Debt Management meets Monetary Policy: The Rise of the Long End*

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Abstract

Do debt management decisions have macroeconomic effects comparable to monetary policy? Using high-frequency movements in interest rate futures around U.S. Treasury issuance announcements, we identify a *Treasury policy shock* —an unanticipated change in public debt supply across maturities. A shock that raises the five-year Treasury yield transmits strongly to corporate borrowing rates, tightens credit conditions, and lowers industrial production significantly. These effects closely mirror those of a conventional monetary policy tightening. While long-term treasury yields increase significantly, the shock has minimal effects on short-term interest rates. We show that this pattern reflects the Federal Reserve's sterilization of short-term Treasury issuance, while issuance at longer maturities is only partially offset.

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1 Introduction

Monetary policy is widely viewed as the central pillar of business-cycle stabilization. By contrast, Treasury debt management is typically regarded as a technical fiscal function—designed to finance government spending at the lowest possible cost but largely neutral for macroeconomic outcomes. This sharp conceptual separation has become increasingly difficult to maintain. Since 2008, the Federal Reserve has operated in an ample-reserves regime, paid interest on reserve balances that are near-perfect substitutes for short-term Treasury bills, and engaged in large-scale purchases of long-maturity assets. Over the same period, the U.S. Treasury has at times aggressively tilted its issuance toward short- or long-term maturities. Together, these developments have blurred the traditional boundary between monetary policy and debt management.

This paper argues that the blurring of this boundary has relevant economic implications. We show that Treasury issuance decisions have large and systematic effects on financial conditions and real economic activity, operating through channels that closely resemble the transmission of conventional monetary policy. We also show that the Fed actively responds to Treasury issuance, primarily through its balance sheet size rather than its policy rate. These findings have two important implications. First, the interaction between the Fed and the Treasury is central to understanding the transmission to interest rates of an unexpected increase in public debt issuance. Second, debt management has the potential to be a powerful macroeconomic stabilization tool.

We identify exogenous variation in Treasury debt supply by exploiting high-frequency movements in Treasury futures prices around Treasury issuance announcements. Such announcements contain detailed information on the size and the maturity composition of forthcoming debt issuance. The shock—which we label *Treasury policy shock*— captures unexpected changes in issuance at both the short and the long end of the maturity spectrum.

The effects of Treasury policy shocks are immediate and quantitatively meaningful. An unexpected increase in debt supply leads to a sharp rise in long-term Treasury yields. Quantitatively, an increase of 10 basis points in the five-year rate leads to a rise of 7.5 to 10 basis points in long-term rates. By contrast, short-term rates barely move. More than half of the increase in long-term rates reflects higher term premia rather than revisions to expected short-term rates. The rise in Treasury yields passes through almost one-for-one to corporate borrowing rates. Hence, credit condition tightens: excess bond premium rises, and business lending contracts.

These interest rate effects have large real consequences. A positive Treasury policy shock induces a persistent decline in industrial production, with a trough of about 1.5 percent below trend one year after the shock. The contraction is driven primarily by a sharp and sustained decline in investment. Consumption expenditure and prices mildly decline. Taken together, these findings imply that transmission of a Treasury policy shock expanding debt issuance is similar to a contractionary monetary policy shock.

This resemblance is not merely qualitative. A direct comparison between Treasury and monetary policy shocks shows remarkably similar paths for output, consumption, investment, excess bond premium and long-term interest rates. The key difference is that a conventional monetary policy shock raises short-term rates, while a Treasury policy shock has little impact at the short end of the curve.

The absence of a response in short-term rates to a Treasury policy shock suggests that the Fed sterilizes the action of the Treasury. It does so to maintain tight control of its operating target. Consistent with this interpretation, the policy rate remains unchanged, while the quantity of short-term Treasury debt held by the Fed rises. By contrast, the rise in long-term interest rates suggests that the Fed does not fully sterilize the effects of the shock at longer maturities. We provide narrative evidence from FOMC documents to support our interpretation of how the Fed responds to Treasury policy shocks.

Our findings have two broad implications. First, they show that Treasury debt management has large macroeconomic effects that closely resemble those of conventional monetary policy. In both cases, these effects are driven by changes in long-term interest rates. Second, the Federal Reserve's response to Treasury debt issuance highlights an underappreciated channel of fiscal–monetary interaction in the United States.

Finally, our results suggest that debt management can serve as an important macroeconomic stabilization tool. Our findings for the past twenty years of U.S. macroeconomic policy are consistent with Milton Friedman's observation that

> *"... open market operations and debt management are different names for the same monetary tool, wielded in one case by the Federal Reserve System, in the other, by the Treasury."*
>
> — Milton Friedman, *A Program for Monetary Stability* (1959)

Related literature and contribution. We connect first to a fast-growing empirical literature that studies Treasury issuance as a driver of financial conditions. Hubert de Fraisse (2024) exploits institutional changes in U.S. debt management to identify exogenous shifts in the maturity structure of government debt, showing that higher long-term issuance raises long-term yields and crowds out long-duration investment. Our results reinforce and extend this insight: unexpected increases in long-term debt supply raise long-term rates and lead to a sizable contraction in investment and output.

A closely related strand exploits Treasury announcements to identify debt supply shocks. Phillot (2025) is the first to use high-frequency surprises around Treasury announcements, focusing on financial market effects.[1] We build on this identification strategy but move beyond asset prices, documenting large and persistent macroeconomic effects. Other recent working papers also study the real effects of Treasury announcements. Houtz (2025) instruments the thirty-year rate using surprises starting in 2008 and estimates a proxy SVAR. Relative to this work, we exploit a longer sample and a broader set of announcements, and we obtain different conclusions regarding prices and the Fed's policy response.

Two further papers decompose announcement surprises into level and maturity components. Mustafi (2025) combines narrative evidence with heteroskedasticity-based identification, while Bi et al. (2025) extract two correlated factors using principal component analysis and oblique rotation. Our approach differs in emphasis. Rather than isolating separate level and maturity shocks, we focus on the first principal component of Treasury announcements as a sufficient statistic for Treasury policy. We argue that what matters for financial conditions is the total amount of short- and long-term debt supplied (Greenwood et al., 2014).

Against this backdrop, our paper makes three main contributions. First, we highlight the distinction between short-term debt—Treasury bills, which are money-like—and long-term debt, which carries duration risk. This distinction is central in the finance literature (Greenwood et al., 2014) and in policy debates (Miran and Roubini, 2024), yet it has been largely absent from existing empirical work. We show that following increases in both short- and long-term issuance, short-term interest rates barely move while long-term rates rise sharply. Second, we document a striking similarity between the aggregate effects and transmission mechanism of Treasury policy shocks and conventional monetary policy shocks. Third, we study the Federal Reserve's response to Treasury issuance and show that Treasury policy is a determinant of the size and composition of the Fed's balance sheet.

Our paper also relates to the literature on quantitative easing and balance sheet policies. A large body of work studies whether and how central bank asset purchases affect financial conditions and the macroeconomy.[2] Early evidence from the 2000–2001 Treasury buyback program already suggested that changes in Treasury supply could have large effects on long-term rates (Bernanke et al., 2004). Subsequent work has examined episodes in which the Fed altered the maturity structure of public debt. Swanson (2011) studies Operation Twist in 1961, while Krishnamurthy and Vissing-Jorgensen (2011) analyze the channels through

[1] Hartley and Rigon (2024) is another recent paper studying the financial effects of Treasury debt issuance announcements.

[2] A non-exhaustive list includes Gagnon et al. (2011), D'Amico et al. (2012), Rogers et al. (2014), Rogers et al. (2018), Bauer and Rudebusch (2018), Christensen and Krogstrup (2019), Swanson (2021, 2023), and Kim et al. (2023).

which QE operates and emphasize a dominant signaling channel, with limited spillovers to corporate rates.[3] More recently, Droste et al. (2024) identify demand shocks to Treasuries using auction data to proxy for QE shocks. They find quantitatively moderate QE-like effects.[4]

Relative to this literature, we contribute along two dimensions. First, we find a much higher pass-through from Treasury yields to corporate borrowing rates than is typically estimated in the QE literature. Second, we focus explicitly on how the Federal Reserve adjusts its balance sheet in response to Treasury issuance.[5] We argue that this balance sheet response help explain the differential effects on interest rates of Treasury issuance across maturities.

Finally, our analysis connects to the broader literature on fiscal–monetary interactions (Leeper, 1991; Sargent et al., 1981). While this literature traditionally focuses on taxes and spending on the fiscal side and interest rate setting on the monetary side,[6] we shift attention to debt management as a core fiscal instrument and to the central bank's balance sheet as a key monetary tool.[7] In doing so, we provide new empirical evidence on a channel that was already anticipated by Friedman (1959), but has become central only in the institutional environment of the past two decades.

Outline. Section 2 describes the institutional context and our identification strategy. Section 3 examines both the financial and macroeconomic effects. After presenting the transmission mechanism of Treasury policy shocks, we compare it to standard monetary policy in Section 4. Finally, in Section 5, we study the response of the Fed. We first provide econometric evidence on the average response of the Fed over the sample period. We then supplement this with anecdotal evidence from FOMC documents to offer a rationale for why the Fed reacts in this way. Section 6 concludes.

2 Identification

The Treasury announces policy decisions in a regular and predictable manner (Phillot, 2025). Market participants closely monitor these decisions, and the announcements can lead to sig-

[3] The authors thus conclude that the effects of QE2— a program targeting only Treasury securities and not MBS or corporate bonds—affected corporate bonds mostly through the expectation of lower future short-term rates.

[4] The paper focuses on testing the portfolio balance channel via the preferred habitat hypothesis from Vayanos and Vila (2021). Selgrad (2023) also studies the Fed's QE to test the portfolio balance theory.

[5] Ferrara and Zanotti (2025) study the Fed's response to increases in the public debt-to-GDP ratio driven by demand shocks and find that the central bank cuts its policy rate. In contrast, we focus on exogenous *supply* shocks to Treasury issuance.

[6] For more contemporary work in this literature, see, for example, Bianchi et al. (2023) or Angeletos et al. (2025).

[7] There is a long theoretical literature on the optimal maturity structure of public debt, including Barro (1979), Lucas and Stokey (1983), Bohn (1990), Angeletos (2002), and more recently Greenwood et al. (2015a).

nificant market reactions. Naturally, this setting lends itself to a high-frequency identification strategy. The idea is to construct a series of surprises computed in a narrow window around Treasury announcements that capture any unexpected news about Treasury policy. In this way, we obtain a series of Treasury policy shocks that can be used to study their financial and macroeconomic effects. Before discussing the identification procedure, we provide some background on how Treasury policy works in practice and on Treasury futures markets.

2.1 Institutional background

The U.S. Treasury is responsible for debt management policy, that is, it manages how the federal government borrows in order to finance public spending. In particular, "debt management necessarily involves judgments about the size and duration of the federal government's borrowing needs." By choosing the size and composition of public debt issuance before every auction, its goal is to "minimize borrowing costs over many years and interest rate cycles."[8]

Particularly relevant for our setting, the Treasury announces policy in a manner similar to how the Federal Open Market Committee (FOMC) announces monetary policy decisions. Once a quarter—typically on Wednesday at 8:30 AM (Eastern Time)—it releases a policy statement called the Quarterly Refunding Statement (QRS), followed by a press conference. These announcements provide news about an upcoming auction that will take place one week later, along with information about the Treasury's borrowing plans for the current quarter (Figure A1). In addition to these announcements, the Treasury releases intermediate statements on its website over the course of the quarter containing information about upcoming auctions. These documents specify the auction date, the maturity that will be offered, and the overall size of the planned issuance (Figure A2). Importantly for our purposes, both types of announcements contain relevant information about the size of debt issuance at different maturities. Moreover, these announcements occur regularly and are scheduled in advance.

To capture any unexpected news about Treasury policy, we need to measure investors' expectations about the likely path of Treasury prices immediately before the announcement. For this purpose, we use Treasury futures prices. Treasury futures have been traded on the Chicago Board of Trade since 1977. Importantly, these contracts are quoted in terms of prices (rather than yields) and do not bear coupon payments. For this reason, they represent an ideal proxy for investors' expectations about near-term future Treasury yields.

For our purposes, it is crucial that Treasury policy announcements are closely watched by market participants. By examining high-frequency changes in Treasury futures prices, we

[8] See the Quarterly Refunding Statement on October 31, 2001.

can assess whether investors react to news released by the Treasury. Figure A3 illustrates market reaction following the May 6, 2020 QRS announcement. The solid lines depict the inverse change in Treasury futures prices, measured in percentage points relative to one hour before the release. In the announcement, the Treasury stated that it planned "to increase its long-term issuance". Consistent with this guidance, Treasury yields rose sharply immediately following the release.

To understand whether Treasury policy has financial and macroeconomic effects of interest, we require an exogenous source of variation in Treasury policy. We can therefore exploit this setting to employ a high-frequency identification strategy, an approach already widely used in the monetary policy literature (Bauer and Swanson, 2023; Gertler and Karadi, 2015). The idea is to observe changes in asset prices in a narrow window around the policy announcement. To the extent that demand is assumed to be fixed during that window, any change in the prices of such assets reflects unexpected news about the supply of these assets.

2.2 Construction of the Treasury policy shock

To construct a Treasury policy shock series, we obtain minute-by-minute data on the prices of futures of 2-, 5-, 10-, and 30-year Treasuries from Refinitiv Datascope. These are front-month contract futures, that is they capture short-term expectations about the price (and therefore the yield) of these underlying assets.[9] We select these four futures since they are a parsimonious representation of the yield curve, and due to data availability. In particular, we have access to a long time series going from February 4, 1998, to June 3, 2025. We choose a 30-minute window around the announcement and compute the high-frequency price change in the four futures. More specifically, for any given future price P_t^f, we compute the high-frequency change as

$$\Delta P_{t+h}^f = 100 * \left(\log(P_{t+h}^f) - \log(P_{t-h}^f) \right) \tag{1}$$

where t is the time of the announcement, and h is the 30-minute window we select. To interpret the high-frequency change as a change in Treasury yields, we multiply ΔP_{t+h}^f by minus one. As explained above, Treasury policy is about choosing the size of debt issuance along the entire maturity spectrum. Given that we obtain the high-frequency changes in four different futures, we summarize the informational content of such announcements via principal component analysis. In particular, given the matrix of high-frequency changes X of dimension $T \times n$, we can write

[9] In particular, front-month contract futures allow an investor to get paid the cheapest-to-deliver Treasury at the closest available delivery date.

$$X = F\Lambda + \eta \tag{2}$$

where F is a $T \times k$ matrix of factors and Λ is $k \times n$ matrix of factor loadings. In our case, $n = k = 4$. In Table 1, we show the results of this decomposition.

