Q2.

Together, the two premia rise by 59.3 basis points (Table 1).

Table 1: Measured Treasury absorption premia

Date	Cash-Treasury s_t^R	Real duration s_t^D	Total s_t
2015Q1	-18.3	7.3	-11.0
2026Q2	2.0	46.3	48.3
2015Q1–2026Q2	20.4	39.0	59.3

Notes: Entries are annualized basis points. Cash-Treasury premia are debt-weighted Treasury par yields minus maturity-matched par swap rates. Real-duration premia are debt-weighted DKW real term premia. Totals and changes are computed before rounding.

2.4 Cash-Treasury repricing

I estimate the cash-spread response to an increase in the stock held outside the Federal Reserve. Following the purchase-allocation evidence in [D’Amico and King \(2013\)](#), identification uses Federal Reserve holdings across two-, three-, five-, seven-, ten-, and thirty-year maturity buckets. At horizon h , measured in months, I estimate by ordinary least squares (OLS)

$$\Delta_h s_{m,t}^R = \phi_m + \psi_t + \beta_h \Delta_h \text{share}_{m,t} + \varepsilon_{m,t}. \quad (6)$$

Here m indexes maturity buckets, t the starting month, and Δ_h the change from t to $t + h$. The variable $\text{share}_{m,t}$ is the percentage of bucket debt held in the Federal Reserve’s System Open Market Account (SOMA). The coefficient β_h is in basis points of spread per percentage-point increase in that share. Maturity effects ϕ_m absorb persistent differences across tenors, and start-month effects ψ_t absorb aggregate news and curve-wide repricing. The disturbance is $\varepsilon_{m,t}$.

Identification comes from relative changes in holdings and spreads across maturity buckets with the same starting month. The supply interpretation requires these relative holdings changes to be uncorrelated with other maturity-specific spread shocks, conditional on the fixed effects. The sample excludes the emergency-market episode of 2020. With $\beta_h < 0$, transferring debt from the Fed to private portfolios raises the Treasury–swap spread.

Let $w_{m,t}$ be bucket m ’s share of notes and bonds held outside the Fed, and $\bar{w}_{m,t}$ the fraction of bucket debt held in SOMA, equal to $\text{share}_{m,t}/100$. Marginal issuance follows the existing maturity distribution. The conversion treats each dollar of issuance as supply-equivalent to a transfer from SOMA at fixed bucket outstanding, giving the stock-repricing term

$$\mathcal{M}_{h,t}^R = -100 \beta_h \sum_m w_{m,t} (1 - \bar{w}_{m,t}). \quad (7)$$

For this conversion, let b_t^{priv} be total privately held debt. A proportional increase db_t^{priv}/b_t^{priv} is equivalent to a SOMA-share change of $-100(1 - \bar{\omega}_{m,t})db_t^{priv}/b_t^{priv}$ in bucket m . Applying the estimated spread response and the portfolio weights $w_{m,t}$ gives (7). Thus the private-float factor converts the proportional supply change to the regression’s percentage-point units.

Applying the relative maturity-bucket estimates to aggregate issuance assumes that they capture its cash-spread effect. The private-float adjustment, $\sum_m w_{m,t}(1 - \bar{\omega}_{m,t})$, is 0.781 in 2015Q1 and 0.840 in 2026Q2.

I measure persistent repricing by averaging the estimates over horizons $h = 12, \dots, 24$ months and omit h when reporting this average. Adjacent outcome windows overlap, so inference uses Driscoll–Kraay/Newey–West standard errors with 24 monthly lags. In a linear specification beginning in 2015, the average slope is approximately -0.27 , implying a 2026Q2 repricing term of 23 basis points. The corresponding estimates are 40 basis points for the sample beginning in 2010 and 32 basis points for the instrumental-variables (IV) specification in Table S2. The linear specifications hold the cash-supply slope fixed; the preferred specification allows it to depend on financial capacity.

2.5 Financial capacity and the capacity-dependent specification

Limited financial capacity can make Treasury spreads more sensitive to additional supply. I measure capacity variation using balance-sheet room and Treasury inventories at Treasury dealers’ holding companies. Let k be a common leverage-ratio threshold, $T1_{i,t}$ dealer parent i ’s Tier 1 capital, $LE_{i,t}$ its leverage exposure, and $UST_{i,t}$ its Treasury inventory. The financial-capacity index $N_t(k)$ is

$$N_t(k) = \sum_i \left(\frac{T1_{i,t}}{k} - LE_{i,t} \right) + \sum_i UST_{i,t}. \quad (8)$$

Adding Treasury inventory to balance-sheet room measures both capacity already devoted to Treasuries and room for additional holdings. The preferred index applies a common 5 percent threshold to every dealer parent with the required data; a second index uses 6 percent. These common thresholds put dealer-parent balance sheets on a comparable scale. Let $\tilde{N}_t$ denote the chosen index standardized using its estimation-sample mean and standard deviation. Monthly capacity interpolates the quarterly regulatory measure using dealer-parent market equity while preserving quarterly means. Appendix A describes the data and regulatory conventions.

I allow the supply response to depend on financial capacity:

$$\Delta_h s_{m,t}^R = \phi_m + \psi_t + \beta_h \Delta_h share_{m,t} + \gamma_h \left(\Delta_h share_{m,t} \times \tilde{N}_t \right) + \varepsilon_{m,t}. \quad (9)$$

At capacity level $\tilde{N}_t$, the spread response to the SOMA share is

$$\beta_h + \gamma_h \tilde{N}_t. \quad (10)$$

Because a higher SOMA share reduces private supply, a positive γ_h means that capacity attenuates the spread response to issuance. Under the 5 percent threshold, the averages over $h = 12, \dots, 24$ are $\beta_h = -0.24$ and $\gamma_h = 0.19$, with Driscoll–Kraay/Newey–West t -statistics between 2.4 and 2.9. Under the 6 percent threshold, the interaction is also positive but its t -statistics range from 1.0 to 1.6.

The 2026Q2 index is \$7.527 trillion, or -2.45 estimation-sample standard deviations. Replacing β_h in (7) by $\beta_h + \gamma_h \tilde{N}_t$ gives the capacity-dependent repricing term. The effective slope is -0.70 , giving a cash-Treasury repricing term of 59.1 basis points, compared with 48.8 in 2015Q1. The number of dealer parents with the required data rises from nine to sixteen across these dates. Among the eight parents present at both endpoints, fixed-rule capacity falls from \$7.632 trillion to \$6.421 trillion. Changes in firm coverage therefore attenuate the decline in measured capacity and, through the estimated interaction, the increase in cash-Treasury repricing costs. Supplemental Appendix SA reports the coefficient paths and IV results.

2.6 Real-duration repricing

I estimate the duration-price response using twelve Federal Reserve announcements that changed expected Treasury purchases or balance-sheet runoff. For each announcement e , let Δs_e^D denote the two-trading-day change in the DKW real term premium. With intercept c_D , purchase-response coefficient β_D , and regression disturbance u_e , I estimate

$$\Delta s_e^D = c_D + \beta_D \text{Amount}_e + u_e. \quad (11)$$

The variable Amount_e assigns each announcement a change in cumulative Treasury purchases, in billions of dollars; purchases are positive and tapering or runoff negative. Fixed-quantity announcements use announced amounts, while open-ended and pace-change announcements require assigned cumulative amounts. Interpreting the slope as a supply response assumes that these amounts capture unanticipated purchase news and that other news affecting real term premia is uncorrelated with them. Appendix A reports the assignments.

For the debt-weighted, average-maturity DKW real term premium, the estimate with an intercept is

$$\beta_D \simeq -0.0054$$

basis points per billion dollars. Here b_t^{priv} is the stock of nominal Treasury notes and bonds held outside the Federal Reserve, measured in billions of dollars. Scaling the announcement response to that stock and reversing the sign gives

$$\mathcal{M}_t^D = -\beta_D b_t^{priv}. \quad (12)$$

This stock rises from \$7.525 trillion in 2015Q1 to \$17.954 trillion in 2026Q2, raising the duration-repricing term from 40.6 to 96.8 basis points at the estimated supply response.

Using the ten-year DKW premium produces a 2026Q2 duration repricing term of 127 basis points. Dividing announced purchase amounts by the contemporaneous stock held outside the Fed produces a 61.5-basis-point term. The first alternative emphasizes long-duration price sensitivity; the second measures purchases relative to the outstanding debt stock.

The cash-Treasury regression identifies a response to relative supply within maturity buckets, whereas the duration event study estimates a response to announced dollar purchases. Applying the latter response to additional Treasury issuance assumes that the announcement mix is informative about issuance at the existing maturity composition. Each slope is converted into $b \partial s / \partial b$ in its estimation units. The dollar duration specification holds the per-dollar price response fixed; in the share-normalized specification, the per-dollar price response is inversely proportional to Treasury market size.

Using leverage-adjusted, heteroskedasticity-robust (HC3) inference, the 95 percent confidence interval for β_D implies a 2026Q2 duration-repricing term of 0–194 basis points (Table 6). Leave-one-event-out estimates imply 73–116 basis points; excluding the two March 2020 announcements gives 152 basis points. With the 61.5-basis-point share-normalized term at both dates, marginal absorption cost rises by approximately 70 basis points between 2015Q1 and 2026Q2, compared with 126 in the dollar specification.

2.7 Accounting for the increase

The empirical exercise compares 2015Q1, the first quarter for which the capacity measure is available, with 2026Q2. I construct the quarterly capacity-dependent estimate from supply-response functions, premium levels, debt stocks, and dealer-parent capacity measured at each date. Marginal issuance preserves each date’s private maturity distribution.

Table 2 reports the four components. The preferred specification combines capacity-dependent cash-Treasury repricing estimated by OLS with the average-maturity duration estimate. Marginal absorption cost rises from 78.4 basis points in 2015Q1 to 204.2 in 2026Q2, an increase of approximately 126 basis points.

Table 2: Marginal Treasury absorption cost

Date and specification	s_t^R	s_t^D	$\mathcal{M}_t^R$	$\mathcal{M}_t^D$	$S_{b,t}$
2015Q1, capacity-dependent OLS	-18.3	7.3	48.8	40.6	78.4
2026Q2, capacity-dependent OLS	2.0	46.3	59.1	96.8	204.2

Notes: Entries are annualized basis points. The capacity-dependent specification uses an OLS interaction between supply changes and financial capacity. The capacity index applies a common 5 percent leverage threshold to all dealer parents with the required data. The duration estimate weights remaining maturities by notes and bonds held outside the Federal Reserve. Table S4 reports the linear estimates. Premium levels and repricing terms use nominal Treasury notes and bonds held outside the Federal Reserve, including foreign official holdings. Sums use unrounded components.

Higher premium levels contribute 59.3 basis points to the increase in marginal cost. Growth in the stock held outside the Fed raises the duration-repricing term by 56.2 basis points, while lower measured capacity acting through the cash-supply interaction, together with changes in maturity weights, adds 10.3. The linear specification estimated on the sample beginning in 2015 gives a cost increase of 117.2 basis points. Supplemental Appendix SA.2 compares the specifications and decomposes the linear increase.

Table S3 varies the duration term with the capacity-dependent cash-Treasury estimate held fixed. The resulting 2026Q2 marginal absorption costs range from 169 to 234 basis points, with the average-maturity estimate at 204 basis points.

2.8 A local calculation at the 2026 borrowing pace

To measure the local increase in marginal absorption cost, I apply the Congressional Budget Office’s projected fiscal-year 2026 borrowing pace. CBO projects a \$1.9 trillion deficit, approximately \$70 billion of additional borrowing from other financing activities, and \$32.1 trillion of debt held by the public at the end of the fiscal year (Congressional Budget Office, 2026). Relative to that end-of-year stock, net borrowing is approximately 6.1 percent. The illustration applies the same proportional increase to notes and bonds held outside the Fed, holding maturity composition, the Federal Reserve share, and financial capacity fixed.

The empirical conversions imply different local scaling for the two repricing terms. With the cash regression coefficients and private-float weights held fixed, $\mathcal{M}^R = bs_b^R$ remains constant, so $s_b^R = \mathcal{M}^R/b$. The duration coefficient is estimated per dollar, so its conversion holds s_b^D constant. Since $S_b = s^R + s^D + \mathcal{M}^R + \mathcal{M}^D$, the resulting local change is

$$dS_b \simeq (\mathcal{M}^R + 2\mathcal{M}^D) \frac{db}{b}. \quad (13)$$

The factor of two arises because additional debt increases the duration premium on the new claim by $s_b^D db$ and raises the stock-repricing term bs_b^D by the same amount. In the cash specification, bs_b^R is held fixed under the local conversion, so only the cash premium itself increases.

The 2026Q2 terms, 59.1 and 96.8 basis points, imply approximately 2.5 basis points of additional marginal cost per 1 percent increase in debt, or 15 basis points at the 6.1 percent borrowing ratio. Supplemental Appendix SA gives the beginning-stock and share-normalized comparisons.

3 The Model

I consider a stationary perpetual-youth endowment economy.

3.1 Environment and government budget

Output is normalized to one; debt, financial wealth, and annual income flows are expressed in these output units. Let N denote effective financial capacity in the model: balance-sheet room, funding capacity, and market-making resources. The index in Section 2.5 measures variation in capacity; N is calibrated separately in model units. The debt stock, financial capacity, and debt maturity index the allocations, and the safe rate r adjusts to clear markets. Let S denote annual absorption payments, as in (1). Section 3.4 derives their dependence on debt, capacity, maturity, and the safe rate.

The government finances debt service and absorption payments through lower purchases. Let $\bar{\tau}$ be a fixed annual tax flow and g government purchases. The government's stationary budget is

$$g = \bar{\tau} - rb - S. \quad (14)$$

3.2 Household consumption and saving

There are two unit-mass household groups, indexed by $j \in \{H, I\}$. Both receive endowment income and hold safe government debt earning the safe rate r . The absorption premium is paid to institutions, and all income generated by their Treasury absorption services accrues to group I .

Effective horizons are represented by a perpetual-youth structure. Members of group j die with Poisson intensity $\lambda_j > 0$ and are replaced one-for-one by newborns with zero financial wealth. They discount utility at rate $\rho > 0$ and have logarithmic flow utility. I take $\lambda_I < \lambda_H$, so absorption-income recipients have longer effective horizons. Actuarially fair annuity markets operate within each group: the safe-asset holdings of members who die are transferred to the surviving members of the same group.

Let $a_{j,t}$ and $c_{j,t}$ be group j 's aggregate safe financial wealth and consumption at time t . Let $y_{j,t}$ be its nontradable income flow and $h_{j,t}$ the capitalized value of that income while a member remains alive. Each member has a nontransferable entitlement that expires at death; newborns receive their own income streams. At a constant safe rate and income flow, $h_j = y_j / (r + \lambda_j)$. Household portfolios consist of safe claims. Appendix B derives this portfolio choice as the limit of a portfolio problem in which households become arbitrarily averse to rollover losses.

An individual member with financial wealth w and consumption c faces the annuitized budget $\dot{w} = (r + \lambda_j)w + y_j - c$. Survival discounts expected log utility at rate $\rho + \lambda_j$, giving consumption growth $\dot{c}/c = r - \rho$. The lifetime budget then implies $c = (\rho + \lambda_j)(w + h_j)$. Within each unit-mass group, members receive the same income flow, so individual and aggregate income coincide. Aggregation preserves the linear consumption rule. Annuity credits paid to survivors offset the removal of deceased members' assets, while newborns arrive with zero assets; aggregate financial income is therefore ra_j .

Aggregating within each group gives

$$\dot{a}_{j,t} = r_t a_{j,t} + y_{j,t} - c_{j,t}, \quad (15)$$

$$c_{j,t} = (\rho + \lambda_j)(a_{j,t} + h_{j,t}). \quad (16)$$

The annual MPC out of financial wealth is $m_j^w \equiv \rho + \lambda_j$. At a given safe rate and current wealth, a permanent increase in nontradable income raises consumption through its capitalized value h_j . The corresponding MPC is

$$m_j(r) \equiv \left. \frac{\partial c_j}{\partial y_j} \right|_{a_j, r} = \frac{\rho + \lambda_j}{r + \lambda_j}. \quad (17)$$

Setting $\dot{a}_j = 0$ equates consumption to $ra_j + y_j$. Combining this stationary budget with the consumption rule determines desired financial wealth.

Let $\kappa_j(r)$ denote stationary desired financial wealth per unit of permanent income:

$$a_j = \kappa_j(r)y_j, \quad \kappa_j(r) = \frac{r - \rho}{(r + \lambda_j)(\rho + \lambda_j - r)}. \quad (18)$$

At constant r and y_j , the aggregate budget and consumption function imply

$$\dot{a}_{j,t} = -(\rho + \lambda_j - r)[a_{j,t} - \kappa_j(r)y_j]. \quad (19)$$

Excess financial wealth is spent at rate $\rho + \lambda_j - r$.

Positive stationary wealth requires $\rho < r < \rho + \lambda_j$. The lower bound gives positive saving from permanent income; the upper bound ensures that excess financial wealth is spent down. Within

this interval, $\kappa'_j(r) > 0$: a higher safe return raises saving from income and slows the spending of accumulated wealth, increasing desired stationary holdings.

The household MPC in (17) and the stationary wealth–income ratio are linked by

$$\kappa_j(r)(\rho + \lambda_j - r) = 1 - m_j(r) = \frac{r - \rho}{r + \lambda_j}. \quad (20)$$

A permanent income increment initially generates saving at rate $1 - m_j(r)$. The resulting accumulation of financial wealth raises consumption relative to financial income at rate $\rho + \lambda_j - r$ per unit of wealth. Saving stops when this additional expenditure absorbs the saved part of the income increment. The stationary wealth–income ratio $\kappa_j(r)$ is therefore the saved share divided by the net rate at which wealth is spent.

3.3 Income and market clearing

Let $x_H > 0$ and $x_I > 0$ denote the groups' fixed after-tax endowment incomes. Both groups pay taxes, with

$$x_H + x_I = 1 - \bar{\tau}. \quad (21)$$

Group I receives the Treasury absorption payment as part of its nontradable lifetime income. The two groups' total nontradable incomes are

$$y_H = x_H, \quad y_I = x_I + S. \quad (22)$$

I consider allocations with positive income flows and nonnegative government purchases.

Substituting the two income flows into (18) gives

$$a_H = \kappa_H(r)x_H, \quad a_I = \kappa_I(r)(x_I + S). \quad (23)$$

Government debt is the private sector's net safe financial asset. Asset-market clearing requires

$$b = a_H + a_I = \kappa_H(r)x_H + \kappa_I(r)(x_I + S). \quad (24)$$

Conditional on positive income flows, desired safe wealth is continuous and strictly increasing from zero to infinity over $(\rho, \rho + \min\{\lambda_H, \lambda_I\})$. For a given absorption payment, equation (24) therefore determines a unique stationary safe rate for each $b > 0$. The full equilibrium also accounts for the response of absorption payments to the safe rate through duration; Section 4.1 states the condition governing that joint response.

In a stationary allocation, the household and government budgets imply

$$c_H + c_I + g = 1 + r(a_H + a_I - b). \quad (25)$$

With asset-market clearing, goods-market clearing is $c_H + c_I + g = 1$.

The payment S cancels from the resource identity because it is a transfer from the government to private recipients. It changes desired safe holdings by changing the recipients' income.

3.4 Treasury absorption payments

Annual absorption payments depend on debt, financial capacity, maturity, and the safe rate. The level of these payments determines recipients' income, while their marginal cost determines the income generated by an additional dollar of debt. The unique-peak result uses increasing marginal payments over the relevant debt range; the construction below identifies the rollover, convenience, and duration forces that govern this curvature.

The construction combines rollover support net of convenience services with duration compensation, corresponding to the cash-Treasury and real-duration components measured in Section 2.

3.4.1 Rollover and financial capacity

First suppose the full debt stock is rolled over during a unit interval. Institutions choose participation before knowing the full active pool and commit capacity to rolling over debt. Their premium compensates exposure to the nonpecuniary balance-sheet costs of providing support beyond available ordinary capacity. The shortfall per unit of capacity depends on debt relative to capacity, so the gross rollover-support spread is a function of b/N :

$$\pi^R(b, N) = p\left(\frac{b}{N}\right). \quad (26)$$

To derive the schedule, let $q = b/N$ and let $\alpha \in [\underline{\alpha}, 1]$ be the fraction of institutions supplying ordinary capacity, where the fraction $\underline{\alpha} \in (0, 1)$ always participates. The remaining institutions choose whether to participate in response to the offered compensation and their opportunity costs; I call these institutions elastic. Active capacity is αN . The rollover shortfall per unit of active capacity is

$$\zeta(q, \alpha) = \frac{[b - \alpha N]_+}{\alpha N} = \left[\frac{q}{\alpha} - 1\right]_+.$$

Here $[u]_+ = \max\{u, 0\}$. Let $\Gamma(\zeta)$ be the annual compensation per dollar required to support this exposure, with $\Gamma(0) = 0$, $\Gamma' > 0$ for positive stress, and $\Gamma'' \geq 0$. It measures the nonpecuniary

cost of expanding commitments beyond ordinary capacity. Lower participation raises each active institution's exposure and required compensation.

Each elastic institution observes $z_i = \theta + \eta \varepsilon_i$, where θ is a common additive opportunity-cost shock, $\eta > 0$ scales signal noise, and the independent noises have a continuous distribution F with a positive log-concave density and finite first absolute moment. The prior over θ is flat. A cutoff strategy with participation when $z_i \leq z^*$ gives

$$\alpha(\theta; z^*) = \underline{\alpha} + (1 - \underline{\alpha})F\left(\frac{z^* - \theta}{\eta}\right).$$

Conditional on the marginal signal $z_i = z^*$, the probability integral transform makes α uniform on $[\underline{\alpha}, 1]$. The Treasury chooses its spread to procure a fixed interior participation share when $\theta = 0$; this keeps z^*/η fixed as noise vanishes. Contracts are divided equally among active institutions, so a participant supports b/α . In the small-noise limit, marginal indifference therefore equates exposure-weighted compensation and support cost:

$$\int_{\underline{\alpha}}^1 \left[\pi^R - \Gamma\left(\left[\frac{q}{\alpha} - 1\right]_+\right) \right] \frac{d\alpha}{\alpha} = 0.$$

Lemma 1 (Rollover-support pricing). *Under the information and procurement assumptions above, the small-noise limit of the gross rollover-support spread is $\pi^R = p(q)$, where*

$$p(q) = \frac{1}{\log(1/\underline{\alpha})} \int_{\underline{\alpha}}^1 \Gamma\left(\left[\frac{q}{\alpha} - 1\right]_+\right) \frac{d\alpha}{\alpha}. \quad (27)$$

The premium is an exposure-weighted average of support costs across possible participation shares. Appendix C derives the finite-noise quote and establishes the cutoff equilibrium. The premium is zero for $q \leq \underline{\alpha}$. Above this threshold, a positive set of participation shares requires additional support, so $p' > 0$. Because each state's cost is convex in utilization and the averaging weights are fixed, $p'' \geq 0$. The derivative signs follow directly:

$$\begin{aligned} \pi_b^R &= \frac{p'(q)}{N} > 0, & \pi_N^R &= -\frac{qp'(q)}{N} < 0, \\ \pi_{bb}^R &= \frac{p''(q)}{N^2} \geq 0, & \pi_{bN}^R &= -\frac{p'(q) + qp''(q)}{N^2} < 0. \end{aligned} \quad (28)$$

Capacity lowers both utilization and the change in utilization caused by a unit of debt, accounting for the negative debt-capacity interaction. The supply-capacity interaction in Section 2 measures the latter property.

Cash Treasuries also provide liquidity, collateral, and transaction services relative to maturity-matched swaps. Let $v(b) > 0$ denote this convenience value, with $v'(b) < 0$ as additional supply

reduces scarcity. The annualized net cash-Treasury spread is

$$s^R(b, N) = \pi^R(b, N) - v(b). \quad (29)$$

The household block takes bs^R as net cash income to group I ; the participation mechanism determines the gross compensation component π^R . Additional private supply dilutes convenience services and raises balance-sheet utilization, so $s_b^R > 0$. Since v is independent of N , $s_{bN}^R = \pi_{bN}^R < 0$. The cash-supply coefficient at mean capacity contains both convenience dilution and balance-sheet pressure; its interaction with financial capacity isolates the capacity-dependent part.

In the short-maturity economy, $s = s^R$, the Treasury's all-in funding rate is $r + s^R$, and the absorption payment is $S(b, N) = bs^R(b, N)$. Its marginal cost is

$$S_b(b, N) = s^R(b, N) + bs_b^R(b, N). \quad (30)$$

Marginal absorption cost combines the spread on the new claim with the increase in payments on the outstanding stock.

Convexity of the absorption payment, which Section 4.2 uses to obtain a unique peak, is a restriction on gross support and convenience together. In this short-maturity economy,

$$S_{bb} = \frac{2p'(q) + qp''(q)}{N} - 2v'(b) - bv''(b).$$

Increasing, convex support costs make the first term positive in the active region. Convenience dilution contributes $-2v' - bv''$, whose sign depends on its curvature. The Laffer result applies over debt ranges where the sum is positive.

A smooth-onset quadratic specification of the support premium is

$$\pi^R(b, N) = \frac{\phi}{2} \left[\frac{b}{N} - \bar{q} \right]_+^2, \quad \phi > 0, \quad (31)$$

where $\bar{q} > 0$ is the utilization threshold and ϕ scales curvature above it. Balance-sheet stress begins at $\hat{b}(N) = \bar{q}N$, with a continuous marginal absorption cost at the threshold.

3.4.2 Maturity and rollover needs

Let $\delta > 0$ be the Poisson maturity intensity of each unit of debt. Average maturity is $1/\delta$. Denote by $\mu(\delta)$ the probability that an inherited claim matures during a unit-length interval:

$$\mu(\delta) = 1 - e^{-\delta}. \quad (32)$$

I measure support exposure by $\mu(\delta)b$, the stock of inherited positions that require rollover during the interval. This convention counts each inherited position once; gross rollover in a stationary Poisson debt stock is instead δb , including repeated rollover. The absorption schedule below uses the former exposure measure, which converges to the full inherited stock as δ becomes large.

With finite maturity, the gross rollover-support spread is

$$\pi^R(b, N, \delta) = p \left(\frac{\mu(\delta)b}{N} \right). \quad (33)$$

The active-region properties extend to $\pi_b^R > 0$, $\pi_N^R < 0$, $\pi_\delta^R > 0$, $\pi_{bN}^R < 0$, and $\pi_{\delta N}^R < 0$. Shorter maturity increases rollover pressure, while capacity attenuates its effect on the spread.

I hold convenience services fixed when varying maturity to isolate the tradeoff between rollover pressure and duration exposure. The net cash-Treasury component continues to subtract the convenience value:

$$s^R(b, N, \delta) = \pi^R(b, N, \delta) - v(b). \quad (34)$$

Hence $s_b^R = \pi_b^R - v' > 0$ and, when convenience services are independent of N , $s_{bN}^R = \pi_{bN}^R < 0$.

In the participation model, stress begins when $\mu(\delta)b/N = \underline{\alpha}$, so $\hat{b}(N, \delta) = \underline{\alpha}N/\mu(\delta)$. In the quadratic illustration, the corresponding threshold is $\bar{q}N/\mu(\delta)$.

3.4.3 Duration compensation

Longer maturity increases bond-price sensitivity to changes in yields. For a bond with a fixed coupon and principal repaid at Poisson maturity, with intensity δ and all-in yield $r + s(b, N, \delta; r)$, price is proportional to

$$\frac{1}{r + s(b, N, \delta; r) + \delta}. \quad (35)$$

The claim's yield duration is $D = 1/(r + s + \delta)$. Let σ_y^2 be the annualized variance of yield innovations; the associated local return variance is $\sigma_y^2 D^2$. Institutions reserve capital against this price risk. With $\chi(N) > 0$ denoting the capital requirement per unit of variance relative to ordinary support, duration exposure requires $\chi(N)\sigma_y^2 D^2$ times the resources committed to rollover support.

Both uses face the same state-dependent cost of committing capacity. The duration requirement therefore multiplies support costs in every participation state by the same factor, and multiplies the gross premium by that factor as well. Define $\vartheta(N) = \chi(N)\sigma_y^2$, with $\chi_N < 0$ capturing the lower capital intensity of price exposure when capacity is abundant. The additional duration premium is

$$s^D(b, N, \delta; r) = \frac{\vartheta(N)}{[r + s(b, N, \delta; r) + \delta]^2} \pi^R(b, N, \delta). \quad (36)$$

The total Treasury absorption premium is the sum of the net cash and duration components. I write its dependence on the safe rate explicitly:

$$s(b, N, \delta; r) = s^R(b, N, \delta) + s^D(b, N, \delta; r). \quad (37)$$

Substituting the two components yields

$$s = -v(b) + \pi^R(b, N, \delta) \left[1 + \frac{\vartheta(N)}{(r + s + \delta)^2} \right]. \quad (38)$$

Higher all-in yields shorten duration, so including the total premium in the denominator moderates the amplification of gross rollover pressure. Equation (38) determines the premium conditional on the safe rate. Since $S = bs$, it must be solved together with asset-market clearing (24) to determine equilibrium.

The admissible domain is

$$r + s + \delta > 0. \quad (39)$$

Conditional on r , the pricing equation has a unique solution on this domain when $\pi^R > 0$: its right-hand side decreases from infinity toward a finite limit as s rises, while its left-hand side increases. When $\pi^R = 0$, the solution is $s = -v(b)$, provided the duration denominator remains positive.

The pricing fixed point implies

$$\begin{aligned} s_b &= \frac{-v' + (1 + \vartheta D^2)\pi_b^R}{1 + 2\vartheta\pi^R D^3} > 0, \\ s_N &= \frac{(1 + \vartheta D^2)\pi_N^R + \pi^R D^2 \vartheta_N}{1 + 2\vartheta\pi^R D^3} \leq 0, \\ s_r &= -\frac{2\vartheta\pi^R D^3}{1 + 2\vartheta\pi^R D^3} \leq 0. \end{aligned} \quad (40)$$

These partial derivatives hold maturity fixed. The capacity effect is strictly negative in the active support region and zero when gross support compensation is zero. Capacity lowers both rollover compensation and its duration amplification. For maturity, the same calculation yields

$$s_\delta = \frac{(1 + \vartheta D^2)\pi_\delta^R - 2\vartheta\pi^R D^3}{1 + 2\vartheta\pi^R D^3}.$$

The first term in the numerator is the higher compensation required for more debt reaching rollover; the second is the reduction in duration compensation. Thus shorter maturity has an ambiguous effect on the total premium. As δ becomes large, the exposed share approaches one and duration amplification vanishes, recovering the short-maturity benchmark.

The annual absorption payment is therefore

$$S(b, N, \delta; r) = bs(b, N, \delta; r). \quad (41)$$

Its marginal cost is $S_b = s + bs_b$, with r , N , and δ fixed. At a fixed debt stock, $S_N = bs_N \leq 0$ because greater capacity lowers the required payment, and $S_r = bs_r \leq 0$ because a higher safe rate shortens duration and reduces duration compensation. The cash-supply interaction $s_{bN}^R < 0$ follows from the rollover block. The total schedule also incorporates duration feedback, so its curvature and cross-partials must be evaluated using the full pricing equation. The Laffer result imposes $S_{bb} > 0$ on the relevant feasible debt range and states the remaining conditions in Section 4.2.

4 The Safe-Debt Laffer Curve

4.1 Debt issuance and safe-asset demand

Unless maturity is explicitly varied, hold δ fixed and let $r(b, N)$ denote the market-clearing safe rate. Throughout this section, S denotes the payment $S(b, N, \delta; r)$ evaluated at that rate, and its partial derivatives hold the other arguments fixed. The debt stock supplies b units of safe assets, while absorption income generates $\kappa_I(r)S$ units of desired holdings. I define *net safe-asset supply* as the difference:

$$\mathcal{B}(b, N) \equiv b - \kappa_I(r(b, N))S(b, N, \delta; r(b, N)). \quad (42)$$

In equilibrium, this balance equals desired holdings generated by households' endowment income. The safe-debt Laffer curve is the equilibrium schedule $b \mapsto \mathcal{B}(b, N)$.

At a given safe rate, an additional unit of annual absorption income raises group I 's desired holdings by $\kappa_I(r)$. A unit of additional debt therefore supplies one unit of safe wealth and induces $\kappa_I(r)S_b$ units of desired holdings. The marginal net contribution is $1 - \kappa_I(r)S_b$.

Differentiating asset-market clearing (24) gives

$$r_b = \frac{1 - \kappa_I(r)S_b}{\kappa_H'(r)x_H + \kappa_I'(r)(x_I + S) + \kappa_I(r)S_r}. \quad (43)$$

The numerator is the marginal net contribution of issuance. The denominator is the response of aggregate desired holdings to the safe rate along the absorption-pricing schedule. A higher rate raises desired wealth per unit of income through the two κ'_j terms. It also shortens duration and lowers absorption payments, reducing group I 's income and desired holdings through $\kappa_I S_r$.

I consider continuous equilibrium branches on which the direct wealth-demand response dominates this income feedback, so the denominator is positive. In the short-maturity limit, $S_r = 0$ and

positivity follows from $\kappa'_j > 0$. When the marginal net contribution is positive, the safe rate rises to induce households to hold the additional supply. When induced demand exceeds issuance, the safe rate falls to reduce desired holdings and restore market clearing. The numerator measures the supply pressure before that adjustment; in the new equilibrium, desired holdings again equal the outstanding debt stock.

Asset-market clearing also gives

$$\mathcal{B}(b, N) = \kappa_H(r(b, N))x_H + \kappa_I(r(b, N))x_I. \quad (44)$$

Consequently,

$$\mathcal{B}_b(b, N) = [\kappa'_H(r)x_H + \kappa'_I(r)x_I] r_b. \quad (45)$$

Because the bracket is positive, net safe-asset supply is a strictly increasing transformation of the safe rate across stationary allocations with the same endowment incomes. The marginal contribution $1 - \kappa_I(r)S_b$ measures additional supply net of induced demand before the rate adjusts; the slope $\mathcal{B}_b$ also incorporates that adjustment. Both change sign at the same debt stock.