Table 1: PCA Results

Panel A: Variance Explained				
	F1	F2	F3	F4
Variance Share	0.8144	0.1288	0.0393	0.0174

Panel B: Loadings				
	F1	F2	F3	F4
2-year	0.4544	0.7531	0.4681	-0.0846
5-year	0.5277	0.1344	-0.6281	0.5559
10-year	0.5312	-0.2321	-0.2805	-0.7651
30-year	0.4826	-0.6007	0.5547	0.3139

Panel A shows the share of variance explained by each component. The first principal component explains a large share of the variance of the matrix X. The second, third, and fourth principal components explain 13, 4, and 2% of the variance, respectively. We focus on the first principal component as a way to summarize the informational content of Treasury policy announcements.[10] Panel B shows the loadings associated with the four principal components. Focusing on the first principal component, loadings are constant across the maturity spectrum. As we will show later, this shock corresponds to unexpected news about a relatively persistent increase in public debt issuance. Importantly, this increase takes place both at the short and at the long-term of the maturity spectrum.

Announcements. We collect dates and timestamps for both Quarterly Refunding Statements and intermediate announcements from July 21, 1998, to June 3, 2025.[11] Our dataset includes a total of 110 Quarterly Refunding Statements and 650 intermediate announcements.[12] However, sometimes other important macroeconomic announcements occur around the same time as the Treasury policy announcements. For example, in five cases, the release

[10] We tried to work on the second principal component, but we find it hard to interpret. It could be that all that the component is capturing is noise. Therefore, in this paper, we do not explore this component.

[11] For the period before July 1998, no timestamp is available for the intermediate announcements, and therefore these are dropped from the construction of the series.

[12] We consider intermediate announcements about coupon-bearing Treasuries, that is of maturity of 2, 3, 5, 7, 10, 20, or 30 years.

of the forecast for U.S. GDP happens at the same time as the Treasury Quarterly Refunding Statement. Including such Treasury announcements in our analysis would run the risk that the high-frequency change in futures prices reflects an unexpected news stemming from the other announcements, and not from Treasury policy. For this reason, we exclude all announcements on days in which another important macroeconomic announcement is released within one hour before and 30 minutes after the time of the Treasury policy announcement.[13] We retain 94 QRS and 498 intermediate announcements, a total of 592 announcements.

2.3 Diagnostics of the shock

The daily series is shown in Figure 1. In what follows, we first provide narrative evidence to describe our series. We then perform diagnostic checks, both at the daily and the monthly frequency, to make sure our shock series is consistent with the requirements of an exogenous shock, as outlined by Ramey (2016).

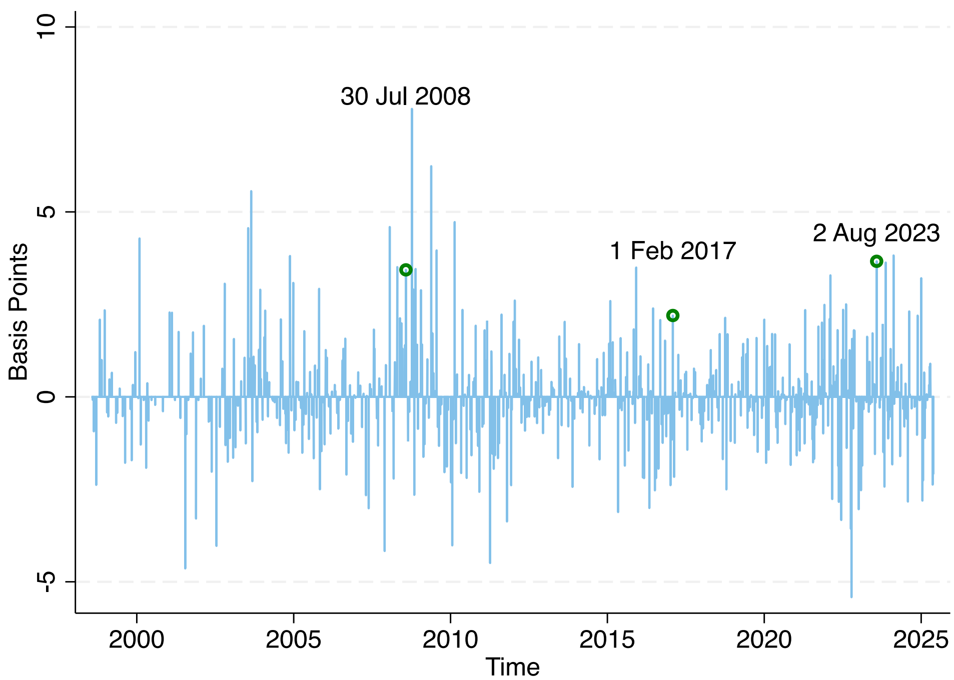


Figure 1: Treasury policy shock series

Note: this figure shows the Treasury supply shock series expressed in basis point changes in the five-year rate.

Narrative evidence. The time-series behavior of our high-frequency Treasury policy shock lines up closely with salient episodes of changes in Treasury debt management policy. We

[13] See Table A1 for a list of announcements that we consider.

focus in particular on QRS announcements, which are highly informative and offer clear narrative statements of Treasury's policy intentions. Consistent with this interpretation, several of the largest shocks in our series occur precisely on days when Treasury communicated adjustments to its issuance strategy. For instance, on August 2, 2023, Treasury announced that it would "gradually increase coupon auction sizes beginning with the August to October 2023 quarter", noting that "further gradual increases will likely be necessary in future quarters". On February 1, 2017, Treasury stated that "given current projected financing needs over the next few years, Treasury expects that the supply of bills will increase." In the July 30, 2008 refunding announcement, it signaled that it was considering "moving to quarterly new issue 30-year bond auctions." These episodes correspond to some of the most pronounced movements in our shock series, reinforcing the view that the measure reliably captures unexpected revisions in Treasury financing policy.

Diagnostic checks. Before providing evidence that our shock series is valid, we need to aggregate the shocks at the monthly frequency. We follow Gertler and Karadi (2015) and weigh each surprise based on the number of remaining days until the end of the month. The idea is to assign part of the surprise to the month in which the announcement takes place, and part to the following month. Weights are chosen based on the number of remaining days until the end of the month from the day of the announcement.

Endowed with both the daily and the monthly shock series, we can perform several diagnostic checks. First, our shock series should not be autocorrelated. In Figures A4 and A5, we plot the autocorrelation function. For the daily series, we see the series does not exhibit significant autocorrelation, except at lags 10 and 14. For the monthly series, by construction the series will show autocorrelation in the first lag, given the aggregation method we just described.[14] Our shock should also not be correlated with other identified macroeconomic shocks of interest. Table A2 verifies that this is indeed the case.

It is also important to check that our shock series is not forecastable by lags of financial and macroeconomic variables. We run a series of Granger causality tests, both at the daily and at the monthly level, and find no evidence of forecastability of the series (Table A3). Finally, an important concern in the monetary policy literature is whether the monetary policy surprises are predicted by news that is released prior to the FOMC announcements (Bauer and Swanson, 2023). Using the same set of news as the one used in that literature, in Table A4 we show that our surprises are not significantly predicted by news available before the actual Treasury policy announcements. Across the three sample periods analyzed, the

[14] Below, in our baseline specification for both daily and monthly regressions, we will control for lags of the shocks. However, controlling or not for the lags of the shocks does not make a notable difference both in terms of point estimates and confidence bands.

R^2 is 3% or lower. Overall, these checks provide evidence on the validity of our shock series.

3 Financial and macroeconomic effects

This section documents the financial and macroeconomic effects of Treasury policy shocks and clarifies the mechanism through which they operate. We show three main results. First, Treasury policy announcements convey news about future debt issuance that translates into systematic changes in the supply of public debt. Second, these shocks have immediate and economically meaningful effects on financial markets: they raise long-term Treasury yields, with little effect on short-term rates, and transmit almost one-for-one to corporate rates. Third, the resulting tightening in financial conditions leads to large and persistent real effects, primarily through a contraction in investment and credit. Together, these findings establish Treasury debt management as a powerful driver of financial conditions and aggregate activity.

To estimate the effects of the Treasury policy shock, we employ both daily and monthly local projections (Jordà, 2005). For each horizon h, we estimate the following regression:

$$y_{t+h} - y_{t-1} = \alpha_h + \beta_h shock_t + \gamma_h \mathbf{X}_{t-p} + \varepsilon_{t+h}, \tag{3}$$

where y denotes a financial or macroeconomic outcome of interest and *shock* is our measure of Treasury policy shock. In the daily specification, $\mathbf{X}_{t-p}$ includes five lags of *shock* and y, as well as year and day-of-the-week fixed effects.[15] In the monthly specification, $\mathbf{X}_{t-p}$ includes six lags (two quarters) of *shock*, y, industrial production (IP), the consumer price index (CPI), and the excess bond premium (EBP), capturing pre-existing macroeconomic and financial conditions.

Our baseline sample runs from July 21, 2003, to June 3, 2025.[16] This starting point reflects the availability of Federal Reserve balance sheet data, which we later use to study the Fed's response to Treasury policy. All impulse responses are scaled to correspond to a 10 basis point increase in the five-year Treasury yield on impact.

3.1 Understanding the shock: Debt response

We begin by clarifying what the Treasury policy shock represents in terms of actual debt issuance. Although the shock is identified from high-frequency movements in Treasury futures prices, its economic interpretation hinges on whether it systematically predicts subsequent changes in the supply of public debt. This subsection shows that it does: Treasury announce-

[15] Day-of-the-week fixed effects are included to account for the seasonality of Treasury policy announcements.

[16] For the monthly analysis, we consider the analogous period 2003:M7 to 2025:M2.

ments contain information about future issuance that materializes in observable changes in the supply of debt.

Figure 2 displays the response of total U.S. public debt in the days following the shock. Debt issuance begins to rise about six days after the announcement, consistent with the institutional structure of Treasury policy. Both Quarterly Refunding Statements and intermediate announcements specify quantities to be auctioned in the following week, implying that increases in debt should occur with a short delay. A shock that raises the five-year yield by 10 basis points leads to an increase in total public debt of about 0.5% after sixteen days.

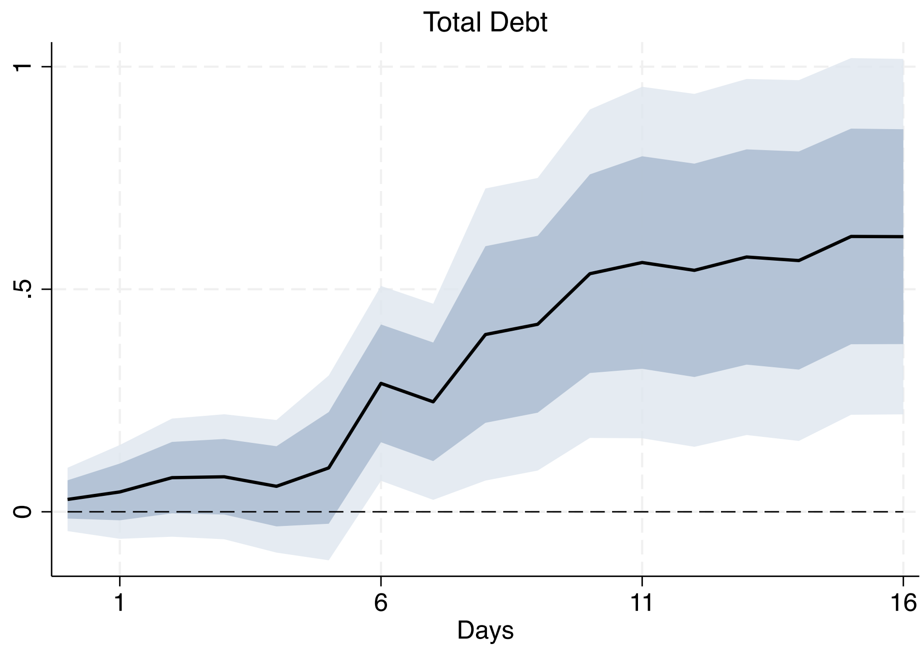


Figure 2: Impulse response of debt to a Treasury policy shock

Note: this figure shows the results of estimating equation (3), with y being total U.S. public debt outstanding. The x-axis shows days from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

Figure 2 shows that the surprise contained in these announcements aligns with the timing of announcements and auctions. However, for both financial effects (on Treasury rates and other financial assets) and macroeconomic effects, what matters is whether these announcements convey news about the current and expected supply of debt. Additionally, for our purposes, it is crucial to distinguish between short- and long-term debt. We define short-term debt as Treasury bills, that is, Treasuries with maturities of one year or lower. Long-term debt includes Treasuries with maturities of two years or longer. This distinction is motivated by the fact that short-term Treasury bills are fundamentally different from longer-term Treasuries: they are money-like instruments and carry essentially no duration risk. In contrast, coupon-bearing instruments such as Treasuries with maturities of two years or longer provide higher returns to investors at the expense of higher duration risk.

Figure 3 shows the impulse responses, at a monthly frequency, of both short- and long-term debt to a Treasury policy shock. Short-term debt rises on impact and remains elevated for a sustained period before gradually reverting to zero after roughly twenty months. In contrast, the response of long-term debt is slower: initially, it does not move, but it gradually increases and exhibits much greater persistence than short-term debt.

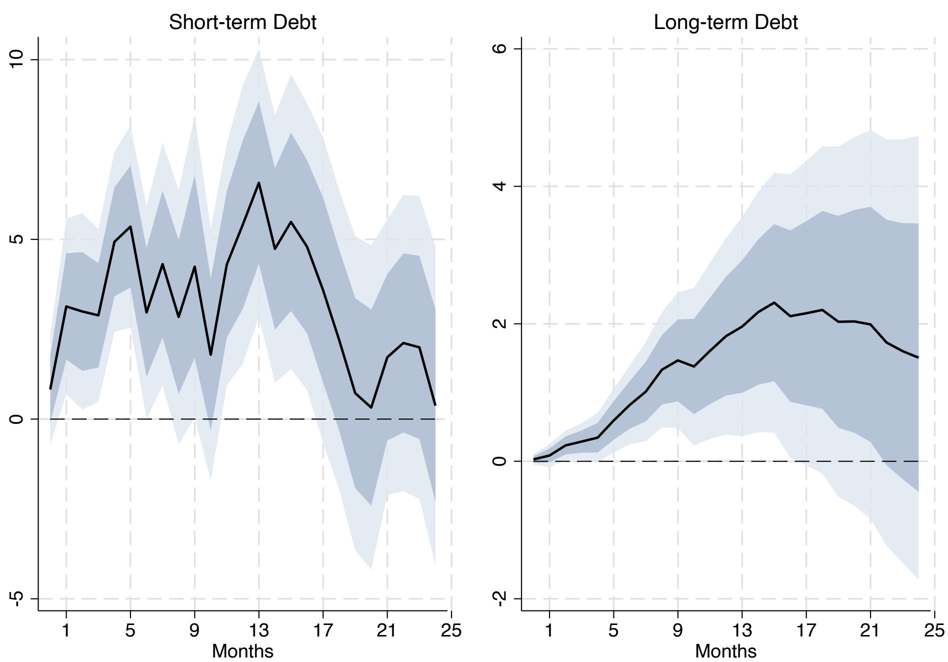


Figure 3: Short and long-term debt

Note: this figure shows the results of estimating equation (3). The left graph shows short-term debt, defined as every maturity of one year or lower; the right graph shows long-term debt, defined as two-year or longer Treasuries. The x-axis shows months from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

This dynamics matches, at least anecdotally, how the U.S. Treasury issues public debt when it faces an increase in financing needs.[17] Initially, it issues short-term debt and then gradually replaces it over time with longer-term debt.[18] To understand the magnitudes of these effects, we also examine the response of overall public debt. Figure C1 shows that

[17] In the Quarterly Refunding Statement of January 30, 2008, it is stated that "bill financing is Treasury's primary means of addressing unexpected or seasonal fluctuations in borrowing needs."

[18] This behavior is perhaps partly explained by the fact that large quantities of short-term debt are more easily absorbed by financial markets compared to longer-term debt.

a 10 basis point increase in the five-year rate leads to an expansion of total U.S. public debt outstanding of about 2% after fifteen months.[19] Given the level of U.S. public debt outstanding as of December 2025, this shock corresponds to an overall increase of roughly $600 billion in U.S. Treasuries.

Finally, Figure C3 shows the response of weighted average maturity and duration. Maturity declines initially, consistent with the dynamics presented in Figure 3. However, the magnitude of the change is very small (the drop is around 0.06 years). Moreover, the decline—especially when looking at duration—is almost never significantly different from zero. It is important to stress, however, that the concept of maturity is crucial when the total level of public debt issued remains fixed. In contrast, this shock increases public debt issuance at both the short and the long end of the curve, with differences arising only in the timing of the increase.

3.2 Financial effects

We now turn to the financial market response. The main result of this subsection is that Treasury policy shocks produce large and persistent movements in long-term interest rates, while leaving short-term rates essentially unchanged.

Figure 4 shows the impact response of the Treasury yield curve on the day of the announcement.

[19] Figure C2 shows other definitions of public debt, computed as a ratio to GDP or deflated using the GDP deflator. Results are unchanged.

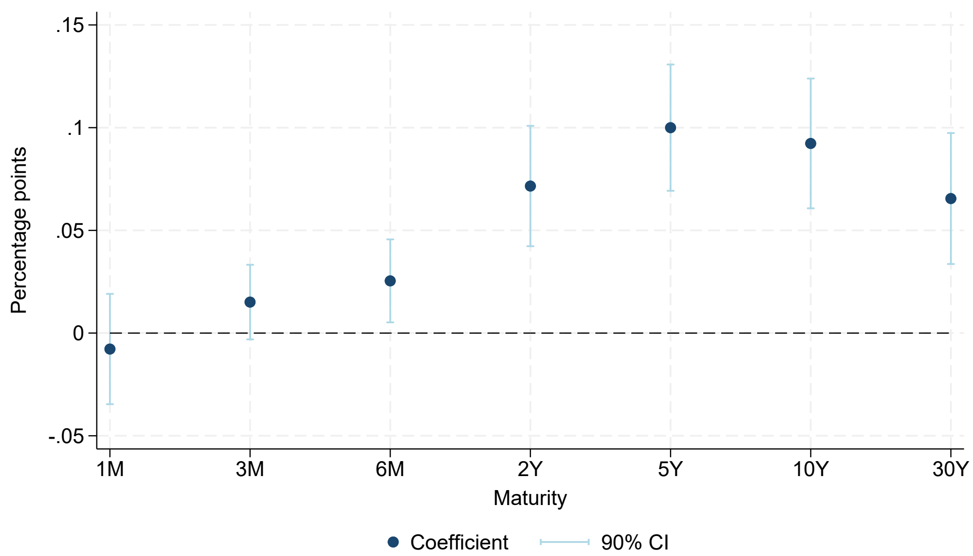


Figure 4: Yield curve impact response

Note: this figure shows the impact response of Treasury rates on the day of the shock. Treasury rates are end-of-day rates. The x-axis shows the maturity of each rate, while the y-axis shows the response in percentage points. The blue dots represent the point estimates, while light blue bars represent 90% Newey-West confidence intervals.

This figure reveals a striking fact: following news about an increase in both short- and long-term public debt supply, short-term rates barely move, while long-term rates rise by a sizable amount. In particular, the responses of the one- and three-month Treasury rates are not significantly different from zero, while the six-month rate increases by about 2.5 basis points. At the same time, rates from two to thirty years rise by between 7.5 and 10 basis points, with the peak at the five-year maturity. This finding extends beyond the first day of the shock. Figure C4 presents the dynamic response of Treasury rates over a sixteen-day horizon. The response of short-term rates is almost never statistically different from zero, while long-term rates jump and remain elevated for about two weeks. More than half of this increase in long-term rates is explained by term premia (Figure C5).

An increase in Treasury yields matters directly for the government budget constraint, as higher interest rates imply a higher cost of financing. However, to assess whether Treasury announcements affect financial markets more broadly—and ultimately the macroeconomy—we must determine whether the rise in Treasury rates spills over to corporate rates. Figure C6 shows that the pass-through to corporate rates, as measured by Moody's AAA corporate bond yield, is very high at around 90%.[20]

Other responses. We also study the response of the stock market to the Treasury policy

[20] The same result holds when using Moody's BAA corporate bond yield.

shock. Figure C7 shows the responses of the S&P 500 Index and the CBOE Volatility Index (VIX). There is no significant effect of Treasury announcements on the stock market. This finding, also documented by Phillot (2025), appears at odds with the large effects that Treasury policy has on Treasury rates. One possible explanation is that bond traders are fundamentally different from equity traders. Thus, following a Treasury announcement, while there are clear movements in the price (and therefore the yield) of government bonds, no significant change appears in the stock market.

We also examine breakeven inflation rates computed using TIPS (Figure C8). Interestingly, breakeven inflation rates do not react to a Treasury policy shock. This is particularly important, as one may worry that our surprise measure could be capturing news about an unexpected increase in government spending (or a reduction in taxes). If that were the case, one would naturally expect inflation expectations to move.[21]

3.3 Macroeconomic effects

The final step is to assess whether the financial tightening induced by Treasury policy shocks translates into real economic effects. The main finding is that it does, with effects that are large, persistent, and concentrated in investment.

We showed that Treasury policy shocks reflect a surprise increase in both short- and long-term debt issuance. This increase immediately affects long-term rates, and the rise in Treasury rates spills over to corporate rates.

Figure 5 shows that a Treasury policy shock raising the five-year yield by 10 basis points reduces industrial production by about 1.5% after one year. Prices decline slightly, but the response of the CPI is never statistically significant.

We also decompose the effect on output into equipment (a measure of investment) and real consumption expenditure. Although the shock produces a contraction in both variables, the magnitude and persistence differ substantially. Equipment declines by almost 4% at its trough, whereas consumption declines by only about 0.5%. Moreover, the effect on equipment is much more persistent.[22]

[21] Many papers have documented the relationship between fiscal expansions and inflation expectations. For example, Hazell and Hobler (2024) finds a sizable increase in inflation expectations, using TIPS data, following the COVID-19 spending shock.

[22] In Figure C10, we also examine the response of nonresidential construction as an alternative measure of investment. The direction and shape of the impulse response function are similar, although the estimates are less precise.

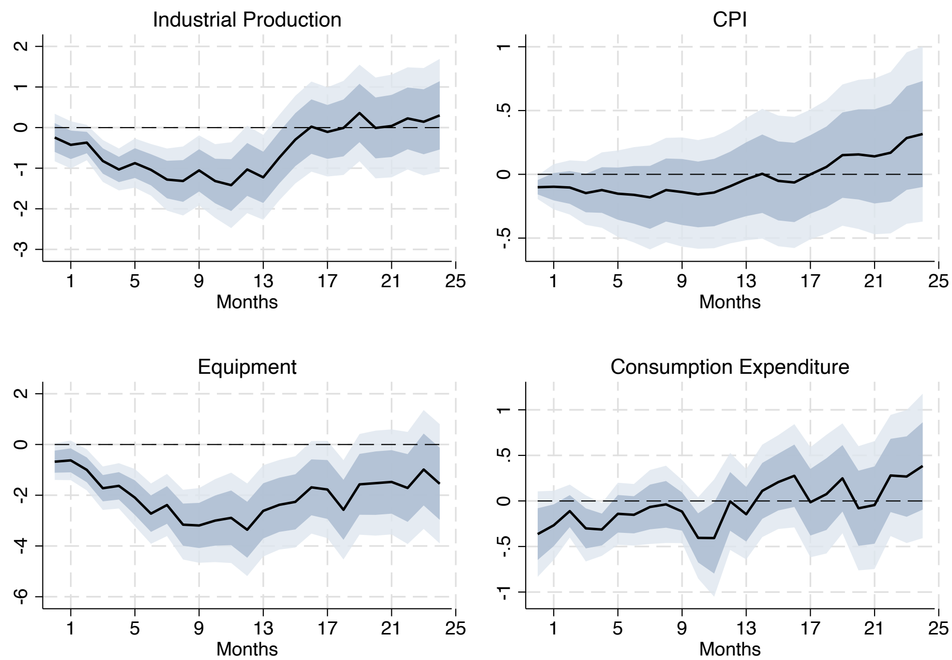


Figure 5: Macroeconomic effects of a Treasury policy shock

Note: this figure shows the results of estimating equation (3). The panels show the response of macroeconomic variables. CPI is the Consumer Price Index, Equipment is a measure of real physical investment, while Consumption Expenditure is real PCE. The x-axis shows months from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

The macroeconomic effects of the Treasury policy shock are sizable. What is the likely mechanism behind this finding? We argue the macroeconomic effects are through tightening of credit conditions. In the previous section, we demonstrated that the rise in long-term Treasury rates passes through to corporate rates. The changes in corporate rates translate to credit conditions. Figure C9 shows the response of the Excess Bond Premium (EBP) and the total amount of business loans outstanding. Starting with the former, the EBP increases on impact (although the response is noisy) and remains elevated for roughly ten months before declining and turning negative. The response of business loans, by contrast, is delayed but sizable: lending falls by about 4% at its trough.[23]

[23] Note that while the EBP is a price measure, business loans are a quantity measure. Therefore, the difference in timing between the two responses is entirely expected.

3.4 Robustness checks

Controls and subsamples. Figures 4 and 5 present the two central results. We now verify that these results are robust to several controls.[24] For the daily response shown in Figure 4, we show that the result is unchanged after adding several controls. Increasing the number of lags from one week to two, or adding lags of the S&P 500, VIX, or the volatility of the 10-year future as controls, does not change the results (Figure C11). We also explore subsample analysis. Splitting the sample into periods before and after December 2008 (the start of QE), or excluding the COVID years, does not alter our findings (Figure C12).

Turning to the monthly analysis, the result in Figure 5 is robust to a wide range of checks. Regarding controls, adding nine lags, excluding the constant, or including a linear trend does not alter the results (Figure C13). Moreover, controlling for lags of business cycle variables such as NBER recession, or for lags of the policy rate, does not materially change our findings (Figure C13). Importantly, we also find no evidence of pre-trends in real variables (Figure C14). Finally, our results are robust to extending the sample back to the start of the shock series in 1998:M7 or to excluding the COVID-19 years (Figure C15).

Shock: window, aggregation, and other definitions. In our baseline analysis, we use a 30-minute window to compute the high-frequency change around the policy announcement. However, we also verify that the result in Figure 5 is robust to using different windows. Figure C16 replicates Figure 5 using high-frequency changes computed over three alternative windows: 10–20, 30–50, and 60–60 minutes. Reassuringly, the direction of the results is not sensitive to the choice of the window.[25]

In high-frequency studies, the choice of aggregation method can also be important. We follow the methodology suggested by Gertler and Karadi (2015) to address temporal aggregation bias. However, in Figure C17, we verify that our results are robust to aggregating the series by simply summing daily surprises over a month (as done in Bauer and Swanson (2023) or Känzig (2021)).

We also orthogonalize the shock with respect to information available prior to the announcement.[26] Figure C18 shows the results. The impulse responses are qualitatively and quantitatively similar to the ones shown in Figure 5, as can be inferred from the low R-squared value of the predicatbility regression. Finally, we purify our shock series from possible information effects using the Poor Man's approach suggested by Jarociński and Karadi

[24] Even though we do not report them, we also verified that the results in Figures 2 and 3 are robust to the same battery of robustness checks.
[25] The magnitude of the effect changes, showing a more muted effect the larger the window.
[26] The exercise results are shown in Table A4.

(2020).[27] The results are unaffected by this consideration (Figure C19).

Different estimation strategy. So far, we have used local projections to estimate financial and macroeconomic effects. We can also explore whether adding more structure to our economic system materially changes the results. For this reason, we estimate a vector autoregression model (VAR) using the internal instrument approach (Plagborg-Møller and Wolf, 2021). We order our shock as the first variable and use a Choleski decomposition. The sample period runs from 2003:M7 to 2025:M2. For every variable shown in Figure 5, we estimate a VAR including IP, CPI, EBP, and the five-year rate, and choose six lags. Figure C20 displays the results and show similar responses to the ones in Figure 5.

4 Treasury and monetary policy: an equivalence result

The results in Section 3 show that Treasury policy shocks tighten financial conditions and generate sizable real contractions: long-term Treasury yields rise, corporate borrowing rates follow with high pass-through, credit conditions worsen, investment falls, and output declines. This sequence mirrors the textbook description of monetary transmission. This section asks whether this similarity is merely qualitative, or whether Treasury and monetary policy shocks are empirically comparable in macroeconomic outcomes.

Our main findings are as follows. First, both Treasury and monetary policy shocks produce large increases in long-term yields on impact. Second, the real responses are remarkably similar in magnitude and persistence, especially for industrial production and consumption. Third, the yield-curve response along the maturity spectrum differs sharply across the two shocks: monetary policy moves the short end substantially, whereas Treasury policy leaves short-term rates largely unchanged even though it raises issuance at both the short and long end. This contrast in yield-curve responses will be central for interpreting the interaction between Treasury issuance and the Fed's policy implementation in Section 5.