The marginal contribution reaches zero when $\kappa_I(r)S_b = 1$. Equivalently, the marginal absorption cost reaches $1/\kappa_I(r)$. Define the absorption-cost margin as this critical cost less the marginal absorption cost:

$$\mathcal{G}(b, N) \equiv \frac{1}{\kappa_I(r(b, N))} - S_b. \quad (46)$$

Both terms are annual rates. Section 2 estimates marginal absorption cost; household consumption and saving determine the critical value. Net safe-asset supply rises with debt when $\mathcal{G} > 0$ and falls when $\mathcal{G} < 0$.

Two groups allow recipients' wealth-income ratio to exceed the aggregate ratio. With a single household type, market clearing would require $b = \kappa(r)(1 - \bar{\tau} + S)$, fixing the critical cost at

$$\frac{1}{\kappa(r)} = \frac{1 - \bar{\tau} + S}{b}.$$

With two groups, aggregate wealth demand determines a weighted combination of κ_H and κ_I , while the response to absorption income depends on κ_I alone. Concentrating that income among high savers allows its marginal wealth-demand effect to exceed the aggregate wealth-income ratio.

4.2 The Laffer peak

Suppose the absorption-cost margin is positive at low debt and becomes negative within the range of feasible allocations, with $S_{bb} > 0$ throughout. This is the partial curvature of absorption payments with respect to debt, holding the safe rate, capacity, and maturity fixed. Net safe-asset supply

initially rises with debt and reaches its peak at the stock b^L satisfying

$$\frac{1}{\kappa_I(r(b^L, N))} = S_b = s + b^L s_b, \quad (47)$$

where the absorption premium and its partial derivatives are evaluated at $(b^L, N, \delta; r(b^L, N))$. At the peak, each additional unit of debt generates exactly one unit of desired safe holdings through absorption income.

Proposition 1 (Safe-debt Laffer curve). *Consider a continuous equilibrium branch on which the denominator in (43) is positive, both income flows remain positive, and government purchases are nonnegative. Suppose there is a low debt stock $\underline{b}$ at which $\mathcal{G}(\underline{b}, N) > 0$. If there is a debt stock $\bar{b} > \underline{b}$ such that $S_{bb} > 0$ throughout $[\underline{b}, \bar{b}]$ and*

$$\kappa_I(r(\bar{b}, N))S_b(\bar{b}, N, \delta; r(\bar{b}, N)) > 1,$$

then there is a unique $b^L(N) \in (\underline{b}, \bar{b})$ satisfying (47). Within this debt range, additional supply exceeds induced demand and net safe-asset supply rises below $b^L(N)$; above it, induced demand exceeds the additional supply and net safe-asset supply falls. The net safe-asset supply schedule has a strict maximum at $b^L(N)$. The market-clearing safe rate reaches its maximum at the same debt stock.

Existence follows from continuity. At every zero of $1 - \kappa_I(r)S_b$, equation (43) gives $r_b = 0$, so the numerator has slope $-\kappa_I(r)S_{bb} < 0$. Hence every crossing is downward. Equation (45) then establishes a unique strict maximum of net safe-asset supply. At a candidate peak, the safe rate and thus the critical cost are locally unchanged. Convex absorption payments make the next unit of debt more costly to absorb, so the induced demand overtakes the additional supply.

The rate adjustment also changes the distribution of debt. Below the peak, the higher rate raises group H 's desired holdings. At the peak, its holdings are unchanged and group I absorbs the marginal claim. Beyond the peak, the lower rate reduces group H 's holdings, so group I absorbs the new claim together with part of group H 's previous holdings.

Remark 1 (The role of nontradable absorption income). Treating S as nontradable lifetime income provides a simple way to capture a more general principle: absorption payments generate demand for safe assets when consumption out of their capitalized value falls short of the payments themselves. In the baseline, the entitlement expires at death, limiting its capitalized value. Supplemental Appendix SC derives the general condition and constructs an alternative equilibrium with a tradable perpetual claim to S . There, costs of bearing duration exposure limit capitalization and preserve the mechanism.

4.3 Financial capacity and maturity

At fixed maturity, more capacity moves the onset of additional rollover support outward because $\widehat{b}(N, \delta) = \underline{\alpha}N/\mu(\delta)$. In the active support region, it lowers both rollover compensation and its duration amplification, giving $S_N < 0$.

At a fixed debt stock, differentiating (24) with respect to capacity gives

$$r_N = -\frac{\kappa_I(r)S_N}{\kappa'_H(r)x_H + \kappa'_I(r)(x_I + S) + \kappa_I(r)S_r}. \quad (48)$$

On the equilibrium branch under consideration, the denominator is positive. Greater financial capacity reduces absorption income and the associated demand for safe holdings, increasing net safe-asset supply at the unchanged debt stock. The safe rate rises to restore market clearing. Using (44) and $\mathcal{B}_b = 0$ at a peak in the active support region gives

$$\frac{d\mathcal{B}(b^L(N), N)}{dN} = [\kappa'_H(r)x_H + \kappa'_I(r)x_I] r_N(b^L, N) > 0. \quad (49)$$

Capacity therefore raises the maximum net safe-asset supply.

The effect on the debt stock at the peak also depends on the marginal absorption cost. For the cash component, greater capacity lowers the supply sensitivity, $s_{bN}^R < 0$. The empirical interaction measures this property: additional debt raises the cash premium more when capacity is scarce. With duration compensation included, the response of total marginal cost also reflects the endogenous change in bond-price exposure.

Differentiating (47) yields

$$\frac{db^L}{dN} = \frac{-S_{bN} - \left[\frac{\kappa'_I(r)}{\kappa_I(r)^2} + S_{br} \right] r_N(b^L, N)}{S_{bb}}. \quad (50)$$

All terms are evaluated at the peak. The first term in the numerator is the direct capacity effect on marginal absorption cost. The higher equilibrium safe rate lowers the critical cost $1/\kappa_I$ and also changes marginal absorption cost through S_{br} . The peak debt stock rises when the combined effect makes the numerator positive. Its direction therefore depends on these responses, while the peak's height rises with capacity.

In the short-maturity schedule, $S_{br} = 0$ and $S_{bN} = \pi_N^R + b\pi_{bN}^R < 0$. Holding the safe rate, and hence the critical cost, fixed isolates the decline in marginal absorption cost. The crossing in Supplemental Figure S5 then moves outward at rate

$$-\frac{S_{bN}}{S_{bb}} > 0.$$

Holding convenience services fixed, maturity changes both the quantity reaching rollover and its price exposure. A higher maturity intensity δ increases rollover needs but shortens duration. The total-payment response $S_\delta = bs_\delta$, derived from the pricing schedule in Section 3.4, combines these opposing effects. At fixed debt and capacity, market clearing gives

$$\begin{aligned} r_\delta &= -\frac{\kappa_I(r)S_\delta}{\kappa'_H(r)x_H + \kappa'_I(r)(x_I + S) + \kappa_I(r)S_r}, \\ \mathcal{B}_\delta &= [\kappa'_H(r)x_H + \kappa'_I(r)x_I] r_\delta. \end{aligned} \quad (51)$$

Whichever maturity change reduces absorption payments also reduces induced demand and raises net safe-asset supply. Its direction depends on the balance between rollover needs and duration exposure. Supplemental Appendix [SB](#) studies optimal maturity when uncertainty about future rollover conditions adds to the price cost of long debt.

4.4 The aggregate-demand interpretation

Saving out of absorption payments has a counterpart in the goods market: recipients' additional consumption offsets only part of the reduction in government purchases needed to finance those payments. Hold the safe rate, financial capacity, and maturity fixed and evaluate expenditure using the household consumption and fiscal schedules. Group H 's income and desired stationary holdings, $\kappa_H(r)x_H$, are unchanged at that rate. Keeping this group at those holdings assigns the additional debt to group I , which also receives the additional absorption income. Group I 's assigned holdings can differ from its desired stationary position.

For an arbitrary allocation of an initial bond issue satisfying $a_H + a_I = b$, the expenditure gap is

$$c_H + c_I + g - 1 = \sum_{j \in \{H, I\}} (\rho + \lambda_j - r)[a_j - \kappa_j(r)y_j].$$

Holding group H at its desired position isolates group I 's deviation from stationary wealth demand. This comparison signs the adjustment of the stationary equilibrium rate; the impact consumption response also depends on the initial allocation of claims.

With $a_H = \kappa_H(r)x_H$ and $a_I = b - a_H$, the consumption and fiscal schedules give

$$c_H + c_I + g - 1 = (\rho + \lambda_I - r)[b - \kappa_H(r)x_H - \kappa_I(r)(x_I + S)]. \quad (52)$$

A marginal claim held by group I raises private consumption by $\rho + \lambda_I$, while its debt service reduces government purchases by r . The associated absorption payment reduces government purchases one-for-one, but the recipients consume only the fraction $m_I(r)$. Using (20), the resulting

expenditure response is

$$\left. \frac{\partial(c_H + c_I + g)}{\partial b} \right|_{r, N, \delta} = (\rho + \lambda_I - r) - [1 - m_I(r)]S_b = (\rho + \lambda_I - r)[1 - \kappa_I(r)S_b]. \quad (53)$$

A high saved share strengthens the contraction from absorption payments; a low wealth MPC weakens the expansion from additional debt.

At a stationary allocation, differentiating (52) with respect to the safe rate gives minus $\rho + \lambda_I - r$ times the denominator in (43). Expenditure therefore declines with the safe rate on the positive-response branch considered here, including the effect of duration on absorption income. The rate rises to offset positive expenditure pressure and falls to offset negative pressure. Equation (53) has the same sign as the asset-market numerator in (43), so the two interpretations give the same reversal condition. The positive wealth effect is dominated above the peak by the fiscal contraction required to finance debt service and absorption payments.

With taxes fixed, additional debt is private net wealth, and government purchases adjust to finance its debt service. Finite horizons permit a stationary safe rate above the common discount rate. Within the admissible rate interval, issuance has a positive net wealth effect and recipients save part of a permanent increase in absorption income. In the infinite-horizon limit with a common discount rate, a stationary interior allocation has $r = \rho$: consumption generated by an additional claim equals its debt service, and recipients consume the full permanent income increment.

5 Back-of-the-Envelope Calculations

To translate the estimated absorption costs into the net contribution of issuance, I combine them with recipients' desired safe holdings per dollar of permanent annual income. The numerical results are suggestive: their magnitudes vary substantially with the parameter choices.

5.1 Household saving and desired safe holdings

I assume an annual marginal propensity to consume out of wealth of 2 percent for the high-net-worth households receiving absorption income. Two estimates in [Di Maggio, Kermani, and Majlesi \(2020\)](#) help motivate this choice. Using Swedish administrative data, they estimate an annual consumption response of 2.1 cents per dollar of factor-related stock-market gains among households in the top 5 percent of financial wealth (Table XIII). For households with heads aged 41–55 in the top 10 percent, the response to portfolio capital gains is 1.8 cents per dollar (Table IX).¹

¹Their pooled-age baseline estimate for the top 5 percent is 2.8 percent (standard error 0.7 percentage point); adding detailed demographic and financial controls gives 2.2 percent (Tables III and XI). Complementary U.S. evidence

With $m_I^w = 0.02$ and the common annual discount rate $\rho = 0.01$, the model implies $\lambda_I = 0.01$. I set the reference safe rate to $r_0 = 1.5$ percent, informed by the medium-run natural-rate estimate in [Cúrdia \(2026\)](#). Equation (18) then gives

$$\kappa_I(r_0) = \frac{r_0 - 0.01}{(r_0 + 0.01)(0.02 - r_0)} = 40. \quad (54)$$

Thus, an additional dollar of permanent annual absorption income raises desired safe holdings by \$40 in steady state.

The consumption and saving responses explain this magnitude. At the reference rate, the MPC out of permanent income is 80 percent, so recipients initially save 20 cents of each additional dollar of annual income. Each dollar of accumulated wealth raises annual consumption by 2 cents and earns 1.5 cents in interest, leaving a net spending rate of 0.5 cent. Desired wealth rises until this additional net spending absorbs the initially saved income. The resulting stock response is $0.20/0.005 = 40$, as implied by (20).

5.2 The net contribution of additional issuance

An additional dollar of public debt supplies one dollar of safe assets. To apply the model, I assign the payments measured by $S_{b,t}$ to the high-saving group as permanent annual absorption income. Under this incidence assumption, the additional dollar of debt generates $S_{b,t}$ dollars of annual income and $\kappa_I(r_0)S_{b,t}$ dollars of desired safe holdings. The marginal net contribution of issuance is

$$1 - \kappa_I(r_0)S_{b,t}. \quad (55)$$

The comparison evaluates desired holdings at r_0 for both dates, before the safe rate adjusts, so the change in the marginal net contribution comes entirely from measured absorption costs.

At the 2015Q1 marginal absorption cost of 78.4 basis points, an extra dollar of debt requires approximately 0.78 cent of additional annual payments. With $\kappa_I = 40$, these payments generate about 31 cents of desired safe holdings, leaving 69 cents of issuance net of induced demand. At the 2026Q2 cost of 204.2 basis points, the annual payment rises to 2.04 cents and the induced demand to approximately 82 cents, leaving 18 cents. With the assumed 2 percent annual wealth MPC, the higher absorption cost reduces the marginal net contribution by about 50 cents per dollar, or 73 percent.

Table 3 reports this calculation alongside the 2.1 and 1.8 percent wealth MPCs motivated by the estimates above. Each row uses the same measured costs, reference safe rate, and discount rate; the

comes from [Beach, Gamber, and Moran \(2025\)](#), who estimate 0.8 percent for the top income quintile using aggregate consumption and total wealth by income group.

model maps the wealth MPC into the corresponding permanent-income consumption response and desired holdings.

Table 3: Issuance net of induced safe-asset demand

Annual wealth MPC	$\kappa_I(r_0)$	2015Q1 cost	2026Q2 cost	Reduction
2 percent	40.0	68.7	18.3	50.3
2.1 percent	32.1	74.9	34.5	40.3
1.8 percent	72.5	43.2	−48.0	91.2

Notes: The last three columns report cents per dollar of issuance, computed from (55) using unrounded inputs. The final column is the difference between the two cost columns. Each row evaluates the household response at the reference safe rate, $r_0 = 1.5$ percent, with $\rho = 1$ percent and $\lambda_I = m_I^w - \rho$. The 2.1 and 1.8 percent cases use the wealth-MPC estimates described above; the model supplies their implications for permanent-income consumption and safe holdings. Historical equilibrium responses also depend on the safe rate and household behavior at each date.

Across these wealth MPCs, the increase in absorption costs substantially reduces the net contribution of issuance. Lower consumption out of wealth produces a larger desired stock of safe assets and a larger offset to new supply. In the 1.8 percent case, induced demand exceeds issuance at the 2026Q2 cost, giving a negative net contribution and a downward safe-rate response.

5.3 Net safe-asset supply as the debt stock expands

To trace net safe-asset supply as debt expands, I combine the 2026Q2 pricing and maturity inputs with a specified absorption schedule and household parameters. Financial capacity, maturity, household preferences, and taxes remain fixed as the debt stock varies, while the safe rate adjusts to clear the asset market.

I normalize annual output to one. On June 30, 2026, federal debt held by the public was \$31.681 trillion, of which the Federal Reserve held \$4.492 trillion (U.S. Department of the Treasury, 2026; Federal Reserve, 2026). The resulting \$27.189 trillion outside the Fed includes bills, TIPS, floating-rate notes, and publicly held nonmarketable debt. Dividing by 2026Q2 annualized nominal GDP of \$32.563 trillion gives $b_0 \simeq 0.835$ (Bureau of Economic Analysis, 2026). I set the annual tax flow to $\bar{\tau} = 0.25$, close to U.S. general-government tax revenue of 25.6 percent of GDP in 2024 (OECD, 2025).

Di Maggio, Kermani, and Majlesi (2020, Table III) estimate that households between the 5th and 50th percentiles of financial wealth consume 23.3 cents per dollar of capital gains. I round this annual wealth MPC to 23 percent for group H . With the common discount rate $\rho = 0.01$, this gives $\lambda_H = m_H^w - \rho = 0.22$.

At the reference safe rate and absorption payment, asset-market clearing and $x_H + x_I = 1 - \bar{\tau}$ determine $x_I \simeq 0.0150$ and $x_H \simeq 0.7350$. The reference debt and tax choices therefore determine the allocation of disposable endowment income across groups. These income allocations remain fixed along the curve; government purchases adjust to finance debt service and absorption payments.