To compare Treasury and monetary policy shocks, we require an externally identified measure of unexpected monetary policy changes. We obtain the orthogonalized monetary policy surprises from Bauer and Swanson (2023). Because this series is available at the daily frequency, we can directly use this instrument to estimate a daily local projection of the form in equation (3). To estimate monthly impulse responses, we follow the methodology suggested by Cloyne et al. (2023). Specifically, we estimate a proxy SVAR using the orthogonalized monetary policy surprise from Bauer and Swanson (2023) as an instrument to

[27] Whenever the S&P 500's future price does not move in the narrow window around the announcement, we consider the event as standard Treasury policy shock. The very fact that the stock market is not reacting suggests the absence of a relevant information channel.

retrieve the structural shock. The VAR includes IP, CPI, EBP, and the two-year rate, and is estimated over the period 1977:M6 to 2020:M2. The monetary policy surprise is available beginning in 1988:M1 and is used to instrument the residual of the two-year rate equation.[28] In the appendix, we verify that results are similar when directly using the monthly series of Bauer and Swanson (2023) surprises in the local projections albeit with some puzzles.

For the baseline analysis, we use the sample from 1988:M1 to 2020:M2 for the monetary policy shock (Bauer and Swanson, 2023). For the Treasury policy shock, we keep our baseline sample ranging from 2003:M7 to 2025:M2.[29] However, in the appendix we verify that the results are similar when using the same sample (2003:M7–2020:M2) for both shocks. We normalize both shocks so as to increase the five-year rate by 10 basis points on impact. Figure 6 shows the impact response of the yield curve on the day of a Treasury and a monetary policy announcement.

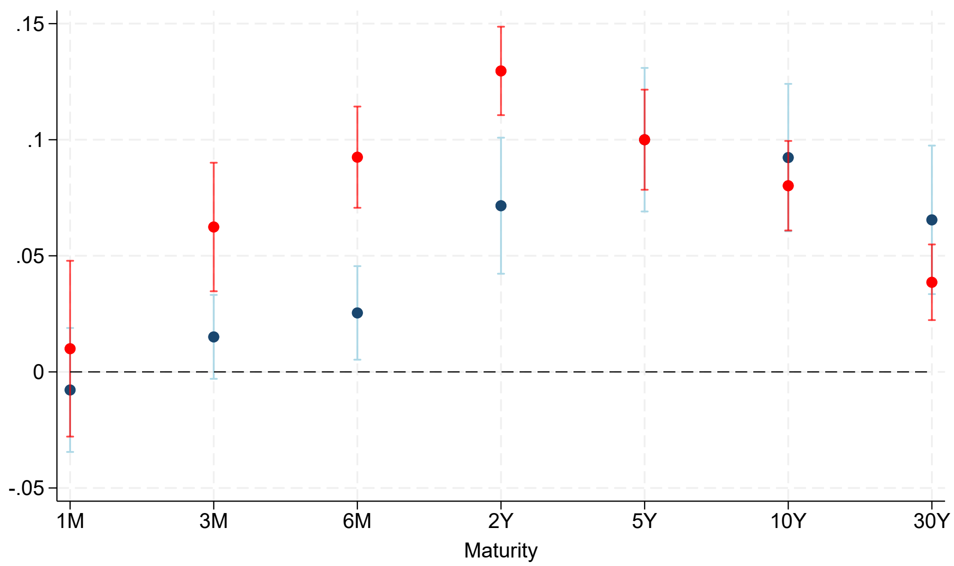


Figure 6: Yield curve response to Treasury and monetary policy shocks

Note: blue dots are the response of Treasury rates to a Treasury policy shock. Red dots are the response to a monetary policy shock from Bauer and Swanson (2023). The x-axis shows the maturity of each security, while the y-axis the percentage points change. Estimation sample is 1988:M1 - 2020:M2 for the monetary policy shock; 2003:M7 - 2025:M2 for the Treasury policy shock. Vertical bars represent 90% Newey-West confidence intervals.

This figure reveals a striking pattern: both shocks push long-term interest rates up by a sizable amount. However, while the monetary policy shock increases short-term rates considerably, the Treasury policy shock does not affect short-term rates. Although surprising, this result is consistent with the working of monetary policy: the Fed implements its monetary policy by setting the federal funds rate, an overnight rate, which then spills over to the entire

[28] Following Gertler and Karadi (2015), the two-year Treasury rate is often used as a measure of the monetary policy stance.
[29] Our shock series begins in 1998:M7; therefore, we cannot start the estimation in 1988:M1.

yield curve including the longer end. Meanwhile, Treasury policy shocks have limited effects on the shorter end of the yield curve.

Figure 7 compares the response of real variables across the two shocks. The impulse responses from Treasury and monetary policy shocks resemble each other in both qualitative and quantitative terms. Focusing on industrial production, both the magnitude and the persistence of the effect are strikingly similar. The same is true for real private consumption expenditure. Turning to investment, we observe the same gradual decline in equipment following a monetary policy shock. However, the magnitude—at least in the point estimate—is smaller.[30] Finally, prices decline more sharply following a hike in the policy rate by the central bank, although the direction of the response is the same under both shocks.

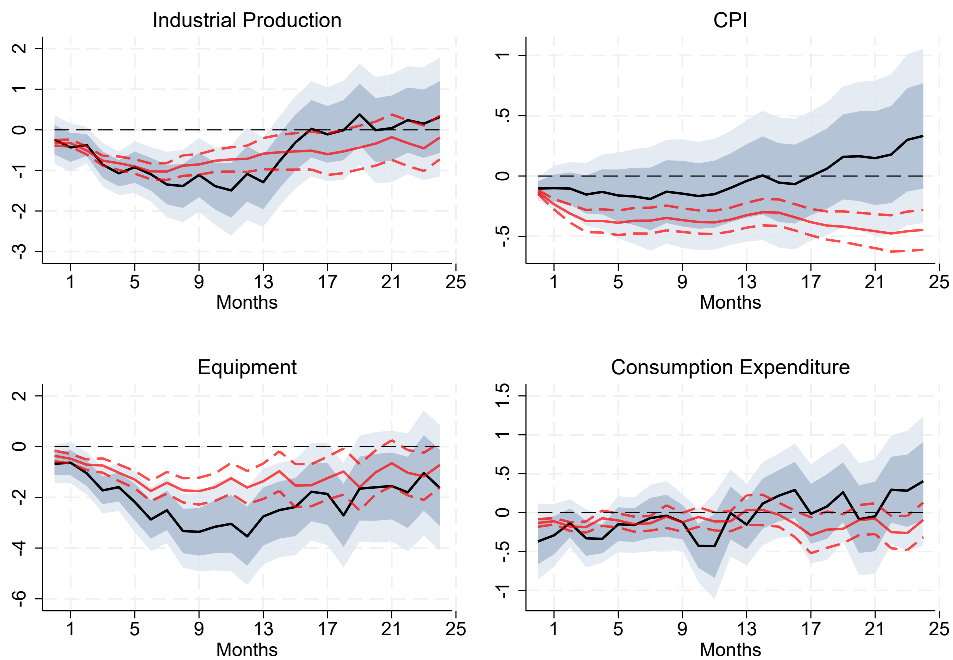


Figure 7: Real responses to Treasury and monetary policy shocks

Note: the black solid line and the gray confidence bands correspond to the response of real variables to a Treasury policy shock. The red solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The structural shock is obtained from a proxy SVAR where we use as instrument the monetary policy surprise from Bauer and Swanson (2023). We follow the methodology suggested by Cloyne et al. (2023) to retrieve the structural shock. The x-axis shows months from when the shock hits, while the y-axis the percentage changes. Estimation sample is 1988:M1 - 2020:M2 for the monetary policy shock; 2003:M7 - 2025:M2 for the Treasury policy shock.

Figure C21 extends our analysis by comparing the impulse responses on credit conditions. Relative to a Treasury policy shock, the EBP reacts more strongly to a monetary policy

[30] It is worth noting that although the magnitudes differ, once estimation uncertainty is taken into account, the responses are not statistically different from each other at the 90% level at any horizon.

shock but then declines relatively quickly. Interestingly, business loans exhibit a price puzzle: following a contractionary monetary policy shock, the business loan amount jumps on impact and remains positive for about eight months. The response then turns negative, showing a relatively persistent decline.

The results presented in Figures 6, 7, and C21 are estimated over different samples. In Figures C22, C23, and C24, we estimate local projections over a common sample from 2003:M7 to 2020:M2 for both shocks.[31] Once we exclude the 1990s from the estimation sample, short-term rates do not react much following a monetary policy shock (Figure C22).[32] However, the effect on the long end of the curve is similar. Figure C23 shows that the results for real variables remain similar, although the monetary policy shock produces a stronger effect on prices. Interestingly, the response of EBP now exhibits an even more similar pattern to that following a Treasury policy shock (Figure C24). After the initial increase, it turns negative after roughly ten months. Business loans continue to display the initial price puzzle described above.

We also reproduce the same results using the orthogonalized monetary policy surprises from Bauer and Swanson (2023) directly in the monthly local projections. Figure C25 shows the results for real variables. Notably, the response of prices to a monetary policy shock is much more muted when using the orthogonalized surprise. Additionally, Figure C26 shows a significant price puzzle in business loans: following a hike in interest rates, business loans jump and remain elevated for one year.

5 How does the Fed respond to Treasury policy?

The previous sections establish that Treasury policy shocks have sizable effects on financial conditions and real economic activity. This naturally raises a further question: does the Federal Reserve respond to Treasury policy, and if so, through which instruments? The answer is not obvious *a priori*. On the one hand, Treasury issuance affects aggregate demand and financial conditions, and thus represents a disturbance that a central bank pursuing its dual mandate might want to offset. On the other hand, the Federal Reserve has consistently emphasized its institutional independence from fiscal authorities and has sought to distance monetary policy from debt management considerations (Greenwood et al., 2015b).

This section shows that the Fed does respond systematically to Treasury policy shocks—but not through its policy rate. Instead, the adjustment occurs almost entirely through the

[31] We stop before COVID because the responses to a monetary policy shock exhibit unusual behavior once the COVID period is included.

[32] In general, results using the orthogonalized measure of monetary policy shocks from Bauer and Swanson (2023) are quite sensitive to the inclusion of the 1990s in the estimation sample.

Fed's balance sheet. Following an unexpected increase in Treasury issuance, the Fed expands its holdings of both short- and long-term Treasuries, fully sterilizing short-term issuance and partially offsetting long-term issuance. This response helps reconcile two facts documented earlier: large increases in debt supply at both ends of the maturity spectrum, and the near absence of any movement in short-term interest rates.

5.1 Empirical evidence

Data. To answer this question, we need data on the Fed's policy instruments. Since a large part of our sample covers the effective lower bound (ELB) period, we use the shadow rate from Wu and Xia (2016) as a measure of the policy rate. This measure is available until 2022:M2. For the Fed's balance sheet, we extract data on Treasury holdings from the System Open Market Account (SOMA) website. These data are available at a monthly frequency from July 2003 to February 2025. We also observe the maturity composition of the Treasuries held by the Fed, allowing us to decompose the Fed portfolio into short- and long-term debt.

To provide background on the Fed's balance sheet behavior over this period, Figure C34 shows the evolution of the Fed's Treasury holdings, broken down into short- and long-term debt. Short-term debt was around $280 billion before the crisis; it then fell and reached zero by August 2012. It remained at zero until May 2019. Its level subsequently surged, as the Fed launched a program in October 2019 to purchase short-term debt following a spike in repo rates.[33]

Turning to the right panel, surges in the amount of long-term debt held by the Fed coincide with the various QE programs. The two declines instead correspond to the two rounds of Quantitative Tightening (QT), the first beginning in October 2017 and the second in June 2022.[34] The notable exception is the sharp increase in Treasury purchases during COVID, from March to July 2020. This program was aimed at restoring order in Treasury markets. As Bernanke (2022) notes, "this purchase was different from QE in that it occurred across a wide range of maturities and was targeted at stabilizing financial markets."[35]

Empirical strategy. The Fed sets its monetary policy stance based on economic conditions. A simple regression of Fed policy variables on changes in Treasury policy would yield biased estimates due to endogeneity. Instead, we leverage our identified Treasury policy shock and estimate a local projection of the following form:

[33] We provide more details about this episode below.
[34] On December 1, 2025, the Fed announced an end to its second round of QT.
[35] See Bernanke (2022), p. 261.

$$y_{t+h}^{Fed} - y_{t-1}^{Fed} = \alpha_h + \beta_h^{Fed} shock_t + \gamma_h^{Fed} \mathbf{X}_{t-p} + \varepsilon_{t+h} \tag{4}$$

where y^{Fed} is the Fed policy variable and *shock* is the Treasury policy shock. The vector $\mathbf{X}_{t-p}$ includes six lags of *shock*, IP, CPI, EBP, and the policy rate.[36] It is important to stress that β^{Fed} captures an *average* effect over our sample period, which goes from 2003:M7 to 2022:M2.[37]

Results. Figure 8 shows the response of the Fed's Treasury holdings, broken down into short- and long-term debt. Each response is expressed in standard deviations of the corresponding y variable.[38] Starting with the left panel, following a Treasury policy shock, the Fed increases its purchases of short-term Treasuries. Two years out, the effect amounts to roughly 0.4 standard deviations. In absolute terms, this implies an increase in the Fed's short-term Treasury holdings of about $50 billion.[39] Turning to the right panel, the response of long-term Treasury holdings displays a very similar pattern, with an effect of about 0.2 standard deviations two years after the shock. The absolute magnitude, however, is extremely large: the standard deviation of this series is $1.4 trillion, implying a total effect of roughly $280 billion two years after the shock.

[36] We follow the Taylor rule literature in controlling for two quarters of lags of the policy rate, as the Fed adjusts its policy stance only gradually (Clarida et al., 2000).

[37] As before, every impulse response is normalized to correspond to a 10 basis point increase in the five-year rate on impact.

[38] Because the time series of the Fed's holdings of short-term Treasuries contains some zeros, we cannot show percentage changes.

[39] The time series of short-term Treasury holdings by the Fed is highly volatile, with a standard deviation of $122 billion.