The pricing schedule uses the participation model in Section 3.4.1, with a linear support assessment, $\Gamma(\zeta) = c_\Gamma \zeta$, and an inelastic participation share $\underline{\alpha} = 0.8$. Convenience services decline inversely with debt toward a 12-basis-point floor:

$$v(b) = 0.0012 + v_a \frac{b_0}{b}.$$

I use the nominal note-and-bond pricing moments and maturity as representative inputs for this broader debt stock. I approximate maturity by the model's Poisson structure. The private-float-weighted remaining maturity of nominal Treasury notes and bonds is approximately 7.3 years in 2026Q2, implying $\delta \simeq 0.137$ per year. At the reference funding yield, the implied duration $D_0 = (r_0 + s_0 + \delta)^{-1}$ is approximately 6.4 years. Duration compensation follows (36) and enters the pricing fixed point (38).

The four 2026Q2 moments in Table 2 determine the remaining financial parameters: the cash and duration premia are 2.0 and 46.3 basis points, and their stock-repricing terms are 59.1 and 96.8 basis points. Matching these moments gives

$$c_\Gamma \simeq 0.00287, \quad N_0 \simeq 0.0675, \quad v_a \simeq 0.000820, \quad \vartheta_0 \simeq 0.0512.$$

The pricing moments determine effective capacity N_0 in model units; the dealer-parent index measures empirical capacity variation. The fit assigns the observed real term premium to the model's duration channel. Appendix D and Supplemental Appendix SE report the calibration details and sensitivity calculations.

At each debt stock, I solve the absorption-pricing equation and asset-market clearing jointly. Figure 2 reports the resulting schedule. The right panel plots

$$\mathcal{B}(b, N) = b - \kappa_I(r(b, N))S(b, N, \delta; r(b, N)),$$

as a percentage of annual model output. The market-clearing safe rate determines both desired holdings per dollar of absorption income and the duration component of absorption payments. Net safe-asset supply is 67.4 percent of annual model output at the reference allocation and reaches a maximum of 68.3 percent at $b^L = 0.974$.

The crossing in the left panel locates the peak in the right panel: marginal absorption cost reaches the critical value $1/\kappa_I(r(b, N))$, and the desired holdings induced by the marginal dollar of

debt absorb that dollar in full. Above that debt stock, induced demand exceeds additional issuance and net supply falls.

At the reference allocation, issuance contributes 18.3 cents per dollar before the safe rate adjusts, and this contribution reaches zero at the peak. The plotted slope, $\mathcal{B}_b$, also incorporates how the equilibrium safe-rate adjustment changes desired holdings and absorption payments. It therefore differs in magnitude from the marginal net contribution $1 - \kappa_I(r)S_b$, although both measures have the same sign and vanish at the same debt stock.

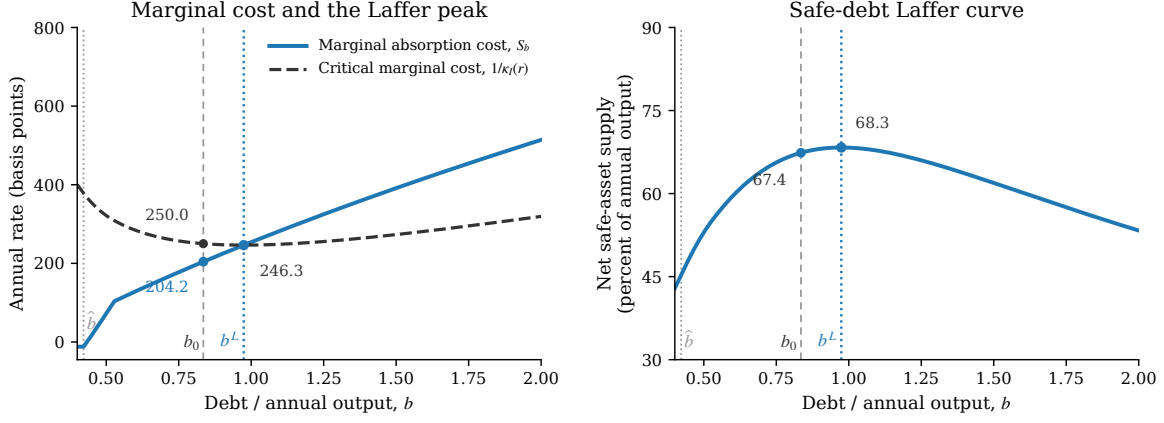


Figure 2: Marginal absorption cost and net safe-asset supply. The left panel plots marginal absorption cost and its critical value in annualized basis points. The right panel plots $100\mathcal{B}(b, N) = 100[b - \kappa_I(r(b, N))S]$, as a percentage of annual model output, evaluated at each debt stock's market-clearing safe rate. Its maximum occurs where marginal absorption cost equals its critical value. The illustration uses the pricing schedule and household parameters described in the text, with 2026Q2 pricing and maturity inputs and the measured reference debt ratio $b_0 \simeq 0.835$. Debt b is measured in units of annual model output. Vertical lines mark the onset of additional rollover support, $\hat{b}$ (gray dotted), the reference stock b_0 (gray dashed), and the Laffer peak b^L (blue dotted).

6 Conclusion

This paper develops a model in which public debt creates demand for safe assets through the payments required to absorb it. Institutions require compensation for rollover commitments and duration exposure, and these payments accrue to households with a low propensity to consume out of wealth. Their desired safe holdings rise with absorption income. As debt expands relative to financial capacity, the payments generated by additional issuance can induce more demand than the new debt supplies. Net safe-asset supply and the market-clearing safe rate then decline. Greater financial capacity reduces the required payments and raises the maximum net safe-asset supply.

The empirical analysis measures marginal Treasury absorption cost by combining cash-Treasury and real-duration premia with estimates of their responses to supply. The cash-supply estimates use changes in Federal Reserve holdings across maturity buckets and allow the response to vary with dealer-parent capacity. The duration estimates use purchase and runoff announcements. Applying these estimates to the stock held outside the Federal Reserve captures the cost of repricing outstanding debt. The resulting quarterly measure rises from approximately 78 to 204 basis points between 2015Q1 and 2026Q2, an increase of 126 basis points. Repricing accounts for 156 of the 204 basis points in 2026Q2. The premium on new debt alone therefore substantially understates the steady-state annual payment generated by additional issuance.

In the illustrative household calculation, this increase in absorption costs reduces the marginal net contribution of issuance from approximately 69 to 18 cents per dollar.

A Empirical Construction

A.1 Data construction

Dealer-parent capacity uses the Federal Reserve’s Consolidated Financial Statements for Holding Companies (FR Y-9C) and equation (8), assigning unused leverage room to potential Treasury absorption and adding existing Treasury inventory. Each fixed-rule measure is standardized separately using its estimation-sample moments. For the 5 percent measure, the twelve-month-horizon panel contains 119 starting months from January 2015 through March 2025, excluding March–June 2020. The estimation-sample mean and standard deviation are \$8.960 trillion and \$0.585 trillion.

The 5 and 6 percent thresholds are motivated by the former U.S. global systemically important bank (GSIB) holding-company and well-capitalized depository-subsubsidiary standards, respectively. Each index applies its chosen threshold uniformly to all reporting dealer parents, including those subject to different requirements. A final rule effective April 1, 2026 tied U.S. GSIB standards to firm-specific systemic-risk surcharges and capped the depository-subsubsidiary enhancement at one percentage point; banks could elect early adoption from January 1, 2026 ([Federal Reserve Board, FDIC, and OCC, 2025](#)). The empirical index retains fixed 5 and 6 percent requirements to measure balance-sheet room on a common scale over time. Its level is therefore a common-threshold capacity proxy.

The monthly capacity measure used in the interaction regression interpolates the quarterly regulatory measure using monthly changes in dealer-parent market equity. The interpolation preserves each quarterly regulatory mean, so leverage-room data determine the level of N_t . The 2026Q2 observation uses quarter-end FR Y-9C filings and the estimation-sample standardization moments. It covers sixteen dealer parents, compared with nine in 2015Q1. Eight appear at both endpoints; their fixed 5 percent capacity falls from \$7.632 trillion to \$6.421 trillion, while the corresponding full-sample values are \$7.772 trillion and \$7.527 trillion.

For cash-Treasury spreads, the two-, three-, five-, ten-, and thirty-year buckets use London Stock Exchange Group (LSEG) series identified by Reuters Instrument Codes (RICs), US2IRS2Y=RR, US3IRS3Y=RR, US5IRS5Y=RR, US10IRS10Y=RR, and US30IRS30Y=RR. The seven-year series uses the LSEG IRS-spread chain, 0#USIRSSPD=RR, where available from February 7, 2017; missing observations are filled with the Treasury par yield from US7YT=RR minus the swap par rate from USDSB3L7Y=. All six series use a LIBOR-consistent basis: the floating leg is three-month U.S. dollar LIBOR before July 2023 and compounded Secured Overnight Financing Rate (SOFR) plus the fixed 26.161-basis-point contractual fallback thereafter.

The cash-premium level uses the two-, five-, ten-, and thirty-year anchors, with remaining maturity clipped to the two- to thirty-year range before linear interpolation. Quarter-end nominal notes and bonds held outside the Federal Reserve determine the weights. I subtract Federal Reserve

holdings at their remaining maturities using the last System Open Market Account observation in each month.

The duration component uses DKW real term premia at five and ten years (D’Amico, Kim, and Wei, 2018). Let $\bar{M}_t$ denote the private-float-weighted remaining maturity of nominal notes and bonds after clipping each security to the one- to fifteen-year range. The daily mapped premium is the five-year estimate plus $(\bar{M}_t - 5)/5$ times the difference between the ten- and five-year estimates; the quarterly level averages this daily series. The mapped real term premium excludes inflation-risk compensation. I use the DKW data release covering observations through July 31, 2026. The June 30, 2026 stock held outside the Fed combines the June 30 Monthly Statement of the Public Debt (MSPD) stock with the June 24 SOMA observation.

The data sources in Table 4 are U.S. Department of the Treasury (n.d.); Federal Reserve Bank of New York (n.d.) for Treasury debt and Federal Reserve holdings, Federal Reserve Board (n.d.); Center for Research in Security Prices (n.d.) for capacity and monthly equity movements, and LSEG (n.d.); Kim, Walsh, and Wei (2019) for premia.

Table 4: Data sources for the empirical section

Series	Source	Frequency
Marketable debt, maturing share, and maturity buckets	Monthly Statement of the Public Debt and Treasury Fiscal Data	Monthly
Federal Reserve Treasury holdings by security	Federal Reserve SOMA holdings	Weekly/monthly
Tier 1 capital, leverage exposure, and Treasuries held by dealer parents	FR Y-9C regulatory filings	Quarterly
Treasury swap spreads	LSEG (RIC: 0#USIRSSPD=RR)	Daily
Real term premia	DKW estimates (D’Amico, Kim, and Wei, 2018)	Daily
Dealer-parent market equity	Center for Research in Security Prices (CRSP)	Daily

A.2 Cash-Treasury estimation and inference

Let m index maturity buckets, t starting months, and h horizons in months. The horizon change in a series x is

$$\Delta_h x_{m,t} = x_{m,t+h} - x_{m,t}.$$

Let $SOMA_{m,t}$ be SOMA holdings and $out_{m,t}$ total outstanding debt in bucket m . The Federal Reserve share is

$$share_{m,t} = 100 \times \frac{SOMA_{m,t}}{out_{m,t}}.$$

Thus β_h in (6) is basis points of spread per percentage-point increase in that share. Let $b_{m,t}^{priv}$ be notes and bonds held outside the Fed in the bucket, $b_t^{priv} = \sum_m b_{m,t}^{priv}$, and $w_{m,t} = b_{m,t}^{priv} / b_t^{priv}$. The SOMA share as a fraction is

$$\bar{w}_{m,t} = \frac{SOMA_{m,t}}{out_{m,t}}.$$

Allocate marginal issuance according to $db_{m,t}^{priv} = w_{m,t} db_t^{priv}$. At fixed bucket outstanding, a supply-equivalent transfer from SOMA implies

$$dshare_{m,t} = -100 \frac{db_{m,t}^{priv}}{out_{m,t}} = -100 \frac{w_{m,t} db_t^{priv}}{out_{m,t}}.$$

The aggregate spread response is

$$ds_t^R = \sum_m w_{m,t} \beta_h dshare_{m,t}.$$

Using $b_{m,t}^{priv} = (1 - \bar{w}_{m,t}) out_{m,t}$ yields (7). The private-float adjustment is 0.781 in 2015Q1 and 0.840 in 2026Q2. Applying the relative maturity-bucket response to aggregate issuance maintains the supply-equivalence assumption stated in Section 2.

With capacity-dependent slopes, the conversion is

$$\mathcal{M}_{h,t}^R = -100 \left(\beta_h + \gamma_h \tilde{N}_t \right) \sum_m w_{m,t} (1 - \bar{w}_{m,t}). \quad (A1)$$

The monthly panel includes maturity and start-month fixed effects and excludes the 2020 emergency-market episode. Persistent repricing averages horizons 12–24 months. Driscoll–Kraay/Newey–West inference uses 24 monthly lags to allow for overlapping outcome windows.

A.3 Real-duration event study

The event study uses two-trading-day DKW real-term-premium changes and assigned cumulative purchase or runoff amounts. Table 5 lists the twelve events and the dollar inputs used in estimation. The Maturity Extension Program is excluded because it changed maturity composition at approximately unchanged face amount. Table 6 reports HC3 inference with small-sample t critical values; the leave-one-event-out row reports point-estimate ranges.

The fixed-quantity purchase entries are \$300 billion for March 2009, \$600 billion for November 2010, and \$500 billion for March 15, 2020. The December 2012 entry of \$540 billion corresponds to twelve months of purchases at \$45 billion per month. For the August 2010 reinvestment announcement and March 23, 2020 open-ended announcement, I use dollar-equivalent amounts

of \$300 billion and \$1 trillion, respectively. For the runoff plan I use a \$540 billion reduction in purchases, and for the slowdown a \$210 billion increase.

Table 5: Treasury-relevant asset-purchase and runoff announcements

Date	Event	Amount	Date	Event	Amount
2009-03-18	QE1 Treasury purchases	+300	2013-12-18	Taper start	-200
2010-08-10	QE2 pre-announcement	+300	2020-03-15	COVID QE	+500
2010-11-03	QE2	+600	2020-03-23	COVID open-ended QE	+1000
2012-12-12	QE3	+540	2021-11-03	Taper	-120
2013-05-22	Taper hint	-300	2022-05-04	QT plan	-540
2013-06-19	Taper timeline	-200	2024-05-01	QT slowdown	+210

Notes: Amounts are announced changes in expected cumulative Treasury purchases, in billions of dollars, with negative values denoting tapering or balance-sheet runoff. QE denotes quantitative easing; QT denotes quantitative tightening. Open-ended and pace-change announcements are assigned cumulative purchase amounts.

Table 6: Duration event-study inference

Specification	β_D	HC3 standard error	95 percent interval	$\mathcal{M}_{2026Q2}^D$
Estimate with intercept	-0.0054	0.0024	[-0.0108, 0.0000]	97 [0, 194]
Excluding March 2020	-0.0085	0.0050	[-0.0201, 0.0031]	152
Leave-one-event-out range	[-0.0065, -0.0041]		—	[73, 116]

Notes: Slopes are basis points per billion dollars; repricing terms are basis points. The first two rows use HC3 standard errors and t critical values with 10 and 8 degrees of freedom. The intercept in the first row is 0.01 basis points with an HC3 standard error of 1.55. The leave-one-event-out row reports the range of point estimates obtained by omitting each event in turn.

B Household Demand for Safe Debt

The household allocation in Section 3 combines logarithmic consumption and saving with portfolios fully invested in supported safe claims. Epstein–Zin preferences with unit intertemporal elasticity recover this allocation as aversion to rollover losses becomes infinite.

B.1 Logarithmic households

For group $j \in \{H, I\}$, mortality has intensity λ_j , the utility discount rate is ρ , and income is nontradable. Actuarially fair annuities transfer the assets of members who die to survivors within the same group.

Index an individual by birth date v . Let $c_{j,v,u}$ be consumption at future date u . Conditional on being alive at date t , a member of group j chooses consumption to maximize

$$\int_t^\infty e^{-(\rho+\lambda_j)(u-t)} \log c_{j,v,u} du. \quad (\text{B1})$$

Let $w_{j,v,t}$ denote safe financial wealth, $y_{j,t}$ the nontradable income flow received by each living member, and r_t the safe interest rate. With actuarially fair annuities, the individual budget constraint is

$$\dot{w}_{j,v,t} = (r_t + \lambda_j)w_{j,v,t} + y_{j,t} - c_{j,v,t}. \quad (\text{B2})$$

The return r_t excludes the Treasury absorption premium.

The capitalized value of nontradable income received while the member remains alive is

$$h_{j,t} = \int_t^\infty \exp \left[- \int_t^u (r_z + \lambda_j) dz \right] y_{j,u} du. \quad (\text{B3})$$

For constant r and permanent income y_j , $h_j = y_j / (r + \lambda_j)$. The optimal consumption function is

$$c_{j,v,t} = (\rho + \lambda_j)(w_{j,v,t} + h_{j,t}). \quad (\text{B4})$$

A longer effective horizon lowers the propensity to consume out of wealth and increases saving from permanent income.