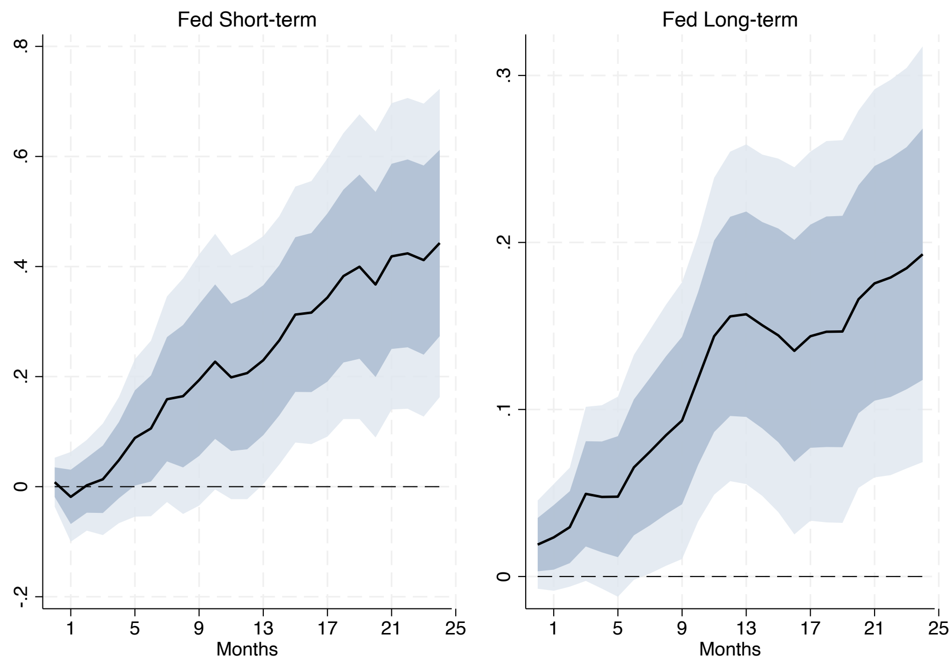


Figure 8: Fed's Treasury holdings response

Note: this figure shows the results of estimating equation (4). The left panel shows the amount of Fed's short-term Treasury holdings (one year of maturity or lower); the right panel the long-term (two years or longer). The x-axis shows months from the shock, while the y-axis shows the response in standard deviations of the y variable. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

We also study whether the Fed adjusts its traditional lever of monetary policy, namely its policy rate. Figure 9 shows that the Fed does not change its traditional policy stance following a Treasury policy shock. Overall, this evidence suggests that the Fed does not alter its policy rate in response to Treasury policy, but instead adjusts its balance sheet. The natural question is why the Fed behaves in this way.

Focusing on the short-term debt response, buying and selling Treasuries has historically been the traditional way in which the central bank set its policy rate in a scarce-reserve system (i.e., before the start of QE).[40] In such a system, an increase in Treasury bills supplied by the government would lower the price of short-term debt, raising its yield. A central bank aiming to keep its short-term policy rate constant would therefore need to step in and purchase short-term Treasuries from primary dealers to counteract the effect of additional bill issuance. The fact that we find no change in the Fed's policy rate, combined with an increase in its short-term Treasury purchases, is consistent with this view.

[40] Importantly, repo agreements are included in our definition of short-term debt held by the Fed. This matters because repo operations are frequently used by the Fed to stabilize liquidity in short-term funding markets.

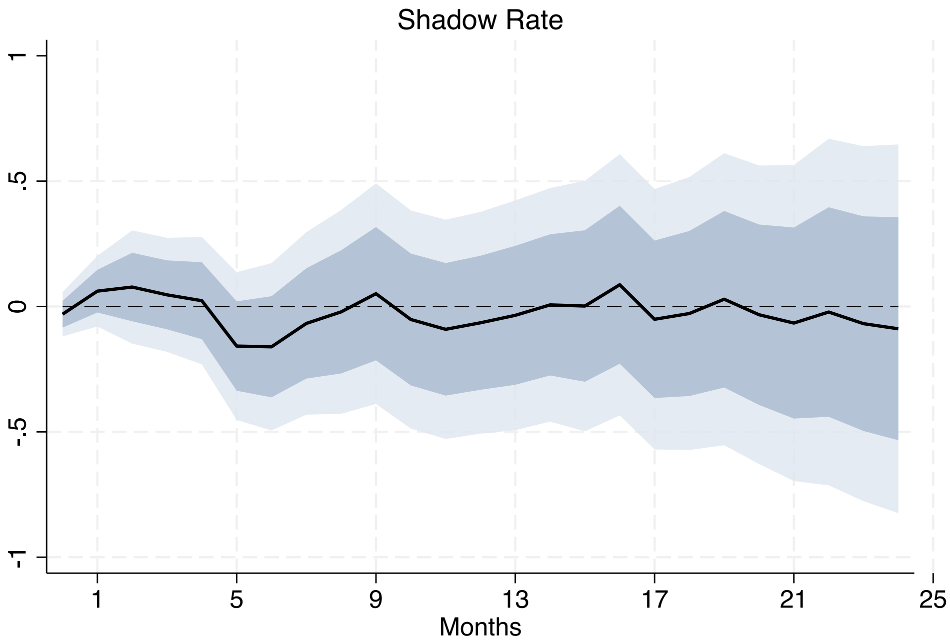


Figure 9: Fed's policy rate response

Note: this figure shows the results of estimating equation (4). The y variable corresponds to the shadow rate as constructed by Wu and Xia (2016). The x-axis shows months from the shock, while the y-axis shows the response in percentage points. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

Since the start of QE, the monetary policy regime has shifted from a scarce-reserve system to an ample-reserve system, in which the short-term rate is determined by an administrative rate on reserves (Interest on Reserve Balances, IORB). However, even in this system, a sudden increase in the demand for liquidity—leading to reserve scarcity—can impair the central bank's ability to control its short-term rate. Thus, even in an ample-reserve environment, the Fed may still choose to purchase short-term Treasuries if it needs to satisfy a high liquidity demand by primary dealers and maintain an adequate level of reserves. This is consistent with the 2019 episode associated with the spike in repo rates. Due to a larger-than-expected increase in short-term Treasury supply by the Treasury, primary dealers struggled to absorb the new issuance because they lacked sufficient liquidity. The Fed therefore stepped in and began a program to purchase $60 billion of short-term Treasuries per month at least through the second quarter of 2020.[41]

Overall, the Fed's behavior at the short end of the curve is consistent with the fact that we find that short-term rates do not move, despite the large increase in short-term debt. If investors expect the Fed to fully offset the additional short-term Treasury supply, short-term

[41] See Bernanke (2022), pp. 248–252.

rates will remain unchanged.

Turning to the long-term response, the Fed may be willing to sterilize—at least partially—the contractionary effects generated by higher long-term interest rates. Although long-term rates do rise, the question is why the Fed does not fully sterilize the increase in long-term debt supply. Two potential explanations arise. First, Fed officials may be concerned about creating a maturity mismatch on the balance sheet: reserves—the Fed's main liability—are short-term, whereas coupon-bearing Treasuries are long-term. Second, QE is politically contentious and unconventional, and has faced strong opposition both within and outside the central banking community (Bernanke, 2022).

In Section 5.2, we provide anecdotal evidence from FOMC minutes and meeting transcripts that supports this interpretation of the Fed's behavior. Before turning to that, we verify that the results shown in Figures 8 and 9 are robust to several controls, sample choices, the inclusion of linear trends, and the presence of outliers.

Robustness checks. We first verify that our results are robust to an alternative set of controls: increasing the number of lags from six to nine, NBER recession dummies, or excluding the constant term from the regression. Figures C27 and C28 show that the main results remain unchanged. We also check for pre-trends in the three policy variables of the Fed. Figure C29 shows that while the amount of short-term Treasuries held by the Fed exhibits no pre-trend, there is a mild pre-trend for long-term Treasuries. However, we confirm that our result for long-term debt in Figure 8 is robust to controlling for a linear trend (Figure C27). The shadow rate displays a downward trend, but we find no effect of the Treasury policy shock on this variable.

We further verify that our results are robust to extending the sample back to the start of the shock series or to excluding the COVID years (Figures C31 and C32). For the policy rate, we also confirm that results are unchanged if we use the shadow rate only for the ELB period (Figure C33). Finally, an important concern relates to outliers in the Fed's Treasury holdings data. As shown in Figure C34, both time series contain periods with large jumps. One might therefore worry that the estimated average effects are driven by these extreme observations. In Figure C35, we show that our findings for the Fed's Treasury holdings remain robust after winsorizing outliers.

5.2 Anecdotal evidence from FOMC documents

In this section, we provide two examples to help illustrate the rationale behind the Fed's intervention in Treasury markets following an increase in Treasury debt supply. The first episode is the spike in repo rates at the end of 2019, which followed a surge in short-term debt issuance by the Treasury. Faced with a sharp increase in liquidity demand from primary dealers, the Fed intervened by purchasing large quantities of short-term Treasuries in exchange for reserves. This episode shows that, even in an ample-reserve system (in place since late 2008), the Fed may still need to buy or sell short-term Treasuries to maintain control of its policy rate.

Regarding the long end of the curve, we did not find an instance in which Fed officials explicitly commented on Treasury long-term debt issuance. However, we provide evidence from the QE era that Fed officials were fully aware of the effects Treasury policy could have on financial conditions and the broader economy. Taken together, we view this anecdotal evidence as suggestive of the rationale behind the Fed's balance sheet adjustments in response to Treasury policy.

The 2019 repo spike. In September 2019, turmoil erupted in repo markets. While the target federal funds rate was around two percent, the repo rate spiked to as high as ten percent. At the FOMC meeting on September 18, Fed officials noted that

> *"Open market operations conducted on the previous day had helped to ease strains in money markets, but the EFFR had nonetheless printed 5 basis points above the top of the target range."*

At the post-meeting press conference, Fed Chair Jerome Powell attributed the surge in repo rates to a sudden increase in the demand for liquidity. Importantly, he suggested that the surge in demand from primary dealers was driven in part by increased issuance of new debt from the Treasury (Bernanke, 2022). The larger-than-expected debt supply was concentrated at the short end of the curve (Figure D1).[42]

In response to this instability in short-term funding markets, Fed officials began developing plans to address the issue. As written in the minutes of the September 18–19 meeting:

> *"Participants agreed that developments in money markets over recent days implied that the Committee should soon discuss the appropriate level of reserve balances sufficient to support efficient and effective implementation of monetary policy in the context of the ample-reserves regime that the Committee had chosen. A few participants noted the possibility of resuming trend growth of the balance sheet to help stabilize the level of reserves in the banking system."*

[42] In particular, we see no sudden change in the growth rate of long-term debt issuance. On the contrary, short-term debt issuance exhibited a spike in August 2019.

Fed officials thus began considering expanding their balance sheet again after a period of QT. However, this expansion was explicitly distinguished from QE:

> *"Participants agreed that any Committee decision regarding the trend pace of balance sheet expansion necessary to maintain a level of reserve balances appropriate to facilitate policy implementation should be clearly distinguished from past large-scale asset purchase programs that were aimed at altering the size and composition of the Fed's asset holdings in order to provide monetary policy accommodation and ease overall financial conditions."*

These minutes suggest that Fed officials were concerned about the increase in liquidity demand—driven in part by the Treasury's larger-than-expected short-term issuance—and the potential for reserve scarcity to impair the Fed's ability to control its short-term policy rate. The minutes from the subsequent FOMC meeting on October 29–30 emphasize this point:

> *"On October 11, the Committee announced its decision to maintain reserves at or above the level that prevailed in early September through a program of Treasury bill purchases and repurchase agreement (repo) operations."*

More specifically, the FOMC announced it would begin increasing reserves by purchasing $60 billion of short-term Treasuries per month, at least through the second quarter of 2020 (Bernanke, 2022). Importantly, Fed officials stressed that these actions did not represent a shift in monetary policy—unlike QE, they did not involve purchasing long-term Treasuries—but were instead purely "technical measures." The goal was to maintain an adequate level of reserves in order to keep the federal funds rate on target. In their own words:

> *"Participants emphasized the importance of maintaining reserves at a level consistent with the Committee's choice of an ample-reserves monetary policy implementation framework, in which control over the level of the federal funds rate is exercised primarily through the setting of the Fed's administered rates and in which active management of the supply of reserves is not required."*

Thus, even in an ample-reserves system, a sudden increase in liquidity demand may require the Fed to actively manage reserves—via purchases or sales of Treasuries—in order to maintain control of its policy rate. This episode aligns closely with the empirical evidence presented in Section 5.1.

Response at the long end. As noted by Greenwood et al. (2014), during the period from the launch of QE through 2014, the Treasury progressively increased the relative issuance of long-term debt. According to their estimates, Treasury policy was able to undo more than a third of the stimulative effects generated by QE.[43]

Searching through the minutes, we did not find an episode in which Fed officials explicitly discussed the Treasury's long-term debt issuance. As suggested by Greenwood et al. (2014), in discussing QE policies the Fed focused exclusively on how asset purchases would affect long-term rates and, in turn, the macroeconomy. It purposely avoided discussing implications for government fiscal risk, likely because the Fed does not want to be seen as monetizing fiscal deficits. Nevertheless, by looking at the Meeting Transcripts, we do find evidence that Fed policymakers were aware of the potentially significant effects that Treasury policy could have on the economy.

During the November 2–3, 2010 FOMC meeting, Charles Plosser, then president of the Philadelphia Fed, posed the following question to Brian Sack, then manager of the System Open Market Account:[44]

> *"Brian, do you think there'd be any difference between the duration effects of our purchases that you're talking about, and those if the Treasury announced a program to quit issuing long-term bonds and issued short-term bonds instead to fund the deficit?"*

Sack replied:

> *"Conceptually, under the portfolio-balance view, those two do have similar effects. The effects we're talking about arise from the amount of duration that's left for the private sector to hold, and that could be changed through debt management decisions just as easily as it could be changed through our portfolio decisions. But there are two differences to highlight. First, we can move a lot more quickly than debt managers—obviously, as they change their issuance calendars, that changes duration, but only slowly, as the auctions occur, and we can move faster than that. Second, debt managers do not have an economic mandate. They operate under a mandate of being regular and predictable and minimizing their borrowing costs over time, so they don't really have a clear structure through which they should make debt management changes like that in order to affect economic outcomes."*

[43] This calculation is based on the high-frequency variation in the ten-year yield around QE and QRS announcements. A similar exercise is performed by Bi et al. (2025).

[44] See the Transcript of the Federal Open Market Committee Meeting on November 2–3, 2010, p. 24.

This exchange illustrates two points. First, during the QE period, Fed officials were clearly aware of the interaction between their balance sheet policy and Treasury debt issuance. Second, they believed that the central bank could act more quickly than the Treasury, and therefore could potentially sterilize the market effects of changes in debt issuance.

We view this anecdotal evidence as suggestive of the potential interaction between the Fed's balance sheet policy and Treasury debt issuance at the long end. The fact that Fed officials openly discuss Treasury issuance at the short end, but rarely at the long end, suggests that markets perceive the two domains differently. As explained by Bernanke (2022), the Fed's purchase of long-term debt is seen as unconventional and politically charged. By contrast, central bank interventions in the short-term funding market are standard operating procedure and have long been the primary way through which the Fed implements monetary policy.

6 Conclusion

Policy innovations over the last twenty years have narrowed the distinction between the Fed and the U.S. Treasury. This naturally raises the question of whether Treasury policy has independent macroeconomic effects, and whether the Fed systematically responds to such policy. In this paper, we identify a Treasury policy shock using high-frequency techniques and show that this shock has sizable effects on financial markets and, in turn, on real economic activity.

We document that unexpected increases in public debt supply raise long-term interest rates, pass through to corporate borrowing costs, tighten credit conditions, and generate a persistent contraction in investment and output. The aggregate effects and transmission mechanism closely mirror those of a conventional monetary policy tightening, as both shocks affect long-term Treasury rates.

We further show that Treasury issuance is a determinant of the Fed's balance sheet. The Fed fully sterilizes short-term debt issuance to maintain control of its operating target and partially offsets long-term issuance through asset purchases. Together, these findings imply that macroeconomic stabilization in the United States is inherently the joint outcome of debt management and monetary policy.

References

Angeletos, George-Marios, "Fiscal policy with noncontingent debt and the optimal maturity structure," *The Quarterly Journal of Economics*, 2002, *117* (3), 1105–1131.

— **, Chen Lian, and Christian K Wolf**, "Fiscal Inaction as Monetary Support," *Working Paper*, 2025.

Barro, Robert J, "On the determination of the public debt," *Journal of political Economy*, 1979, *87* (5, Part 1), 940–971.

Bauer, Michael and Mikhail Chernov, "Interest rate skewness and biased beliefs," *The Journal of Finance*, 2024, *79* (1), 173–217.

Bauer, Michael D and Eric T Swanson, "A reassessment of monetary policy surprises and high-frequency identification," *NBER Macroeconomics Annual*, 2023, *37* (1), 87–155.

— **and Glenn D Rudebusch**, "The signaling channel for Federal Reserve bond purchases," *36th issue (September 2014) of the International Journal of Central Banking*, 2018.

Bernanke, Ben S, *21st century monetary policy: The Federal Reserve from the great inflation to COVID-19*, WW Norton & Company, 2022.

Bernanke, Ben, Vincent Reinhart, and Brian Sack, "Monetary policy alternatives at the zero bound: An empirical assessment," *Brookings papers on economic activity*, 2004, *2004* (2), 1–100.

Bi, Huixin, Maxime Phillot, and Sarah Zubairy, "Treasury Supply Shocks: Propagation Through Debt Expansion and Maturity Adjustment," *Working Paper*, 2025.

Bianchi, Francesco, Renato Faccini, and Leonardo Melosi, "A fiscal theory of persistent inflation," *The Quarterly Journal of Economics*, 2023, *138* (4), 2127–2179.

Bohn, Henning, "Tax smoothing with financial instruments," *The American Economic Review*, 1990, pp. 1217–1230.

Christensen, Jens HE and Signe Krogstrup, "Transmission of quantitative easing: The role of central bank reserves," *The Economic Journal*, 2019, *129* (617), 249–272.

Clarida, Richard, Jordi Gali, and Mark Gertler, "Monetary policy rules and macroeconomic stability: evidence and some theory," *The Quarterly journal of economics*, 2000, *115* (1), 147–180.

Cloyne, James, Clodomiro Ferreira, Maren Froemel, and Paolo Surico, "Monetary Policy, Corporate Finance, and Investment," *Journal of the European Economic Association*, 03 2023, *21* (6), 2586–2634.

de Fraisse, Antoine Hubert, "Crowding Out Long-Term Corporate Investment: The Role of Long-Term Government Debt Supply," 2024.

Droste, Michael, Yuriy Gorodnichenko, and Walker Ray, "Unbundling quantitative easing: Taking a cue from treasury auctions," *Journal of Political Economy*, 2024, *132* (9), 3115–3172.

D'Amico, Stefania, William English, David López-Salido, and Edward Nelson, "The Federal Reserve's large-scale asset purchase programmes: rationale and effects," *The Economic Journal*, 2012, *122* (564), F415–F446.

Ferrara, Andrea and Luca Zanotti, "Why the Federal Reserve Cuts Rates when Public Debt Rises," *Working Paper*, 2025.

Friedman, Milton, *A program for monetary stability*, Ravenio Books, 1959.

Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian P Sack, "Large-scale asset purchases by the Federal Reserve: did they work?," *Economic Policy Review*, 2011, *17* (1), 41.

Gertler, Mark and Peter Karadi, "Monetary policy surprises, credit costs, and economic activity," *American Economic Journal: Macroeconomics*, 2015, *7* (1), 44–76.

Gilchrist, Simon and Egon Zakrajsek, "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 2012.

Greenwood, Robin, Samuel G Hanson, and Jeremy C Stein, "A comparative-advantage approach to government debt maturity," *The Journal of Finance*, 2015, *70* (4), 1683–1722.

_ , Samuel G. Hanson, Joshua S. Rudolph, and Lawrence H. Summers, *The $13 Trillion Question: Managing the U.S. Government's Debt*, Brookings Institution Press, 2015.

_ , Samuel Hanson, Joshua S Rudolph, and Lawrence H Summers, "Government debt management at the zero lower bound," 2014.

Hartley, Jonathan and Lorenzo Rigon, "Does Government Debt Management Matter? High Frequency Identification From US Treasury Quarterly Refunding Announcements," *Working Paper*, 2024.

Hazell, Jonathon and Stephan Hobler, *Do Deficits Cause Inflation?: A High Frequency Narrative Approach*, London School of Economics and Political Science, 2024.

Houtz, Alex, "How Government Debt Shocks Impact the Economy," 2025.

Jarociński, Marek and Peter Karadi, "Deconstructing monetary policy surprises—the role of information shocks," *American Economic Journal: Macroeconomics*, 2020, *12* (2), 1–43.

Jordâ, Òscar, "Estimation and inference of impulse responses by local projections," *American economic review*, 2005, *95* (1), 161–182.

Känzig, Diego R, "The macroeconomic effects of oil supply news: Evidence from OPEC announcements," *American Economic Review*, 2021, *111* (4), 1092–1125.

Kim, Kyungmin, Thomas Laubach, and Min Wei, "Macroeconomic effects of large-scale asset purchases: New evidence," 2023.

Krishnamurthy, Arvind and Annette Vissing-Jorgensen, "The effects of quantitative easing on interest rates: channels and implications for policy," Technical Report, National Bureau of Economic Research 2011.

Leeper, Eric M, "Equilibria under 'active'and 'passive'monetary and fiscal policies," *Journal of monetary Economics*, 1991, *27* (1), 129–147.

Lucas, Robert E and Nancy L Stokey, "Optimal fiscal and monetary policy in an economy without capital," *Journal of monetary Economics*, 1983, *12* (1), 55–93.

Miran, Stephen and Nouriel Roubini, "ATI: Activist Treasury Issuance and the Tug of War over Monetary Policy," *Hudson Bay Capital, available at: www. hudsonbay-capital. com/documents/FG/hudsonbay/research/635102_ Activist_ Treasury_ Issuance_ - _Hudson_ Bay_ Capital_ Research. pdf*, 2024.

Mustafi, Pal Utso, "Deconstructing debt supply shocks using Treasury auction announcements," *Available at SSRN 4794463*, 2025.

Phillot, Maxime, "US Treasury Auctions: A High-Frequency Identification of Supply Shocks," *American Economic Journal: Macroeconomics*, 2025, *17* (1), 245–273.

Plagborg-Møller, Mikkel and Christian K Wolf, "Local projections and VARs estimate the same impulse responses," *Econometrica*, 2021, *89* (2), 955–980.

Ramey, Valerie A, "Macroeconomic shocks and their propagation," *Handbook of macroeconomics*, 2016, *2*, 71–162.

Rogers, John H, Chiara Scotti, and Jonathan H Wright, "Evaluating asset-market effects of unconventional monetary policy: a multi-country review," *Economic Policy*, 2014, *29* (80), 749–799.

_ , _ , and _ , "Unconventional monetary policy and international risk premia," *Journal of Money, Credit and Banking*, 2018, *50* (8), 1827–1850.

Sargent, Thomas J, Neil Wallace et al., "Some unpleasant monetarist arithmetic," *Federal reserve bank of minneapolis quarterly review*, 1981, *5* (3), 1–17.

Selgrad, Julia, "Testing the portfolio rebalancing channel of quantitative easing," Technical Report, Working paper 2023.

Swanson, Eric T, "Let's twist again: a high-frequency event-study analysis of operation twist and its implications for QE2," *Brookings Papers on Economic Activity*, 2011, *2011* (1), 151–188.

_ , "Measuring the effects of federal reserve forward guidance and asset purchases on financial markets," *Journal of Monetary Economics*, 2021, *118*, 32–53.

_ , "The Macroeconomic Effects of the Federal Reserve's Conventional and Unconventional Monetary Policies," Technical Report, National Bureau of Economic Research 2023.

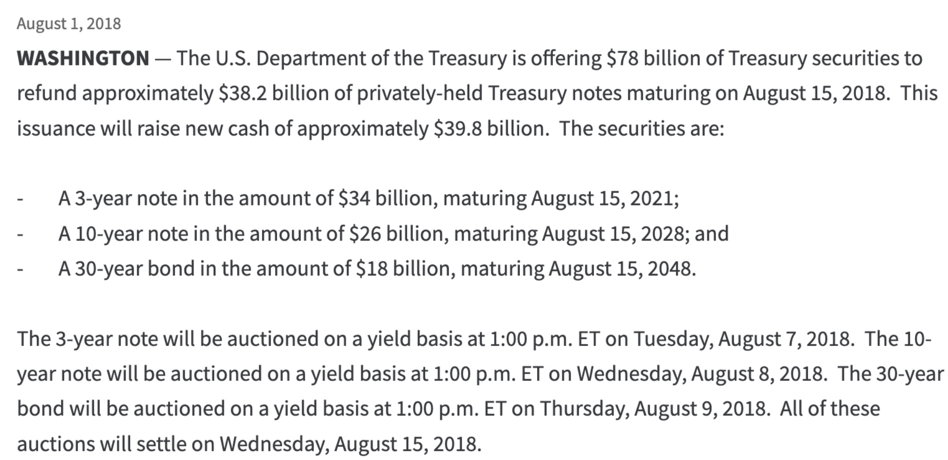
Vayanos, Dimitri and Jean-Luc Vila, "A preferred-habitat model of the term structure of interest rates," *Econometrica*, 2021, *89* (1), 77–112.

Wu, Jing Cynthia and Fan Dora Xia, "Measuring the macroeconomic impact of monetary policy at the zero lower bound," *Journal of Money, Credit and Banking*, 2016, *48* (2-3), 253–291.

Appendix

A Identification: background and sensitivity

A.1 Treasury policy announcements



August 1, 2018

WASHINGTON — The U.S. Department of the Treasury is offering $78 billion of Treasury securities to refund approximately $38.2 billion of privately-held Treasury notes maturing on August 15, 2018. This issuance will raise new cash of approximately $39.8 billion. The securities are:

- A 3-year note in the amount of $34 billion, maturing August 15, 2021;
- A 10-year note in the amount of $26 billion, maturing August 15, 2028; and
- A 30-year bond in the amount of $18 billion, maturing August 15, 2048.

The 3-year note will be auctioned on a yield basis at 1:00 p.m. ET on Tuesday, August 7, 2018. The 10-year note will be auctioned on a yield basis at 1:00 p.m. ET on Wednesday, August 8, 2018. The 30-year bond will be auctioned on a yield basis at 1:00 p.m. ET on Thursday, August 9, 2018. All of these auctions will settle on Wednesday, August 15, 2018.

Figure A1: Quarterly Refunding Announcement

PUBLIC DEBT NEWS

Department of the Treasury • Bureau of the Public Debt • Washington, DC 20239

Embargoed Until 11:00 A.M.
April 21, 2008

CONTACT: Office of Financing
202-504-3550

TREASURY OFFERING ANNOUNCEMENT[1]

Term and Type of Security	5-Year Note
Offering Amount	$19,000,000,000
Currently Outstanding	$0
CUSIP Number	912828HY9
Auction Date	April 24, 2008
Original Issue Date	April 30, 2008
Issue Date	April 30, 2008
Maturity Date	April 30, 2013
Dated Date	April 30, 2008
Series	K-2013
Yield	Determined at Auction
Interest Rate	Determined at Auction
Interest Payment Dates	October 31 and April 30
Accrued Interest from 04/30/2008 to 04/30/2008	None
Premium or Discount	Determined at Auction
Minimum Amount Required for STRIPS	$100
Corpus CUSIP Number	912820QV2
Additional TINT(s) Due Date(s) and	April 30, 2013
CUSIP Number(s)	912833Z94
Maximum Award	$6,650,000,000
Maximum Recognized Bid at a Single Yield	$6,650,000,000
NLP Reporting Threshold	$6,650,000,000
NLP Exclusion Amount	$0
Scheduled Purchases in Treasury Direct	$26,000,000
Minimum Bid Amount and Multiples	$100
Competitive Bid Yield Increments[2]	0.001%
Maximum Noncompetitive Award	$5,000,000
Eligible for Holding in Treasury Direct	Yes
Eligible for Holding in Legacy Treasury Direct	Yes
Estimated Amount of Maturing Coupon Securities Held by the Public	$21,609,000,000
Maturing Date	April 30, 2008
SOMA Holdings Maturing	$5,228,000,000
SOMA Amounts Included in Offering Amount	No
FIMA Amounts Included in Offering Amount[3]	Yes
Noncompetitive Closing Time	12:00 Noon ET
Competitive Closing Time	1:00 p.m. ET