In aggregation, the annuity return $\lambda_j w_{j,v,t}$ to survivors offsets the removal of deceased members' holdings; newborns enter with zero assets. Aggregate financial income is therefore $r_t a_{j,t}$. Aggregating the individual budget and consumption rule gives (15) and (16). At constant income and safe rate, solving the stationary aggregate budget gives (18). The adjustment equation (19) follows by subtracting this stationary position from the aggregate budget.

B.2 Preferences and investment opportunities

For group $j \in \{H, I\}$, hold the safe rate r and permanent nontradable income $y_j > 0$ fixed. Let $\beta_j = \rho + \lambda_j$ denote the effective discount rate and $R_j = r + \lambda_j$ the annuitized safe return. Preferences weight utility by survival through the temporal discount rate; risk aversion $\sigma_j > 0$ concerns financial payoff risk conditional on survival.

Let $U_{j,t} > 0$ be continuation utility in consumption units. Preferences are the continuous-time limit, as $\Delta \downarrow 0$, of the Epstein–Zin recursion with unit intertemporal elasticity (Epstein and Zin, 1989; Duffie and Epstein, 1992):

$$\log U_{j,t} = (1 - e^{-\beta_j \Delta}) \log c_{j,t} + e^{-\beta_j \Delta} \log \text{CE}_{j,t}(U_{j,t+\Delta}), \quad (\text{B5})$$

where $\text{CE}_{j,t}(Z) = (\mathbb{E}_t Z^{1-\sigma_j})^{1/(1-\sigma_j)}$, with $\text{CE}_{j,t}(Z) = \exp(\mathbb{E}_t \log Z)$ at $\sigma_j = 1$. Expectations are over rollover risk conditional on being alive. On a deterministic consumption path, these preferences give the logarithmic objective in (B1), up to a positive normalization.

Capitalized income is $h_j = y_j/R_j$, and total wealth is $X_j = w_j + h_j$, where w_j is financial wealth. The deterministic income flow can collateralize annuitized borrowing, subject to the natural debt bound $X_j > 0$. Assets with rollover support earn R_j . A position without this support $u_j \geq 0$ earns an additional promised flow χu_j , with $\chi \geq 0$, but is exposed to rollover losses. Let J_t be a compound Poisson loss process with intensity $\eta > 0$ and independent loss fractions $\ell \in [0, \bar{\ell}]$, where $\bar{\ell} < 1$ and $\Pr(\ell > 0) > 0$. The position's share in total wealth is $\theta_j = u_j/X_j \in [0, 1]$. Conditional on survival, wealth obeys

$$dX_{j,t} = [R_j X_{j,t} - c_{j,t} + \chi u_{j,t}] dt - u_{j,t} - dJ_t. \quad (\text{B6})$$

The loss changes financial wealth while leaving the income flow unchanged. Investment opportunities are constant, and rollover losses are the household's only source of financial risk.

B.3 The finite-risk-aversion solution

Write $L_j(X) = \log U_j(X)$ for the optimized logarithmic continuation value. The recursive Bellman equation is

$$0 = \max_{c>0, 0 \leq \theta \leq 1} \left\{ \beta_j [\log c - L_j(X)] + L'_j(X) [(R_j + \chi \theta)X - c] \right. \\ \left. + \frac{\eta}{1 - \sigma_j} \mathbb{E} \left[e^{(1-\sigma_j)[L_j(X(1-\theta\ell)) - L_j(X)]} - 1 \right] \right\}, \quad (\text{B7})$$

with the jump term interpreted by continuity at $\sigma_j = 1$.

Define the risk-adjusted portfolio gain

$$Q_\sigma(\theta) = \chi\theta + \frac{\eta}{1-\sigma} \mathbb{E}[(1-\theta\ell)^{1-\sigma} - 1], \quad \theta_\sigma \in \arg \max_{\theta \in [0,1]} Q_\sigma(\theta). \quad (\text{B8})$$

At $\sigma = 1$, $Q_1(\theta) = \chi\theta + \eta \mathbb{E} \log(1 - \theta\ell)$. For any $\sigma > 0$, the objective is strictly concave. Let $Q_\sigma^* = Q_\sigma(\theta_\sigma)$. The household solution is

$$c_j(X) = \beta_j X, \quad u_j(X) = \theta_{\sigma_j} X, \quad (\text{B9})$$

$$U_j(X) = \beta_j X \exp \left[\frac{R_j - \beta_j + Q_{\sigma_j}^*}{\beta_j} \right]. \quad (\text{B10})$$

The infinite-horizon value follows by taking the horizon to infinity in discounted recursions with terminal utility proportional to total wealth. The homogeneous value has $L'_j(X) = 1/X$; the Bellman equation then separates consumption from the portfolio choice in (B8). Unit intertemporal elasticity gives the consumption fraction β_j , while risk aversion determines the unsupported share and the value of investment opportunities.

An interior unsupported share satisfies

$$\chi = \eta \mathbb{E} [\ell(1 - \theta_\sigma \ell)^{-\sigma}]. \quad (\text{B11})$$

If $\chi \leq \eta \mathbb{E} \ell$, the optimum is $\theta_\sigma = 0$. Otherwise it is the unique interior root when that root is below one, and the upper corner when it is not. For a fixed loss fraction $\ell = L \in (0, 1)$ and $\chi > \eta L$, the closed-form share is

$$\theta_\sigma = \min \left\{ 1, \frac{1 - (\eta L / \chi)^{1/\sigma}}{L} \right\}. \quad (\text{B12})$$

B.4 The limit of infinite risk aversion

Keep the promised excess return and loss distribution fixed as $\sigma \rightarrow \infty$. At any positive optimum, $\chi \geq \eta \mathbb{E} [\ell(1 - \theta_\sigma \ell)^{-\sigma}]$, with equality at an interior solution. For any share bounded away from zero, this risk-weighted loss diverges: choose $\ell_0 > 0$ with positive probability of $\ell \geq \ell_0$. Its contribution is bounded below by a positive constant times $(1 - \theta_\sigma \ell_0)^{-\sigma}$. Hence

$$\theta_\sigma \rightarrow 0, \quad 0 \leq Q_\sigma^* \leq \chi \theta_\sigma \rightarrow 0. \quad (\text{B13})$$

For a fixed loss and $\chi > \eta L$, $\theta_\sigma = \log(\chi / \eta L) / (\sigma L) + O(\sigma^{-2})$. Unsupported holdings and wealth losses vanish, so (B6) converges to the budget in (B2). The consumption rule $c_j = (\rho + \lambda_j)(w_j + h_j)$ already holds at every finite σ_j .

B.5 Aggregation and stationary wealth demand

Because the policies are linear in total wealth, within-group aggregation gives $c_j = \beta_j(a_j + h_j)$ and unsupported exposure $u_j = \theta_{\sigma_j}(a_j + h_j)$. Here a_j is aggregate financial wealth. When rollover losses are common, finite-risk-aversion aggregate wealth is stochastic. Let $\bar{a}_j$ denote its stationary mean and define $d_j = (\chi - \eta \mathbb{E}\ell) \theta_{\sigma_j}$, the expected excess-return contribution. If $\rho + \lambda_j - r - d_j > 0$, the mean budget implies

$$\bar{a}_j = \frac{r - \rho + d_j}{(r + \lambda_j)(\rho + \lambda_j - r - d_j)} y_j. \quad (\text{B14})$$

For a fixed safe rate in the main text's admissible interval, stationary risk also vanishes. Write $k_j = \beta_j - r - d_j$ for the mean adjustment rate and $v_j = \eta \theta_{\sigma_j}^2 \mathbb{E}\ell^2$ for the jump-variance coefficient. For sufficiently large σ_j , $2k_j > v_j$, and the stationary second moment gives

$$\text{Var}(a_j) = \frac{v_j(\bar{a}_j + h_j)^2}{2k_j - v_j} \longrightarrow 0. \quad (\text{B15})$$

The stationary allocation therefore converges in mean square to the main text's deterministic wealth demand:

$$a_j = \kappa_j(r) y_j, \quad \kappa_j(r) = \frac{r - \rho}{(r + \lambda_j)(\rho + \lambda_j - r)}, \quad (\text{B16})$$

on the main text's admissible interval $\rho < r < \rho + \lambda_j$. With $y_H = x_H$ and $y_L = x_L + S$, these are the two wealth demands in (23). The MPC out of permanent income is $\beta_j / (r + \lambda_j)$, as in (17).

With both groups' portfolios fully supported, these wealth demands and the government budget recover the main text's stationary equilibrium.

C Participation, Duration, and Treasury Absorption

This appendix derives the rollover-support and duration-pricing schedules in Sections 3.4.1 and 3.4.3 from institutional participation. A unit mass of financial institutions supplies rollover commitments that keep Treasury claims safe. Participation determines how much ordinary balance-sheet capacity is available. Institutions choose participation without observing the full active pool and require compensation for the support they may have to provide beyond ordinary capacity.

C.1 Rollover exposure and participation

Hold maturity fixed. Let $R = \mu(\delta)b$ be the inherited debt requiring rollover during the interval, where $\mu(\delta) = 1 - e^{-\delta}$; the short-maturity benchmark sets $\mu = 1$. Potential ordinary absorption capacity is N . An inelastic fraction $\underline{\alpha} \in (0, 1)$ always participates. The remaining, elastic institutions choose whether to participate in response to compensation and opportunity costs. If their participation share is $\tilde{\alpha}$, total participation is $\alpha = \underline{\alpha} + (1 - \underline{\alpha})\tilde{\alpha}$, and active ordinary capacity is αN .

Define utilization $q = R/N$. The rollover shortfall and the associated stress per unit of active capacity are

$$X = [R - \alpha N]_+, \quad \zeta(q, \alpha) = \frac{X}{\alpha N} = \left[\frac{q}{\alpha} - 1 \right]_+. \quad (\text{C1})$$

Normalizing the shortfall by active capacity makes the cost schedule homogeneous in debt and capacity. Lower participation raises the exposure borne by each unit of active capacity.

Let $\Gamma(\zeta)$ be the annualized compensation per dollar of supported debt required for this exposure. It reflects the nonpecuniary cost of committing balance-sheet resources to rollover support. Assume $\Gamma(0) = 0$, $\Gamma'(\zeta) > 0$ for $\zeta > 0$, and $\Gamma''(\zeta) \geq 0$. The state-contingent assessment borne by a participant is $a(q, \alpha) = \Gamma(\zeta(q, \alpha))$. Convexity captures the increasing marginal cost of expanding support beyond ordinary capacity.

C.2 The participation game and premium

Elastic institutions observe private signals $z_i = \theta + \eta \varepsilon_i$. The fundamental $\theta \in \mathbb{R}$ is an additive change in the annual opportunity cost of committing balance-sheet resources, measured relative to the reference state $\theta = 0$. Signal noise has scale $\eta > 0$; the independent noises have continuous distribution F , strictly positive log-concave density f , and finite first absolute moment. The prior over θ is flat. The private-signal structure follows Morris and Shin (1998).

Institutions maximize expected net compensation at the participation margin. Contracts are allocated equally across active institutions. A participant supports notional debt b/α and receives

$$\frac{b}{\alpha} [\pi^R - a(q, \alpha) - \theta]. \quad (\text{C2})$$

High opportunity costs discourage participation even with a large active pool. Aggregate gross payments remain $b\pi^R$. A symmetric cutoff strategy, $e_i = 1$ if $z_i \leq z^*$, implies

$$\alpha(\theta; z^*) = \underline{\alpha} + (1 - \underline{\alpha}) F\left(\frac{z^* - \theta}{\eta}\right). \quad (\text{C3})$$

Under the flat prior, conditional on the marginal signal, $(z^* - \theta)/\eta$ has density f , so α is uniform on $[\underline{\alpha}, 1]$. Equal contract allocation weights this posterior by exposure $1/\alpha$. Define

$$\begin{aligned} p(q) &= \frac{1}{\log(1/\underline{\alpha})} \int_{\underline{\alpha}}^1 \Gamma\left(\left[\frac{q}{\alpha} - 1\right]_+\right) \frac{d\alpha}{\alpha}, \\ c_F &= \frac{1}{\log(1/\underline{\alpha})} \int_{\underline{\alpha}}^1 F^{-1}\left(\frac{\alpha - \underline{\alpha}}{1 - \underline{\alpha}}\right) \frac{d\alpha}{\alpha}. \end{aligned} \quad (\text{C4})$$

The marginal institution's indifference condition is

$$\pi^R = p(q) + z^* - \eta c_F. \quad (\text{C5})$$

For a given quote, this equation determines a unique cutoff. Conditional on that cutoff, the payoff numerator decreases strictly with θ : participation falls, the exposure assessment rises, and the outside opportunity cost increases. It crosses zero once, with positive payoffs at sufficiently low fundamentals and negative payoffs at sufficiently high ones. Log-concavity gives the monotone likelihood ratio property. Marginal indifference then implies positive expected payoffs below z^* and negative expected payoffs above it, establishing the unique symmetric cutoff equilibrium.

Before opportunity costs are realized, the Treasury quotes the lowest spread that induces a target ordinary-capacity share $\alpha^T \in (\underline{\alpha}, 1)$ in the reference state $\theta = 0$. Equation (C3) fixes $z^* = \eta F^{-1}((\alpha^T - \underline{\alpha})/(1 - \underline{\alpha}))$, so the required spread is

$$\pi_\eta^R(q) = p(q) + \eta \left[F^{-1}\left(\frac{\alpha^T - \underline{\alpha}}{1 - \underline{\alpha}}\right) - c_F \right]. \quad (\text{C6})$$

As signal noise vanishes, $\pi_\eta^R(q) \rightarrow p(q)$ for every interior target. The main text uses this limit.

C.3 Implications for the absorption schedule

Proposition C1 (Participation and the gross support spread). *The premium in (C4) is zero for $q \leq \underline{\alpha}$, increasing for $q > \underline{\alpha}$, and convex. Thus $\pi^R(b, N, \delta) = p(\mu(\delta)b/N)$ has the active-region debt and capacity properties used in Sections 3.4.1 and 3.4.*

For each participation state, the assessment is increasing and convex in utilization, and the fixed exposure-weighted average preserves these properties. Once $q > \underline{\alpha}$, a positive measure of participants faces strictly positive stress, giving $p' > 0$. The negative debt-capacity interaction follows because additional capacity lowers both utilization and the sensitivity of the premium to debt. Derivatives at changes in the stress region can be interpreted as one-sided limits.

The quadratic illustration also has a participation interpretation. If Γ is smooth at zero with $\Gamma'_+(0) > 0$, the onset of stress satisfies

$$p(q) = \frac{\Gamma'_+(0)}{2\underline{\alpha}^2 \log(1/\underline{\alpha})} (q - \underline{\alpha})^2 + o((q - \underline{\alpha})^2), \quad q \downarrow \underline{\alpha}. \quad (C7)$$

Thus the smooth-onset specification in (31) captures the local expansion of the stress region as debt rises. In these capacity units, $\bar{q} = \underline{\alpha}$ and $\phi = \Gamma'_+(0)/[\underline{\alpha}^2 \log(1/\underline{\alpha})]$. Extending the quadratic beyond this local region supplies the curvature used in Figure S5.

Treasury convenience enters through $s^R = \pi^R - v(b)$, and the short-maturity absorption payment is $S = bs^R$. The net-cost restriction $S_{bb} > 0$ also depends on convenience dilution, as specified in Section 3.4.1. The participation game determines gross support compensation, and the household block assigns the net payment S to group I as lifetime income.

C.4 Duration exposure and balance-sheet compensation

The participation game extends to the duration-price component when ordinary rollover support and the associated mark-to-market exposure use the same balance-sheet resources. Let $D = (r + s + \delta)^{-1}$ be the duration of a claim with Poisson maturity. A mean-zero yield innovation with annualized variance $\sigma_y^2 > 0$ gives the claim local return variance

$$\sigma_y^2 D^2 = \frac{\sigma_y^2}{(r + s + \delta)^2}. \quad (C8)$$

Assume that balance-sheet resources reserved against price risk (economic capital) are proportional to this return variance. Let $\chi(N) > 0$ be the capital requirement per unit of variance, relative to the resources committed to ordinary support. Both uses face the same state-dependent cost of committing capacity, including its fundamental component θ . The additional duration-

capital requirement is therefore $\chi(N)\sigma_y^2 D^2$ times ordinary support. With $\vartheta(N) = \chi(N)\sigma_y^2$, the total assessment per dollar of supported debt is

$$a^T(q, \alpha, \theta; r, s, \delta) = [a(q, \alpha) + \theta] [1 + \vartheta(N)D^2]. \quad (\text{C9})$$

The restriction $\chi_N < 0$, and hence $\vartheta_N < 0$, captures the lower capital intensity of duration exposure when financial capacity is abundant.

Let π_η^{gross} denote the combined gross quote. Replacing the assessment by a^T gives $\pi_\eta^{\text{gross}} = [1 + \vartheta(N)D^2]\pi_\eta^R$ under the same procurement target. Taking the small-noise limit yields

$$\pi^{\text{gross}} = [1 + \vartheta(N)D^2] p(q) = [1 + \vartheta(N)D^2] \pi^R. \quad (\text{C10})$$

At a given quote s , holding r , N , and δ fixed, the capital multiplier is common across participation states. Scaling both the quote and the full assessment multiplies net payoffs by the same positive factor, preserving the cutoff and procurement condition. Netting out convenience services yields the fixed point in (38), with $s^D = \vartheta(N)\pi^R D^2$. The squared-duration factor reflects return variance; the proportionality to π^R follows from the shared capital-cost technology. Supplemental Appendix [SB](#) adds an independent component of uncertainty about future rollover conditions for the maturity-choice problem.

D Parameters and Numerical Illustration

The reference allocation used for Figure 2 combines 2026Q2 pricing and maturity inputs with the measured reference debt-to-GDP ratio and the 2 percent wealth MPC used in Section 5.

D.1 Pricing inputs and reference allocation

I set the reference safe rate to $r_0 = 1.5$ percent, informed by the medium-run natural-rate estimate in Cúrdia (2026). The reference absorption premium is 48.3 basis points. I use the nominal note-and-bond pricing moments and maturity as representative inputs for federal debt held by the public excluding the Fed. I approximate maturity by the model’s Poisson structure. Let $\bar{M}_0$ be the private-float-weighted remaining maturity of nominal notes and bonds, approximately 7.3 years in 2026Q2. The maturity intensity and implied yield duration are

$$\delta = \bar{M}_0^{-1}, \quad D_0 = \frac{1}{r_0 + s_0 + \delta}. \quad (\text{D1})$$

These inputs imply $\delta \simeq 0.137$ per year and $D_0 \simeq 6.4$ years. The remaining-maturity measure uses the debt and Federal Reserve holdings described in Appendix A, before the clipping used to interpolate the real term premium.

The absorption schedule matches the four 2026Q2 moments in Table 2. I use the participation schedule in Appendix C with a support cost proportional to rollover shortfalls and convenience that declines inversely with debt toward a 12-basis-point floor. The two premium levels and two stock-repricing terms jointly determine the support-cost scale, baseline utilization, convenience above the floor, and the duration coefficient. The dealer-parent index measures capacity variation; fitting these pricing moments determines the model’s effective capacity level. Baseline utilization exceeds ordinary capacity at every participation rate, so the gross support spread is affine in debt between the baseline and the peak. Supplemental Appendix SE reports the fit and Table S5 lists the parameters. The fitted model capacity is $N_0 \simeq 0.0675$, in model units. Matching the full DKW real term premium attributes it to the model’s duration channel; the measured premium can reflect real-duration risk arising through balance-sheet constraints and other channels.

D.2 Household parameters and the absorption-cost margin

Section 5 motivates the assumed annual wealth MPC of $m_I^w = 0.02$. I set $m_H^w = 0.23$, rounding the 0.233 estimate for financial-wealth percentiles 5–50 in Di Maggio, Kermani, and Majlesi (2020, Table III), and set $\rho = 0.01$. Since $m_j^w = \rho + \lambda_j$, these choices imply $\lambda_I = 0.01$ and $\lambda_H = 0.22$. At

the reference safe rate, group I 's permanent-income MPC is 0.8 and its desired safe holdings per unit of annual income are $\kappa_I = 40$.

The annual net spending rate out of additional wealth is $m_I^w - r_0 = 0.005$. Dividing by the initially saved share of additional income gives the critical marginal cost:

$$\frac{1}{\kappa_I(r)} = \frac{m_I^w - r}{1 - m_I(r)}. \quad (\text{D2})$$

At the reference allocation this critical cost is 250 basis points.

I use the measured reference debt-to-GDP ratio $b_0 \simeq 0.835$ and the tax flow $\bar{\tau} = 0.25$, as described in Section 5. At the reference safe rate and absorption payment, asset-market clearing and $x_H + x_I = 1 - \bar{\tau}$ determine the two after-tax endowment incomes. Their allocation is then held fixed as debt varies. Group I holds 91.3 percent of safe debt. Its after-tax endowment income is approximately 0.0150 units of output and its income including absorption payments is approximately 0.0191. These shares are implied by market clearing and the household parameters.

With one household type, asset-market clearing would require $b = \kappa(r)(1 - \bar{\tau} + S)$. Matching the same reference debt stock, safe rate, tax flow, and absorption payment gives a wealth–income ratio of 1.11 and a critical cost of approximately 9,031 basis points, compared with 250 in the two-group illustration. These aggregates pin down the one-group threshold across preferences consistent with the reference allocation. The lower two-group threshold depends on concentrating absorption income among households whose desired wealth–income ratio substantially exceeds the aggregate ratio.

For comparisons of measured costs at a common household response, define

$$\mathcal{G}_t^{\text{ref}} = \frac{1}{\kappa_I(r_0)} - S_{b,t}. \quad (\text{D3})$$

The margin falls from 171.6 basis points at the 2015Q1 cost to 45.8 at the 2026Q2 cost. Multiplying by $\kappa_I(r_0)$ gives the marginal net contribution per dollar of debt, the comparison in Section 5. Along the full equilibrium debt experiment, the safe rate and the critical cost adjust together.

D.3 Debt issuance and financial capacity

I increase debt holding financial capacity, the duration coefficient ϑ , maturity intensity, household preferences, and taxes fixed. Government purchases adjust to the stationary budget constraint. At each stock, I jointly solve the absorption-pricing condition (38) and asset-market clearing (24).

Before the peak, issuance expands the net supply of safe assets while raising the absorption premium and the cost of repricing the outstanding stock. The accompanying increase in the safe rate raises recipients' desired wealth per unit of income, reducing the critical marginal cost. It

also shortens duration, which moderates the rise in absorption cost. Along the computed schedule, marginal cost rises and the critical value falls, narrowing the absorption-cost margin.

Greater financial capacity lowers the cost of supporting a given debt stock and reduces the duration-capital requirement. Let N_0 and ϑ_0 denote reference capacity and the duration coefficient. I vary capacity with $\vartheta(N) = \vartheta_0 N_0 / N$, holding the support-cost and convenience parameters, household preferences, and taxes fixed. At the reference debt stock, a 10 percent capacity increase raises net safe-asset supply from 67.4 to 72.2 percent of annual model output; a 25 percent increase raises it to 78.5 percent. The corresponding maxima are 74.5 and 83.6 percent, compared with 68.3 percent at reference capacity (Table S7).

D.4 The illustrative Laffer peak

Table 7 compares the reference allocation with the computed maximum of net safe-asset supply.

	Reference allocation	Laffer peak
b (annual model output units)	0.835	0.974
Net safe-asset supply, $\mathcal{B}$ (annual model output units)	0.674	0.683
Real safe rate (percent)	1.500	1.504
Real Treasury funding rate (percent)	1.983	2.240
Absorption premium (bp)	48.3	73.6
Marginal absorption cost (bp)	204.2	246.3
Critical marginal cost (bp)	250.0	246.3
Absorption-cost margin (bp)	45.8	0.0

Notes: The reference allocation uses 2026Q2 pricing and maturity inputs and the measured reference debt ratio $b_0 \simeq 0.835$. Debt service and absorption payments are financed by lower government purchases. Net safe-asset supply is defined in (42). Its peak satisfies $1 - \kappa_I(r)S_b = 0$, and the denominator in (43) is positive along the reported schedule. The wealth MPCs are 2 and 23 percent, and the common discount rate is 1 percent. These preferences remain fixed as debt changes. Calculations use unrounded inputs.

In this illustration, net safe-asset supply rises from 0.445 units of annual output at the reference allocation to a maximum of 0.451. The safe rate rises by 0.4 basis point over this interval, while the funding rate rises by 25.7 basis points, of which 25.3 come from the absorption premium. Elastic stationary wealth demand limits the safe-rate adjustment: a 1-basis-point increase raises desired holdings by approximately 3.4 percent at the reference allocation. The critical cost falls from 250 to 246.3 basis points. Supplemental Tables S6 and S7 report how the illustrative curve changes with pricing assumptions and financial capacity.

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Supplemental Appendix

SA Additional Empirical Results

SA.1 Cash-Treasury repricing details

The cash-Treasury design is a monthly maturity panel. The term $\mathcal{M}_{h,t}^R$ is the stock-repricing contribution at horizon h and date t ; γ_h is the capacity interaction coefficient. Omitting h from the repricing term denotes its average over the reported horizons. Equations (6) and (9) include maturity and start-month fixed effects and exclude the 2020 emergency-market episode. Because adjacent $h = 12\text{--}24$ changes overlap, inference uses Driscoll–Kraay/Newey–West standard errors with 24 monthly lags. The figures show overlap-robust and month-clustered confidence bands.

Start-month effects absorb curve-wide repricing, so the regressions identify maturity-specific movements around the Treasury curve. The interaction sample begins in 2015Q1, when regulatory capacity becomes available. The linear estimates use the average supply slope, while the interacted estimates evaluate how that slope changes at the 2026Q2 capacity level.

Figure S1 reports linear estimates for samples beginning in 2015 and 2010. The average slopes over the persistent $h = 12\text{--}24$ window are -0.27 and -0.48 , respectively. The overlap-robust bands are wider than the month-clustered bands, especially in the shorter sample. Point estimates are negative in both samples.

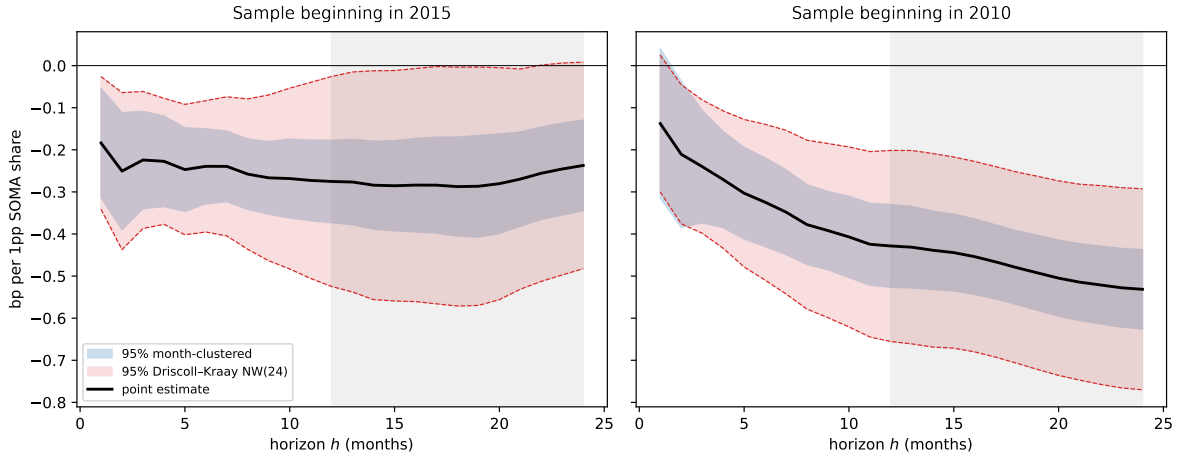


Figure S1: Linear cash-Treasury repricing estimates. The panels report β_h for samples beginning in 2015 and 2010. Black lines are point estimates; blue bands are month-clustered 95 percent confidence intervals; red dashed bands use Driscoll–Kraay/Newey–West inference with 24 monthly lags. The shaded region is the $h = 12\text{--}24$ averaging window. The average slopes in that window are -0.27 and -0.48 , respectively.

Table S1: Capacity-dependent cash-Treasury repricing

Leverage threshold	Average β_h	Average γ_h	Overlap-robust t_{γ_h}
Fixed 5 percent	−0.24	0.19	2.4–2.9
Fixed 6 percent	−0.34	0.17	1.0–1.6

Notes: Coefficients are averages over $h = 12$ –24. Here t_{γ_h} is the t -statistic for the interaction coefficient, using Driscoll–Kraay/Newey–West standard errors with 24 monthly lags. Capacity is standardized separately for each leverage threshold using fixed estimation-sample moments.

Under the fixed 5 percent leverage threshold, the interaction is positive throughout the 12–24-month horizon range and statistically significant under the reported inference (Figure S2).

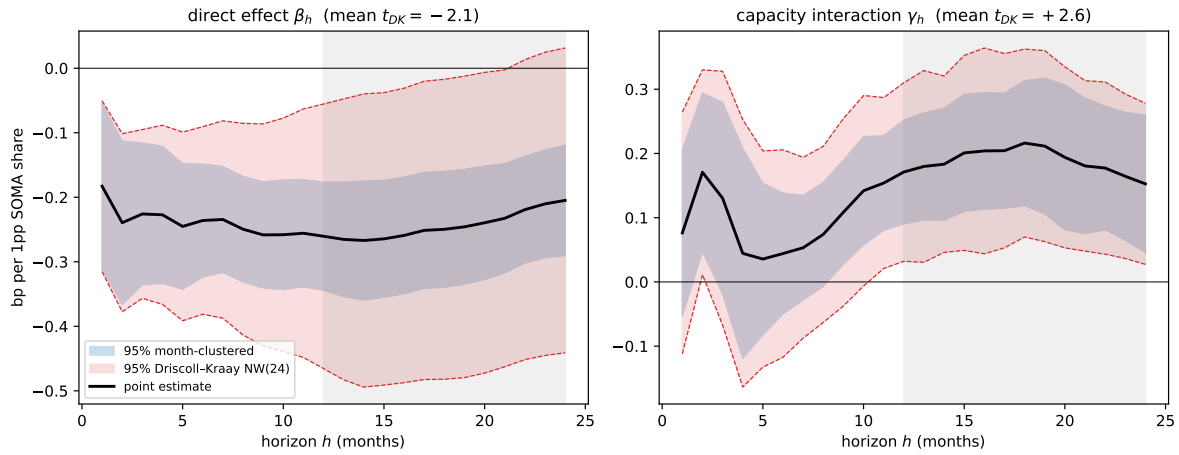


Figure S2: Capacity-dependent cash-Treasury repricing estimates. The left panel reports the supply slope at mean capacity β_h , and the right panel reports the capacity interaction γ_h , using the fixed 5 percent leverage threshold. Black lines are point estimates; blue bands are month-clustered 95 percent confidence intervals; red dashed bands use Driscoll–Kraay/Newey–West inference with 24 monthly lags. Over $h = 12$ –24, the interaction averages 0.19 and its overlap-robust t -statistics average 2.6.

The interaction is positive under both the 5 and 6 percent leverage thresholds (Figure S3). Its overlap-robust t -statistics range from 2.4 to 2.9 under the 5 percent threshold and from 1.0 to 1.6 under the 6 percent threshold.

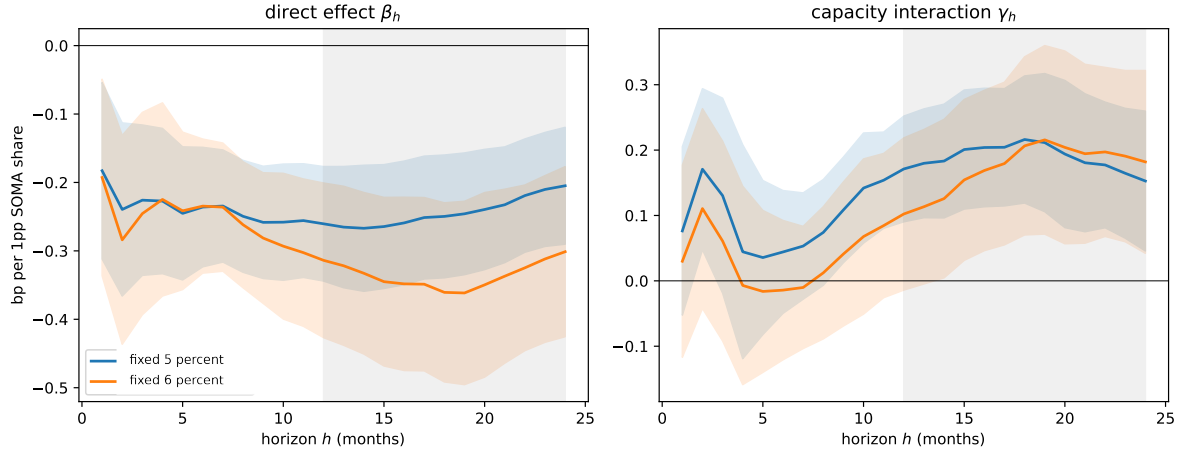


Figure S3: Capacity-dependent estimates under fixed 5 and 6 percent leverage thresholds. Point estimates and bands are shown for the supply slope at mean capacity β_h and capacity interaction γ_h ; the shaded region is the $h = 12\text{--}24$ averaging window.

The instrumental-variables (IV) specification instruments the SOMA share within each maturity bucket with its $t - 6$ level and trailing six-month issuance into the bucket relative to bucket outstanding, a proxy for the on-the-run status of recently issued securities. These variables adapt the pre-program security characteristics in [D’Amico and King \(2013\)](#); maturity effects absorb time-invariant maturity attributes. The exclusion restriction is that, conditional on the fixed effects, the instruments affect subsequent spread changes through the SOMA share. [Figure S4](#) reports the linear two-instrument specification alongside the linear OLS comparison.