Figure A2: Intermediate announcement

A.2 Treasury futures markets

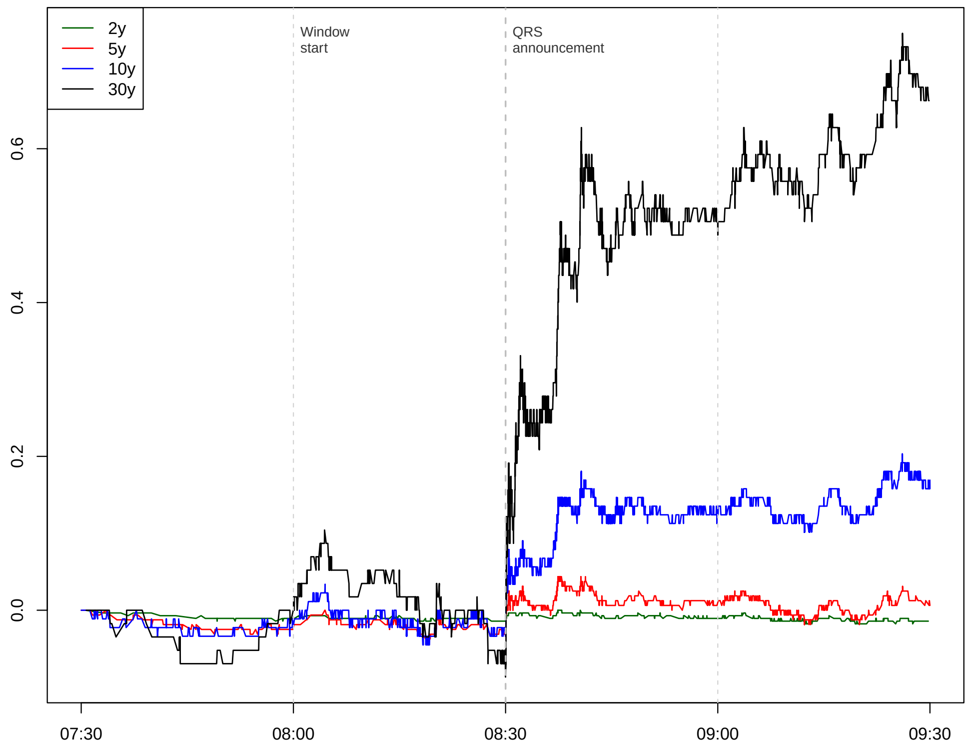


Figure A3: High-frequency market reaction around 6 May 2020 QRS

A.3 Data Release

Table A1: Macroeconomic Data Releases

Release	**Frequency**
PCE, CPI, Unemployment, Retail Sales, Housing Start, PPI, UoM, Durable Goods Orders, New House Sales, IPI, CB confidence index ISM, Government Deficit, Consumer Credit	Monthly
GDP (1st, 2nd and 3rd release)	Quarterly
FOMC	Six weeks

A.4 Treasury policy shock: diagnostic checks

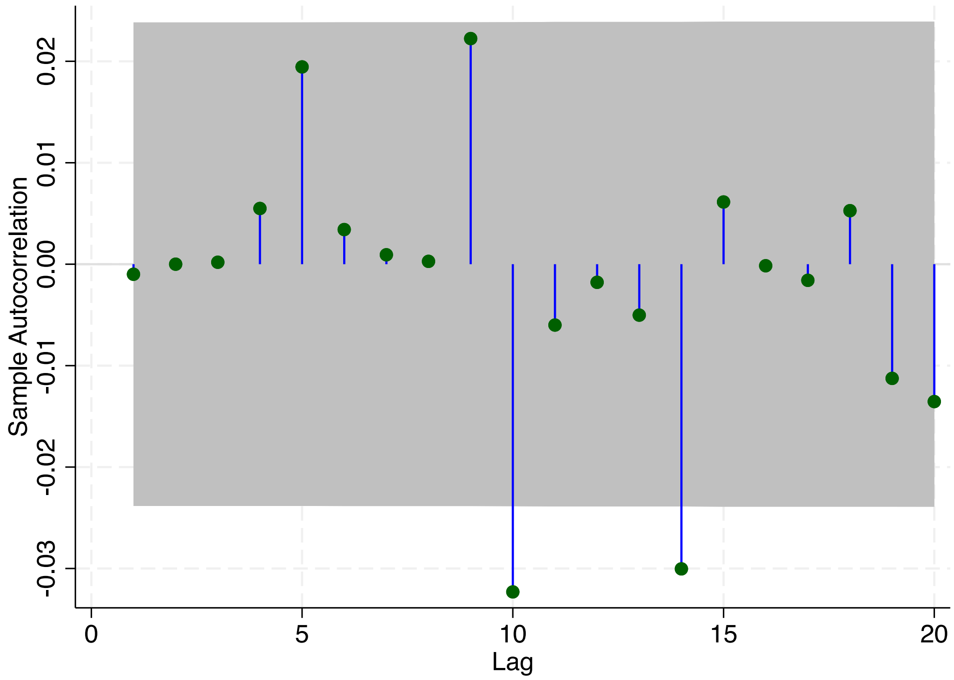


Figure A4: Daily autocorrelation function of Treasury policy shock

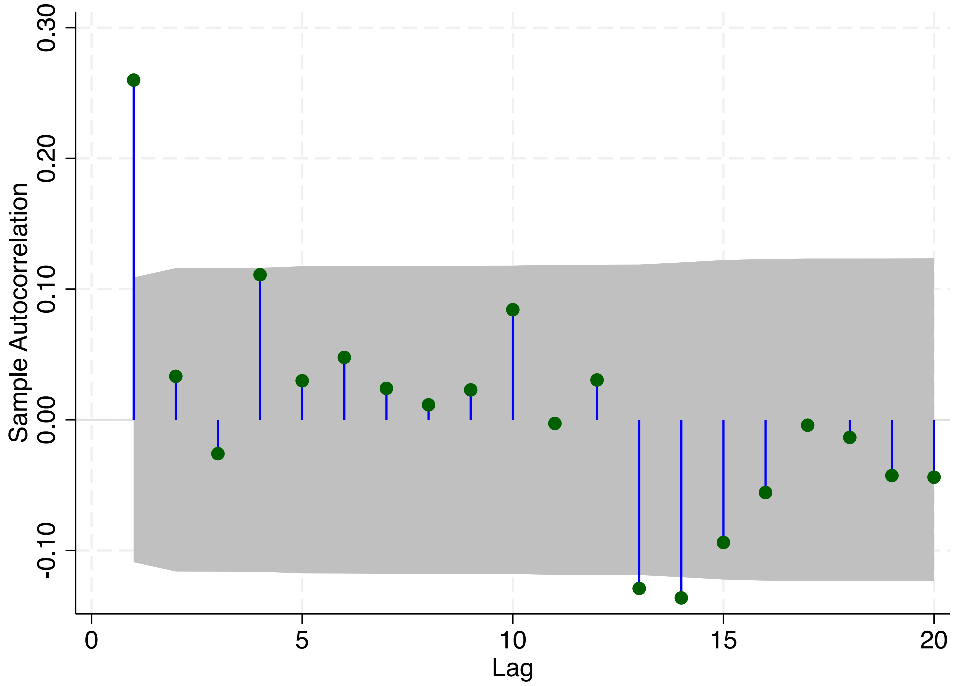


Figure A5: Monthly autocorrelation function of Treasury policy shock

Shock correlation.

Table A2: Correlation Results

Shock	Source	ρ	p-value	N	Sample
MoPo Surprise	Bauer and Swanson (2023)	-0.077	0.18	306	1988M2-2023M12
MoPo Surprise Orth	Bauer and Swanson (2023)	-0.016	0.78	306	1988M2-2023M12
FFR factor	Swanson (2021)	-0.135	0.03	252	1991M7-2019M1
FG factor	Swanson (2021)	0.041	0.52	252	1991M7-2019M1
LSAP factor	Swanson (2021)	-0.075	0.24	252	1991M7-2019M1
Treasury Demand	Droste et al. (2024)	0.003	0.97	234	1995M2-2017M12
Oil supply news	Känzig (2021)	-0.073	0.21	306	1975M1-2023M12

Granger test.

Table A3: Granger causality results

Panel A: Daily frequency

Variable	p-value
3M T-bill	0.7023
2Y Treasury	0.4885
5Y Treasury	0.4494
10Y Treasury	0.3381
30Y Treasury	0.6932
Term premium 2Y	0.4967
Term premium 3Y	0.5848
Term premium 5Y	0.2530
Term premium 10Y	0.2622
Breakeven 2Y	0.7517
Breakeven 5Y	0.9564
Breakeven 10Y	0.9105
AAA	0.6918
VIX	0.1014
WAM	0.6212

Panel B: Monthly frequency

Variable	p-value
3M T-bill	0.0183
2Y Treasury	0.2348
5Y Treasury	0.4150
10Y Treasury	0.4595
30Y Treasury	0.8420
Term premium 2Y	0.1759
Term premium 3Y	0.1764
Term premium 5Y	0.1799
Term premium 10Y	0.1836
Breakeven 2Y	0.2137
Breakeven 5Y	0.7869
Breakeven 10Y	0.9096
AAA	0.8791
VIX	0.1087
WAM	0.0842
CPI	0.1585
GDP	0.3876
Industrial production	0.5736

Note: The table reports the p-values from Granger causality tests of our Treasury policy shock series. We conduct the tests at both the daily (Panel A) and monthly (Panel B) frequencies. We examine whether a set of macroeconomic and financial variables Granger-cause the shock series. We include a constant term and set the lag order to 6 lags at the monthly frequency and 5 lags at the daily frequency.

Predictability exercise. We follow Bauer and Swanson (2023) and study whether our surprises are predicted by macroeconomic and financial news available prior to the announcement. For this purpose, we construct a daily-level dataset of "news" released prior to any Treasury policy announcements. We then restrict the exercise to days in which a Treasury policy announcement is released.

We include the surprise in non-farm payrolls, and the three-month change in the slope of the yield curve, the S&P 500, and in the Bloomberg Commodity Spot Price Index, an index of Treasury skeweness from Bauer and Chernov (2024), and employment growth over the last twelve months. These are the same regressors used by Bauer and Swanson (2023). We consider three different sample periods. Column (1) includes the entire time series of the shock; column (2) restricts to the sample used for the baseline analysis; column (3) excludes the COVID years.

Table A4: Predictability of Treasury policy surprises

	(1)	(2)	(3)
Nonfarm Payroll	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.001)
Empl. growth (12m)	-0.931	-1.461	-5.566
	(2.541)	(2.564)	(6.384)
Δ Slope (3m)	0.410**	0.474**	0.377**
	(0.185)	(0.201)	(0.192)
Δ log S&P 500 (3m)	1.146	0.911	1.278
	(1.320)	(1.496)	(1.447)
Δ log comm. price (3m)	-3.043**	-3.277**	-3.178**
	(1.260)	(1.385)	(1.377)
Treasury skewness	-0.064	-0.101	-0.050
	(0.196)	(0.199)	(0.216)
Constant	0.065	0.115	0.119
	(0.092)	(0.097)	(0.131)
R^2	0.026	0.032	0.027
Period	1998/7/21–2025/6/3	2003/7/21–2025/6/3	Excl. 2020/2/1–2021/12/31
N	587	524	527

Note: The table replicates equation (14) in Bauer and Swanson (2023). In particular, given the Treasury policy surprise tps_t at any time t, we estimate the regression: $tps_t = \alpha + \beta' X_{t-} + u_t$. Predictors X are observed prior to the Treasury policy announcements: the surprise component of the most recent nonfarm payrolls release, the log change in the S&P 500 index from 3 months before to the day before the Treasury announcement, the change in the yield curve slope over the same period, the log change in a commodity price index over the same period, the Treasury skewness the implied skewness of the 10-year Treasury yield computed by Bauer and Chernov (2024) averaged over the preceding month, the log change in nonfarm payroll employment from one year earlier to the most recent release. Heteroskedasticity-consistent standard errors are in parentheses. The third column Excl. 2020/2/1-2021/12/31 excludes the COVID years from our baseline sample of 2003/7/21 to 2025/6/3.

B Data

Table B1: Data and Sources

Variable	Description	Source
Intradaily data.		
Treasury futures	Tick-data for U.S. Treasury futures at 2, 5, 10, and 30-year maturities [TUc1, FVc1, TYc1, USc1]	LSEG Tick History
Daily data.		
Treasury bond yields	Yields on U.S. Treasury securities at constant maturity 2, 5, 10, and 30-year maturities	Refinitiv
Corporate bond yields	AAA and BAA Corporate Bond Yields	FRED
Term premia	Term Premium on 1-, 2-, 3-, 5-, and 10-Year Zero-Coupon Treasury Bonds	FRED
VIX	CBOE Volatility Index	FRED
S&P 500 Index	Stock market index	Bloomberg
Inflation Expectations	Breakeven Inflation Expectations	FRED
Total Debt	U.S. total marketable debt	U.S. Treasury and own calculations
Treasury Skewness	Implied skewness of the 10-year Treasury yield	Bauer and Chernov (2024)
Macroeconomic and financial news	"News" used for the predictability exercise	Bloomberg and FRED
Monthly data.		
SOMA holdings	System Open Market Account Holdings of Domestic Securities	New York Fed and own calculations
Consumer Price Index	CPI for all urban consumers: all items	FRED
Consumption	Personal Consumption Expenditure	FRED
Industrial Production	Industrial production index	FRED
Equipment	Manufacturers' Value of Shipments: Nondefense Capital Goods	FRED
Construction	Total Private Construction Spending: Nonresidential in the United States	FRED

Continued on next page

Table B1 – Continued

Variable	**Description**	**Source**
Business loans	Commercial and Industrial Loans, All Commercial Banks	FRED
Shadow rate	Shadow rate from Wu and Xia (2016)	Atlanta Fed
EBP	Excess bond premium from Gilchrist and Zakrajsek (2012)	Gilchrist's webpage
Short-term debt	Treasuries with maturities at issuance of one year or lower	U.S. Treasury
Long-term debt	Treasuries with maturities at issuance of two years or greater	U.S. Treasury
WAM	Weighted Average Maturity of marketable debt	U.S. Treasury
WAD	Weighted Average Duration of marketable debt	U.S. Treasury and own calculations

C Additional results and robustness checks

C.1 Debt response

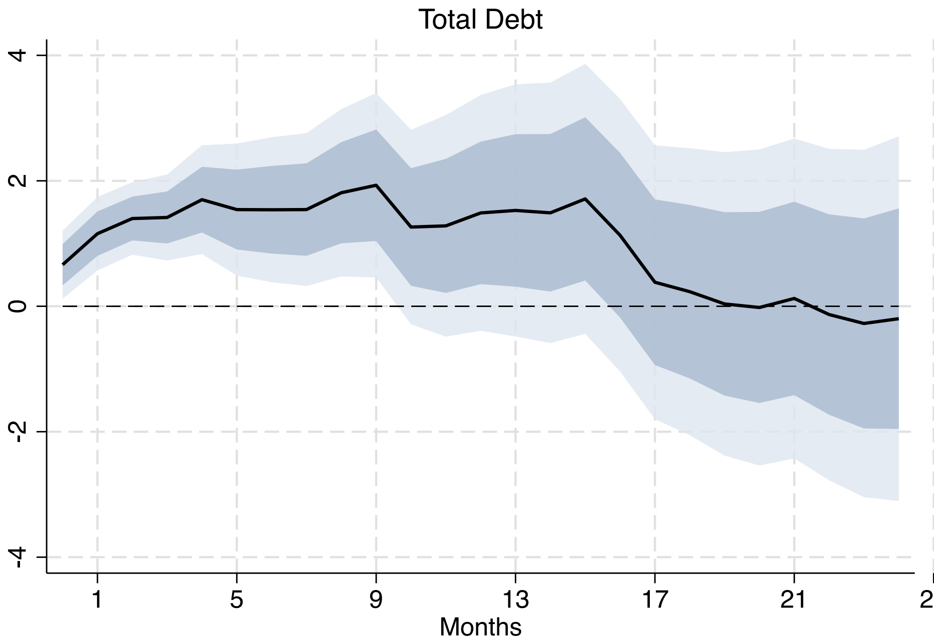


Figure C1: Impulse response of debt to a Treasury policy shock

Note: this figure shows the results of estimating equation (3), with the y variable being total U.S. public debt outstanding. The x-axis shows months from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