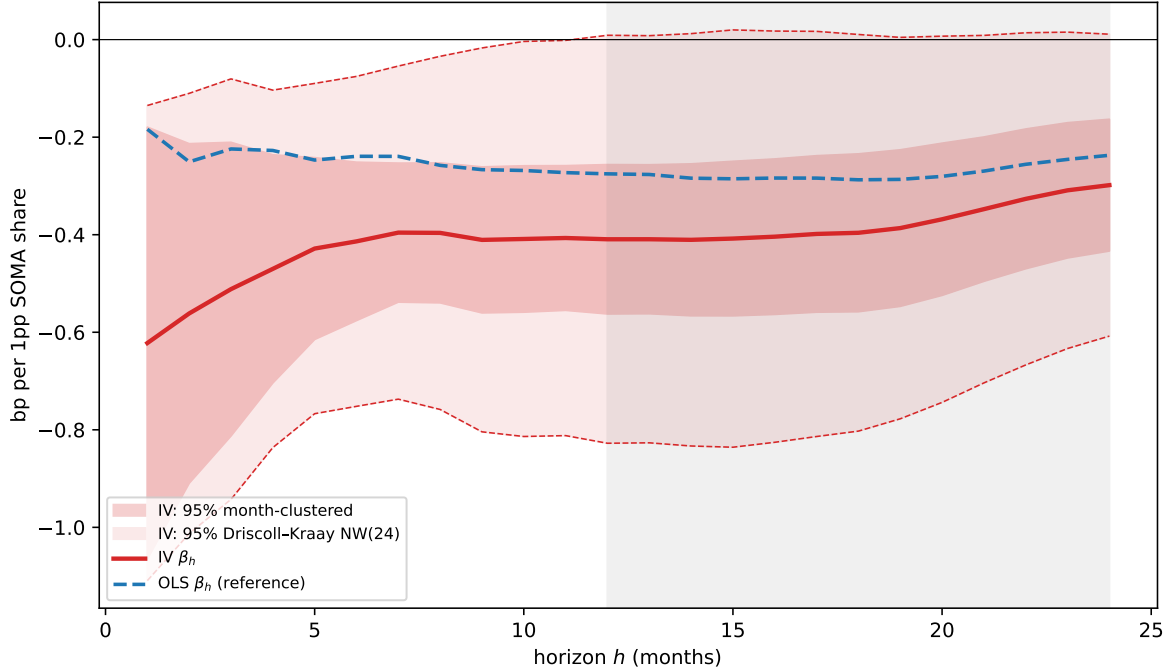


Figure S4: Linear IV estimates with overlap-robust inference. The instruments, measured at $t - 6$, are lagged maturity-bucket SOMA share and a trailing-issuance on-the-run proxy. The solid red line is the IV estimate and the dashed blue line is the OLS estimate; the bands show month-clustered and Driscoll–Kraay/Newey–West 95 percent confidence intervals. The shaded region is the $h = 12\text{--}24$ averaging window, over which the IV and OLS slopes average -0.37 and -0.27 .

Table S2: Linear cash-Treasury repricing estimates

Specification	Sample	Average β_h , $h = 12\text{--}24$	$\mathcal{M}_{2026Q2}^R$
OLS, no capacity interaction	2015–2026	-0.273	23
OLS, no capacity interaction	2010–2026	-0.480	40
IV, no capacity interaction	2015–2026	-0.375	32

Notes: Coefficients are basis points per percentage point of the SOMA share within a maturity bucket; repricing terms use the 2026Q2 maturity weights and are rounded to whole basis points. Inference allows for serial dependence across overlapping starting months. The IV row instruments the change in the SOMA share with lagged SOMA share and trailing issuance, an on-the-run proxy for recently issued securities. Appendix A describes the cash-Treasury design and inference.

SA.2 Comparisons across empirical specifications

Between 2015Q1 and 2026Q2, marginal absorption cost rises by 125.9 basis points in the capacity-dependent specification and 117.2 in the linear specification estimated on the sample beginning in 2015. The corresponding increases in the linear OLS sample beginning in 2010 and the linear IV specification are 118.4 and 117.8 basis points.

The 117.2-basis-point increase in the linear specification consists of 59.3 basis points from higher premium levels, 56.2 from growth in the stock held outside the Fed through duration repricing, and 1.6 from changes in the cash-Treasury maturity weights. The capacity-dependent specification also allows the cash-supply response to steepen as dealer-parent capacity falls.

Table S3 varies the duration estimate using the 2026Q2 data. The share-normalized estimate regresses the two-day average-maturity premium change on announced purchases divided by the contemporaneous stock of notes and bonds held outside the Fed. The ten-year estimate uses the two-day change in the ten-year DKW real term premium. Both use the twelve announcements and an intercept.

Table S3: Duration sensitivity of the 2026Q2 marginal Treasury absorption cost

Capacity-dependent specification	$S_{b,2026Q2}$	Reference margin $\mathcal{G}_{2026Q2}^{\text{ref}}$
Share-normalized duration (61.5 bp)	169	81
Average-maturity duration (96.8 bp)	204	46
Ten-year duration (127 bp)	234	16

Notes: Entries are rounded to whole basis points. The cash-Treasury premium, real-duration premium level, and cash repricing term are measured in 2026Q2; the latter uses the fixed 5 percent leverage threshold. The reference margin compares measured marginal cost with the illustrative threshold of 250 basis points defined in Appendix D.2.

Table S4: Marginal Treasury absorption cost across specifications, 2026Q2

Specification	s_t^R	s_t^D	$\mathcal{M}_t^R$	$\mathcal{M}_t^D$	$S_{b,t}$
Capacity-dependent OLS	2	46	59	97	204
Linear OLS, 2015–2026	2	46	23	97	168
Linear OLS, 2010–2026	2	46	40	97	185
Linear IV, 2015–2026	2	46	32	97	177

Notes: Entries are annualized basis points rounded to whole numbers. The capacity-dependent row uses the OLS interaction under the fixed 5 percent leverage threshold. Linear rows use the slopes in Table S2. Repricing terms apply the 2026Q2 debt stock and maturity weights to equations (7), (A1), and (12). Totals are computed before rounding.

SA.3 Local cost changes

The local calculation in Section 2.8 uses the CBO's end-of-year debt stock. Using the implied beginning-of-year stock raises the borrowing ratio to approximately 6.5 percent and the calculation to about 16 basis points. Under the share-normalized duration conversion, both repricing terms are held fixed; a 61.5-basis-point duration term implies approximately 7 basis points at the 6.1 percent ratio.

SB Maturity Choice

SB.1 Rollover uncertainty and debt management

This appendix extends the maturity specification in Section 3.4 to allow uncertainty about future rollover conditions. Longer duration increases exposure to this uncertainty, including when the current expected rollover burden is small. Let b denote the debt stock, N absorption capacity, r the safe rate, δ the maturity intensity, and $\pi^R = p(\mu(\delta)b/N)$ the gross rollover-support spread, with $\mu(\delta) = 1 - e^{-\delta}$. The convenience value is $v(b)$, and $\vartheta(N)$ scales duration-price compensation.

The duration component in Section 3.4 prices the current expected rollover burden. For the debt-management problem, future rollover conditions can also vary around that expectation. Let $\sigma_X^2 > 0$ denote the variance of exogenous uncertainty about future rollover conditions or compensation, and let $\vartheta_X(N) > 0$ price the associated balance-sheet exposure, with $\vartheta_{X,N}(N) < 0$.

Let s^M denote the total premium for maturity choice. Its cash, duration, and rollover-uncertainty components are s^R , s^D , and s^X , respectively:

$$s^R = \pi^R(b, N, \delta) - v(b), \quad (\text{SB1})$$

$$s^D = \frac{\vartheta(N)\pi^R(b, N, \delta)}{[r + s^M(b, N, \delta) + \delta]^2}, \quad (\text{SB2})$$

$$s^X = \frac{\vartheta_X(N)\sigma_X^2}{[r + s^M(b, N, \delta) + \delta]^2}. \quad (\text{SB3})$$

Combining the three components gives the maturity-choice fixed point:

$$s^M = -v(b) + \pi^R(b, N, \delta) + \frac{\pi^R(b, N, \delta)\vartheta(N) + \vartheta_X(N)\sigma_X^2}{[r + s^M + \delta]^2}. \quad (\text{SB4})$$

Equation (SB4) has a unique solution on $r + s^M + \delta > 0$, conditional on the safe rate. Shorter maturity raises rollover utilization but reduces the duration exposure to both expected rollover costs and uncertainty about future conditions.

Capacity lowers gross rollover compensation and both price-exposure coefficients, implying $s_N^M < 0$ at a fixed safe rate and maturity.

SB.2 Optimal maturity

This exercise holds convenience services fixed across maturities. Greater convenience benefits at the short end would add a force favoring shorter debt. For fixed b , minimizing total funding cost $b[r + s^M]$ at a given safe rate is equivalent to minimizing s^M . The government chooses the optimal

maturity intensity $\delta^*(b, N)$:

$$\delta^*(b, N) \in \arg \min_{\delta > 0} s^M(b, N, \delta). \quad (\text{SB5})$$

At an interior local minimum with $s_{\delta\delta}^M > 0$, the optimality condition balances the marginal rollover cost of shorter maturity against its reduction in duration exposure:

$$\left[1 + \frac{\vartheta(N)}{(r + s^M + \delta)^2} \right] \pi_{\delta}^R = \frac{2 [\pi^R \vartheta(N) + \vartheta_X(N) \sigma_X^2]}{(r + s^M + \delta)^3}. \quad (\text{SB6})$$

The left side is the amplified increase in rollover-support cost from shortening maturity. The right side is the reduction in price exposure obtained by shortening the claim. The exogenous uncertainty term remains positive even if the current expected rollover burden is zero.

At a given safe rate and debt stock, the capacity response of this interior optimum is

$$\frac{d\delta^*(b, N)}{dN} = - \frac{s_{\delta N}^M(b, N, \delta^*)}{s_{\delta\delta}^M(b, N, \delta^*)}. \quad (\text{SB7})$$

The effect is generally ambiguous. Capacity attenuates the rollover-utilization effect of shorter maturity and lowers both price-exposure coefficients, while the endogenous duration denominator adds an offsetting effect. When $s_{\delta N}^M < 0$ at the optimum, greater capacity raises the optimal maturity intensity; a reduction in capacity therefore increases optimal average maturity.

SC Capitalization and Demand for Safe Assets

Absorption payments create demand for safe assets when the additional payments exceed the consumption they induce, including through capitalization. This appendix states the condition and develops an implementation in which households can trade a perpetual claim on the payments. A nonpecuniary assessment of owners' duration exposure determines its value and their optimal portfolios.

SC.1 The consumption condition

Keep the main text's stationary environment. Output is one, taxes are fixed at $\bar{\tau}$, and government purchases satisfy

$$g = \bar{\tau} - rb - S(b, r). \quad (\text{SC1})$$

Financial capacity N and maturity intensity δ are held fixed and suppressed from the arguments. Group I receives the absorption payment S ; $x_H, x_I > 0$ are fixed after-tax endowment incomes, with $x_H + x_I = 1 - \bar{\tau}$. Let a_I be group I 's safe holdings and let $c_I(a_I, b; r)$ be its consumption schedule, including the wealth value of future absorption payments. The partial derivative $c_{I,b}$ holds safe holdings and the safe rate fixed and includes all capitalization effects of issuance.

Within a stationary allocation, asset prices and aggregate holdings are constant. Group I 's budget therefore gives

$$c_I(a_I, b; r) = ra_I + x_I + S(b, r). \quad (\text{SC2})$$

Suppose $c_{I,a} > r$, so excess safe wealth is spent down. Differentiating this budget at a fixed safe rate gives the response of desired safe holdings:

$$a_{I,b}^d = \frac{S_b - c_{I,b}}{c_{I,a} - r}. \quad (\text{SC3})$$

The numerator is the additional payment less the consumption it induces at unchanged safe holdings. The denominator is the net spending generated by each unit of accumulated safe wealth.

Group H 's desired safe holdings depend only on r . On an equilibrium branch with $a_H'(r) + a_{I,r}^d > 0$, market clearing implies

$$r_b = \frac{1 - a_{I,b}^d}{a_H'(r) + a_{I,r}^d}. \quad (\text{SC4})$$

Issuance lowers the safe rate precisely when

$$S_b - c_{I,b} > c_{I,a} - r. \quad (\text{SC5})$$

Thus a positive saving response to absorption payments is not by itself sufficient for reversal: induced demand must exceed the additional debt. In the goods market, hold group H at its desired holdings and assign the additional debt to group I . The expenditure response is $c_{I,a} - r + c_{I,b} - S_b$, giving the same condition.

SC.2 Nontradable income and tradable claims

The two implementations below share a linear consumption rule. As in the main text, mortality intensities satisfy $\lambda_H > \lambda_I > 0$. Write

$$m = \rho + \lambda_I, \quad h = \frac{x_I}{r + \lambda_I}, \quad \rho < r < m,$$

where ρ is the common discount rate and λ_I is group I 's mortality intensity. Let $V(b, r)$ denote the wealth value of absorption payments entering consumption, so

$$c_I = m(a_I + h + V). \quad (\text{SC6})$$

In the baseline, V is human wealth from the nontradable entitlement. In the alternative, it is the market value of the tradable claim. Absorption payments enter wealth once in either case.

For $j \in \{H, I\}$, retain

$$\kappa_j(r) = \frac{r - \rho}{(r + \lambda_j)(\rho + \lambda_j - r)}.$$

Combining (SC6) with the stationary budget yields

$$a_I = \kappa_I(r)x_I + T(b, r), \quad T(b, r) = \frac{S(b, r) - mV(b, r)}{m - r}. \quad (\text{SC7})$$

Here T is the change in desired safe holdings attributable to the absorption payment stream. The marginal response is

$$T_b = \frac{S_b - mV_b}{m - r}. \quad (\text{SC8})$$

For the baseline entitlement, $V = S/(r + \lambda_I)$. Equation (SC7) then gives $T = \kappa_I S$, recovering the main text. The mortality adjustment applies because the entitlement expires at death.

For a tradable perpetual claim with value $Q = S/R$, R is its stationary capitalization yield. The claim survives its owner's death, and $V = Q$. At a fixed capitalization yield, an additional unit of annual payments raises desired safe holdings by

$$\left. \frac{\partial a_I^d}{\partial S} \right|_{r, R} = \frac{1 - m/R}{m - r}. \quad (\text{SC9})$$

This response is positive when $R > m$. More generally, issuance can change the required yield as well as the payment, and the relevant consumption response is mQ_b . The next subsection determines both the yield and ownership from portfolio choice.

SC.3 A tradable absorption franchise

Replace group I 's personal absorption entitlement with one unit of a tradable perpetual franchise paying $S > 0$. The available financial assets are safe claims and the franchise. The franchise has no operating expenditure, so its dividend equals the absorption transfer. Its value is Q , its capitalization yield is $R = S/Q$, and its yield duration, holding the dividend fixed, is $D_S = 1/R$.

The main text assesses institutional duration exposure using

$$s^D = \vartheta(N)\pi^R(b, N, \delta)D_B^2, \quad D_B = (r + s + \delta)^{-1},$$

where π^R is gross rollover compensation and ϑ incorporates yield variance and the capital requirement per unit of variance. Extend this assessment to owners of the franchise by setting

$$k(b, N, \delta) = \zeta \vartheta(N)\pi^R(b, N, \delta), \quad \zeta > 0. \quad (\text{SC10})$$

The coefficient ζ allows owners' exposure cost and the franchise's yield-shock loading to differ from those of institutions holding Treasuries. Setting $\zeta = 1$ uses the same coefficient; Treasury pricing alone does not identify this restriction.

For an individual in group I , let w be financial wealth, $X = w + h > 0$ total wealth, and q the market value of franchise holdings. Define the portfolio share $\alpha = q/X$. Fair annuities cover both financial assets, and the individual faces

$$\dot{X} = [r + \lambda_I + (R - r)\alpha]X - c. \quad (\text{SC11})$$

Borrowing in the safe account is allowed subject to lifetime solvency. At constant prices, the individual chooses consumption and the portfolio to maximize

$$\int_0^\infty e^{-mt} \left[\log c_t - \frac{k}{2mR^2} \alpha_t^2 \right] dt. \quad (\text{SC12})$$

The assessment is quadratic in portfolio duration α/R , and is nonpecuniary. A sale transfers the dividend entitlement and duration exposure to the buyer. Trading reallocates the exposure across owners; it does not remove the aggregate exposure.

The Bellman equation admits $v(X) = \log X/m + C$. Substitution gives

$$c = mX, \quad \alpha = \frac{(R-r)R^2}{k}. \quad (\text{SC13})$$

The portfolio objective is strictly concave, so the holding is unique at given prices. The consumption rule follows from the homogeneity of the objective, including the exposure assessment.

Group H retains its safe portfolio. This can be optimal with access to the same franchise: let its nonpecuniary assessment be $k_H|\alpha_H|/(m_H R^2)$, where $m_H = \rho + \lambda_H$. Its optimal holding is zero whenever $k_H > (R-r)R^2$. On a branch with $0 < \alpha < 1$, any $k_H > k$ suffices. Consumption remains $c_H = m_H(a_H + x_H/(r + \lambda_H))$, and stationary safe demand is $a_H = \kappa_H x_H$.

SC.4 Stationary equilibrium

All group I members choose the same portfolio share. Annuity transfers cancel mortality losses in aggregation, and newborns enter with zero financial wealth. Franchise-market clearing requires aggregate holdings $q = Q$. The stationary budget and consumption rule are therefore

$$ra_I + S + x_I = m(a_I + Q + h). \quad (\text{SC14})$$

They give (SC7) with $V = Q$. They also imply

$$X = \frac{\lambda_I h + S(1 - r/R)}{m - r}, \quad \alpha(R; S, r) = \frac{S(m - r)}{\lambda_I h R + S(R - r)}. \quad (\text{SC15})$$

Combining this share with optimal portfolio choice determines the capitalization yield:

$$(R - r)R^2 = k \frac{S(m - r)}{\lambda_I h R + S(R - r)}. \quad (\text{SC16})$$

For fixed $r, S, k > 0$, the left side is zero at $R = r$ and strictly increasing for $R > r$. The right side is positive and strictly decreasing. There is exactly one root $R > r$.

With the main text's convenience schedule $v(b)$, the complete stationary equilibrium solves

$$s = -v(b) + \pi^R(b, N, \delta) \left[1 + \frac{\vartheta(N)}{(r + s + \delta)^2} \right], \quad S = bs, \quad (\text{SC17})$$

$$(R - r)R^2 = k\alpha(R; S, r), \quad Q = S/R, \quad (\text{SC18})$$

$$b = \kappa_H(r)x_H + \kappa_I(r)x_I + \frac{S - mQ}{m - r}. \quad (\text{SC19})$$

Admissibility requires $\rho < r < m$, $S > 0$, nonnegative safe holdings and purchases, and the stated inequality for group H 's assessment. The safe-rate response condition below selects a locally regular branch.

The aggregate allocation is supported by a stationary cohort distribution. A newborn has $X = h$; at age u , its total wealth is $he^{\gamma u}$, where

$$\gamma = r + \lambda_I + (R - r)\alpha - m.$$

Equation (SC15) implies

$$\lambda_I - \gamma = m - r - (R - r)\alpha = \frac{\lambda_I h}{X} > 0. \quad (\text{SC20})$$

Integrating over the age density $\lambda_I e^{-\lambda_I u}$ gives total wealth X and franchise holdings $\alpha X = Q$. Hence the aggregate equations are consistent with individual optimization, entry, and mortality. The franchise itself remains outstanding when an owner dies.

Finally, stationary consumption satisfies $c_H = ra_H + x_H$ and $c_I = ra_I + x_I + S$. The two asset-market conditions and the government budget imply $c_H + c_I + g = 1$.

SC.5 Issuance and the Laffer curve

Define endowment-generated safe demand and net safe-asset supply by

$$M(r) = \kappa_H(r)x_H + \kappa_I(r)x_I, \quad \mathcal{B} = b - T. \quad (\text{SC21})$$

Equilibrium gives $\mathcal{B} = M(r)$, and $M'(r) > 0$ on the admissible interval. Let

$$\mathcal{D} = M'(r) + T_r$$

be the response of desired safe holdings to the safe rate, including the induced changes in payments and capitalization.

Proposition S1 (Capitalization and the Laffer condition). *Consider an admissible equilibrium branch with $\mathcal{D} > 0$. In either implementation,*

$$r_b = \frac{1 - T_b}{\mathcal{D}}, \quad \mathcal{B}_b = M'(r)r_b. \quad (\text{SC22})$$

Issuance reduces net safe-asset supply and the safe rate if and only if

$$S_b - mV_b > m - r. \quad (\text{SC23})$$

At a point where equality holds and $T_{bb} > 0$, both schedules have a strict local maximum. If $T_{bb} > 0$ throughout a connected debt interval and T_b crosses one, the maximum in that interval is unique.

Proof. Differentiate $b = M(r) + T(b, r)$ and use (SC8). At a crossing, $r_b = 0$, so differentiating the numerator gives $-T_{bb} < 0$. Thus $r_{bb} = -T_{bb}/\mathcal{D} < 0$ and $\mathcal{B}_{bb} = M' r_{bb} < 0$. If every crossing is downward, there can be only one on the interval. $\square$

In the tradable-franchise model, debt issuance affects the required capitalization yield. Holding r fixed, the share in (SC15) satisfies $\alpha_R < 0$ and $\alpha_S > 0$. Differentiating (SC16) gives

$$R_b = \frac{k_b \alpha + k \alpha_S S_b}{R(3R - 2r) - k \alpha_R} > 0 \quad (\text{SC24})$$

when $S_b > 0$ and $k_b \geq 0$. At a given yield, higher payments increase the franchise's share of recipients' wealth; a higher exposure assessment further increases the required yield. Consequently,

$$T_b = \frac{(1 - m/R)S_b + mSR_b/R^2}{m - r}. \quad (\text{SC25})$$

The first term is saving out of the higher payment at a fixed yield. The second is the additional saving induced by the lower capitalization of the payment stream as the yield rises. A yield above the wealth MPC, $R > m$, is sufficient for a positive safe-demand response when $R_b \geq 0$, but the Laffer condition still requires $T_b > 1$.

If the exposure assessment vanishes and the claim is a perfect substitute for the safe asset, $R = r$. Then $T = -S/r$ and $T_b = -S_b/r$. For $S_b > 0$, capitalization crowds out safe debt in this case. The duration assessment supplies the valuation wedge in the tradable implementation.

SC.6 Existence and interpretation

The tradable model has an admissible interior peak using the main paper's unchanged household parameters, endowments, and Treasury absorption schedule, with $\zeta = 1$. The solution is approximately

$$b = 0.702, \quad r = 1.496\%, \quad R = 2.263\%, \quad \alpha = 0.054.$$

Both groups' safe holdings are positive, government purchases are about 0.238, and the cohort condition (SC20) holds. At this allocation, $T_b = 1$, $\mathcal{D} \simeq 233.2 > 0$, and $T_{bb} \simeq 8.4 > 0$. These strict inequalities imply that a nearby peak survives small changes in parameters. This is an existence calculation using the paper's inputs, rather than an estimate of the franchise's value or its owners' exposure cost.

The result supports a common description of the two implementations: absorption payments generate demand for safe assets when their capitalization induces less consumption than the payments themselves. The precise issuance condition compares the marginal payment S_b , the marginal consumption response mV_b , and the net wealth effect $m - r$. Nontradable lifetime income limits capitalization through the mortality adjustment. A tradable franchise can do so through the compensation required to bear duration exposure.

The owner-level assessment is the additional assumption in the tradable construction. It extends the main text's stationary representation of duration-bearing costs; it does not derive that cost from a stochastic process for interest rates. In a stochastic term-structure model, risk compensation and hedging demands must be determined jointly. Long real claims can hedge reinvestment risk, so long duration alone does not establish the required valuation wedge ([Campbell and Viceira, 2001](#); [Vayanos and Vila, 2021](#)).

SD Financial Capacity

The smooth-onset quadratic premium in (31) illustrates how greater financial capacity lowers marginal absorption cost. Holding the household threshold fixed isolates the effect of lower marginal absorption costs; the equilibrium threshold and absorption cost can also respond through the safe rate, as shown in (50).

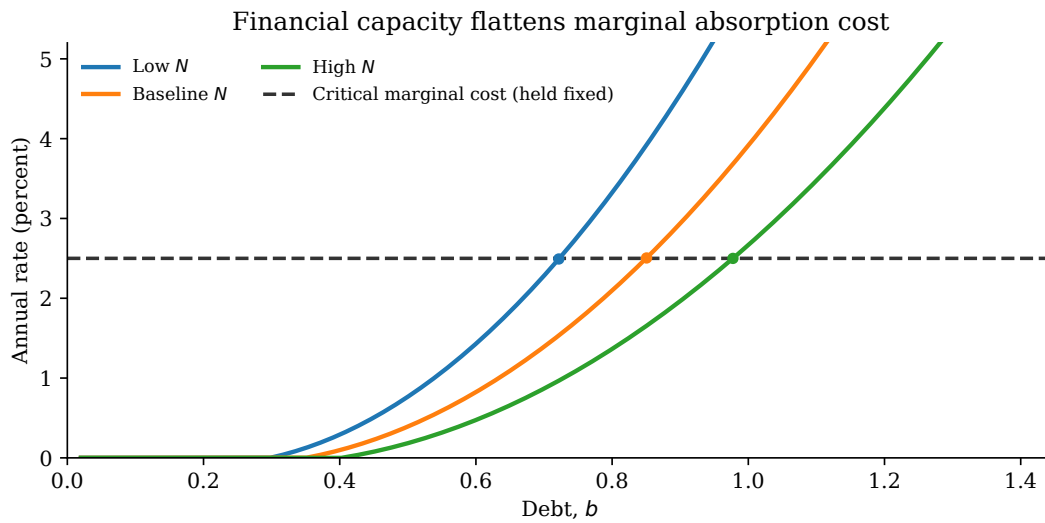


Figure S5: Schematic illustration of financial capacity and marginal Treasury absorption cost. Higher N moves the stress threshold outward and flattens the marginal-cost schedule. The figure holds the critical marginal cost fixed, isolating the effect of lower marginal absorption costs on the peak debt stock.

SE Quantitative Calibration

The calibration in Appendix D uses the exposure-weighted participation schedule in (C4), with $\Gamma(\zeta) = c_\Gamma \zeta$, where $c_\Gamma > 0$ scales the stress assessment. The inelastic participation share is $\underline{\alpha} = 0.8$. Let b_0 denote debt per unit of annual model output at the reference allocation. The stock consists of nominal Treasury notes and bonds held outside the Federal Reserve, including foreign official holdings, measured on June 30, 2026. Convenience services take the form

$$v(b) = v_\infty + v_a(b/b_0)^{-\xi}, \quad v_\infty \geq 0, \quad v_a, \xi > 0. \quad (\text{SE1})$$

I set $v_\infty = 12$ basis points and $\xi = 1$. The four 2026Q2 pricing estimates determine the support-cost scale, baseline utilization, the remaining convenience value, and the duration coefficient.

The reference safe rate of 1.5 percent and the measured absorption premium of 48.3 basis points imply a real Treasury funding rate of approximately 1.98 percent. Together with the maturity intensity in (D1), it implies duration $D_{Q2} \simeq 6.4$ years. Both subscript Q2 and subscript zero refer to the 2026Q2 allocation. Define the baseline support elasticity by $E_0 = b_0 \pi_b^R / \pi_0^R$. Differentiating the duration fixed point at a fixed safe rate gives

$$E_0 = \frac{\mathcal{M}_{Q2}^D}{s_{Q2}^D} + 2D_{Q2}(\mathcal{M}_{Q2}^R + \mathcal{M}_{Q2}^D), \quad \pi_0^R = \frac{\mathcal{M}_{Q2}^R + \xi(s_{Q2}^R + v_\infty)}{E_0 + \xi}. \quad (\text{SE2})$$

All premia and repricing terms in this expression are annual decimal rates. The convenience coefficient is $v_a = \pi_0^R - s_{Q2}^R - v_\infty$, and $\vartheta_0 = s_{Q2}^D / (\pi_0^R D_{Q2}^2)$. Baseline utilization solves $q_0 p'(q_0) / p(q_0) = E_0$. The scale and $N_0 = \mu(\delta) b_0 / q_0$ then match π_0^R . The solution is $q_0 = 1.583 > 1$, so every participation state uses capacity beyond its ordinary allotment between the baseline and the peak. The dealer-parent index in Section 2 measures capacity variation; the pricing estimates determine the effective capacity level N_0 .

At the Q2 calibration point, a 1 percent increase in debt raises marginal cost by approximately 2.6 basis points at a fixed safe rate, close to the 2.5-basis-point local conversion in Section 2.

For the household calibration, I divide the June 2026 stock of federal debt held by the public excluding the Fed, \$27.189 trillion, by annualized nominal GDP of \$32.563 trillion to obtain $b_0 \simeq 0.835$, and set $\bar{\tau} = 0.25$ as in Section 5. At the reference safe rate, asset-market clearing and $x_H + x_I = 1 - \bar{\tau}$ give

$$x_I = \frac{b_0 - \kappa_H(r_0)(1 - \bar{\tau}) - \kappa_I(r_0)S_0}{\kappa_I(r_0) - \kappa_H(r_0)}, \quad x_H = 1 - \bar{\tau} - x_I. \quad (\text{SE3})$$

The resulting group I debt share is $\kappa_I(r_0)(x_I + S_0) / b_0 = 0.913$.

Table S5: Parameters of the stationary equilibrium

Financial parameter	Value	Household or fiscal parameter	Value
α	0.8	b_0	0.83497
δ	0.13693	$\bar{\tau}$	0.25000
N_0	0.06748	ρ	0.01000
c_T (bp)	28.70516	λ_I	0.01000
v_∞ (bp)	12	λ_H	0.22000
v_a (bp)	8.20346	x_I	0.01502
ξ	1	x_H	0.73498
ϑ_0	0.05116		

Notes: Rates and intensities are annual decimals except where basis points are indicated. Debt, capacity, and income are in units of annual model output. The x_j terms are after-tax endowment income and exclude financial and absorption income. Numerical solutions use unrounded parameters.

The debt experiment holds these parameters fixed. At each debt stock, the pricing fixed point and asset-market equation are solved jointly. The peak solves $1 - \kappa_I(r)S_b = 0$. Marginal cost increases with debt from the baseline onward.

SE.1 Pricing specifications

Table S6 varies the stress assessment, the duration-repricing estimate, convenience services, and participation. Each specification holds the annual wealth MPCs at 2 and 23 percent; the common discount rate is 1 percent. Initial asset-market clearing determines income allocations and debt ownership. The financial parameters are calibrated to the four pricing estimates, using the indicated $\mathcal{M}_{Q2}^D$ in the duration rows. The share-normalized row uses the 61.5-basis-point estimate in Table S3.

Table S6: Illustrative maxima of net safe-asset supply across pricing specifications

Specification	Peak net safe-asset supply (percent of output)	Debt at peak (output units)	Safe-rate rise to peak (bp)
Reference specification	68.32	0.974	0.4
Quadratic stress assessment	67.96	0.917	0.3
Duration repricing $\times 0.75$	69.82	1.078	1.0
Duration repricing $\times 1.20$	67.67	0.909	0.1
Share-normalized duration repricing (61.5 bp)	70.87	1.140	1.5
Convenience floor 0–20 bp; $\xi = 0.5$ –2	68.28–68.53	0.968–1.006	0.4–0.5
Participation floor $\underline{\alpha} = 0.5$ –0.9	68.32	0.974	0.4

Notes: Net safe-asset supply is $\mathcal{B} = b - \kappa_I(r)\mathcal{S}$; output denotes annual model output. Each specification starts from debt $b_0 \simeq 0.835$ and net safe-asset supply equal to 67.4 percent of output. Convenience ranges use all 35 combinations of floors from 0 to 20 basis points in 5-basis-point steps and elasticities from 0.5 to 2 in steps of 0.25. The endpoints in different columns can correspond to different specifications. Participation uses floors of 0.5, 0.8, and 0.9. As a separate conditional calculation, holding the safe rate at its reference value gives a maximum net safe-asset supply of 68.7 percent of output at debt 0.986, where $S_b = 250$ basis points. This fixed-rate calculation measures the net supply before the market-clearing rate adjusts.

The quadratic stress assessment makes the gross support spread convex within each participation state, increasing the curvature of marginal absorption cost. The participation floor affects the exposure weights, but the locally fitted affine support schedule is the same for all three reported floors between the baseline and peak. The peak is less sensitive to convenience than to the stress-cost and duration-repricing specifications.

SE.2 Financial capacity

I vary effective capacity holding the support-cost and convenience parameters fixed and specify

$$\vartheta(N) = \vartheta_0 \frac{N_0}{N}. \quad (\text{SE4})$$

With household preferences and taxes fixed, greater capacity lowers gross rollover compensation and the duration-capital requirement. Lower absorption payments increase net safe-asset supply at the reference debt stock because recipients seek fewer safe holdings from this income. The reduction in marginal absorption cost also increases the debt stock at the Laffer peak in this illustration.

Table S7: Financial capacity and the peak of net safe-asset supply

Capacity relative to reference	Net safe-asset supply at reference debt (percent of output)	Peak net safe-asset supply (percent of output)	Debt at peak (output units)
1.00	67.37	68.32	0.974
1.10	72.24	74.47	1.044
1.25	78.52	83.61	1.146

Notes: Capacity is the model's effective support capacity N . Net safe-asset supply is $\mathcal{B} = b - \kappa_I(r)S$, evaluated at each allocation's market-clearing safe rate; output denotes annual model output. The reference debt stock is $b_0 \simeq 0.835$. Household parameters remain fixed. A 10 percent capacity increase raises the safe rate at reference debt by 2.0 basis points, followed by a further 0.9-basis-point rise to the peak; the corresponding changes for a 25 percent increase are 4.5 and 1.8 basis points. At reference capacity, the rise from reference debt to the peak is 0.4 basis points.