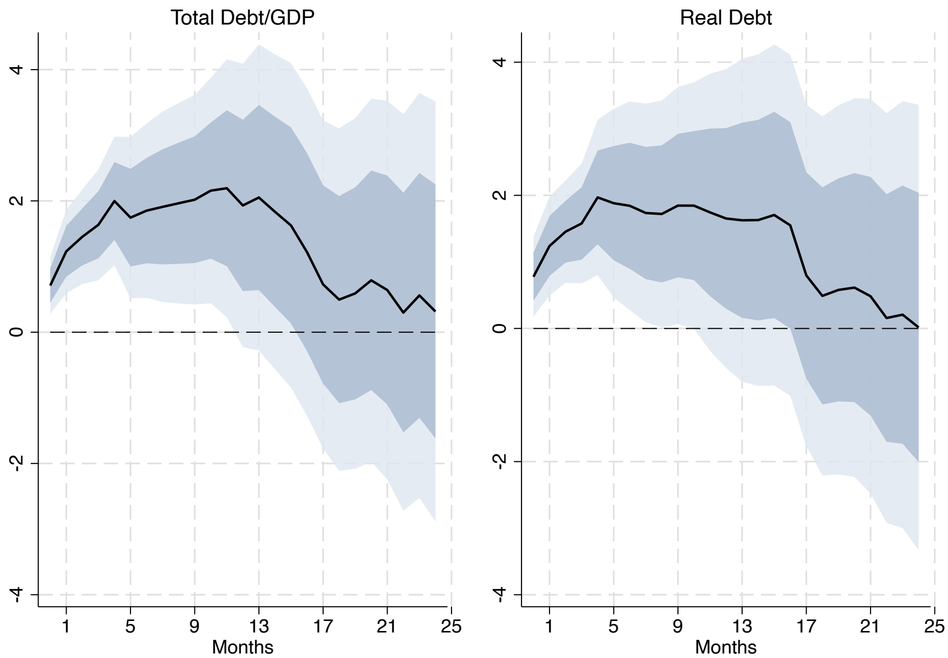


Figure C2: Other definitions of U.S. public debt

Note: this figure shows the results of estimating equation (3). The left graph shows total debt over GDP; the right graph shows total debt deflated with the GDP deflator. The x-axis shows months from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

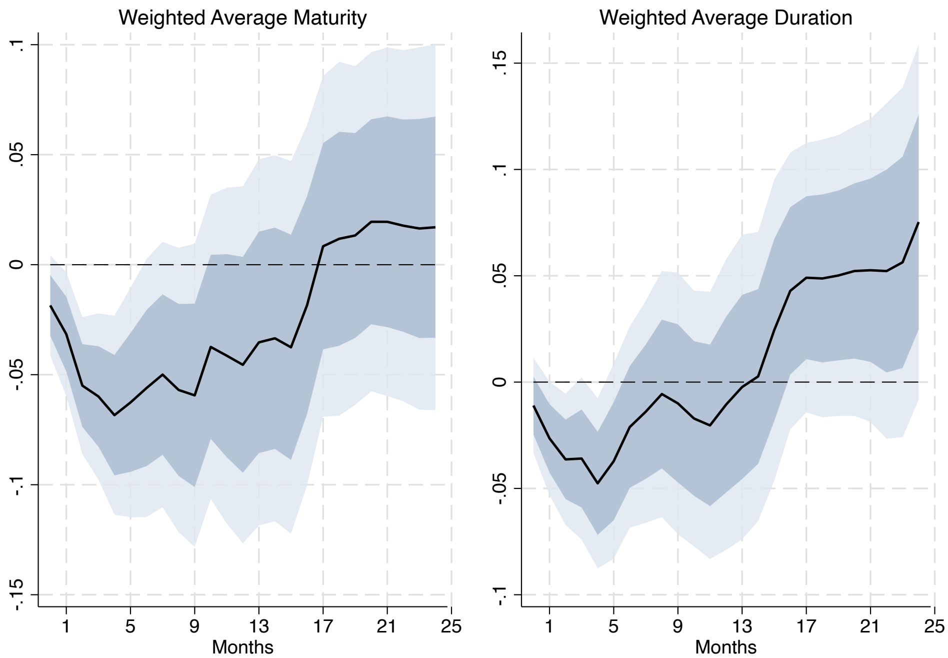


Figure C3: Maturity and Duration

Note: this figure shows the results of estimating equation (3). The left graph shows the weighted average maturity of U.S. public debt; the right graph shows the weighted average duration of U.S. public debt. The x-axis shows months from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

C.2 Financial and macroeconomics effects

Additional results.

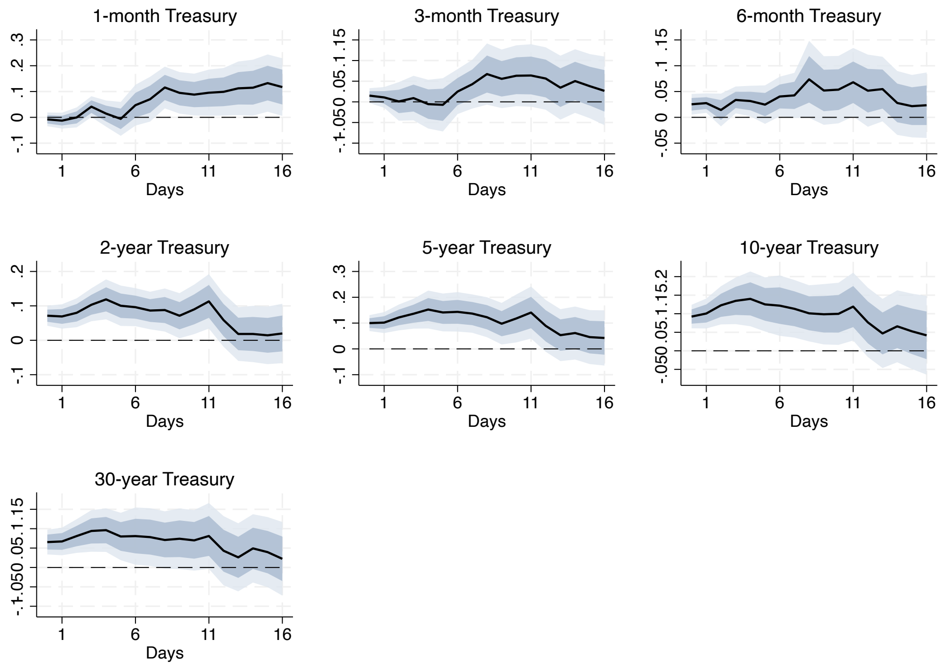


Figure C4: Treasury rates dynamic response

Note: this figure shows the results of estimating equation (3). All the panels show the response of Treasury rates, from maturity of one month to thirty years. The x-axis shows days from the shock, while the y-axis shows the response in percentage points. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

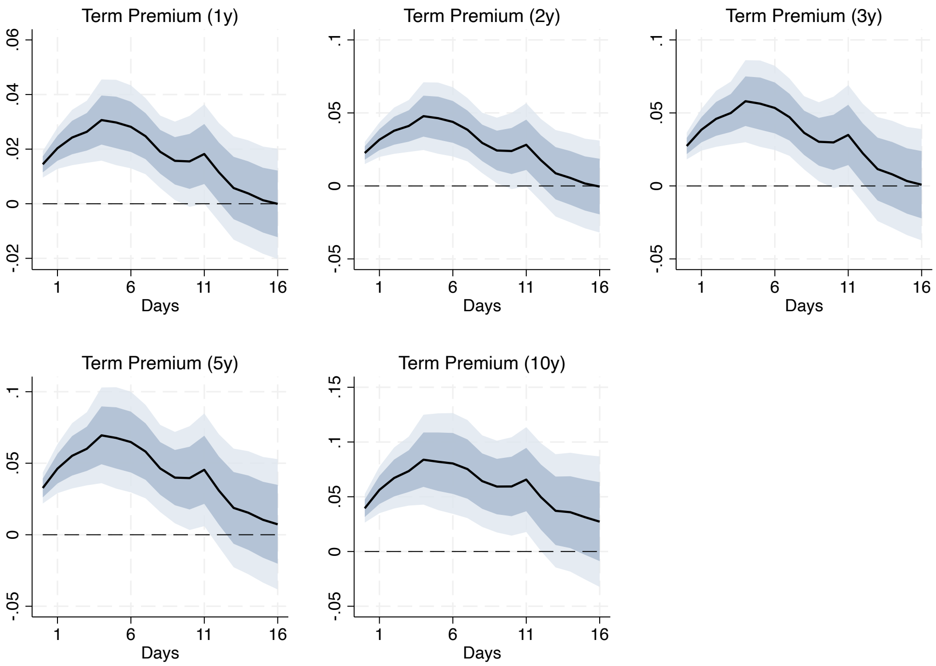


Figure C5: Term premia

Note: this figure shows the results of estimating equation (3). All the panels show the response of term premia, from maturity of one year to ten years. The x-axis shows days from the shock, while the y-axis shows the response in percentage points. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

Figure C6: Spillover to corporate rates

Note: this figure shows the results of estimating equation (3). The left panel shows the response of the ten-year Treasury rate; the right panel shows the response of AAA corporate rate (which is an index pooling together corporate bonds of maturity of twenty years or longer). The x-axis shows days from the shock, while the y-axis shows the response in percentage points. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

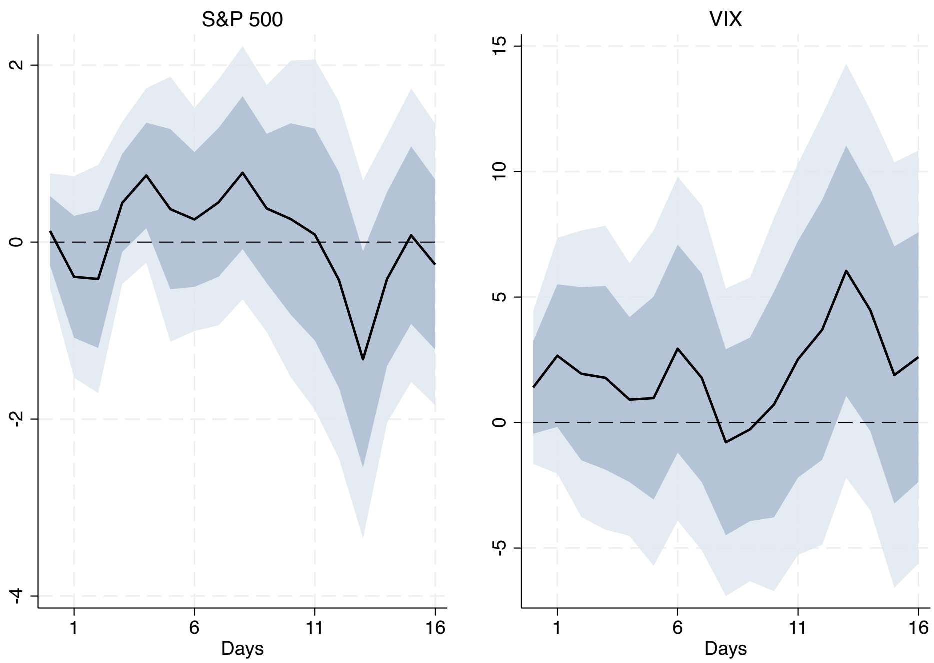


Figure C7: Stock market response

Note: this figure shows the results of estimating equation (3). The left panel shows the response of the S&P 500 Index; the right panel shows the response of the CBOE Volatility Index (VIX). The x-axis shows days from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

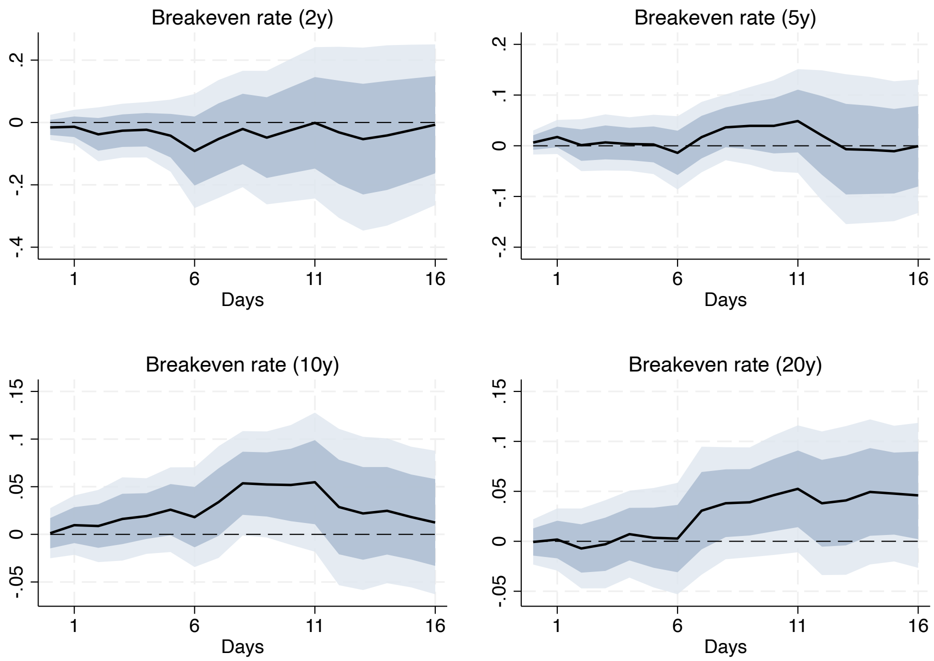


Figure C8: Inflation expectations response

Note: this figure shows the results of estimating equation (3). The panels show the breakeven inflation rate for different maturities computed using TIPS. The x-axis shows days from the shock, while the y-axis shows the response in percentage points. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

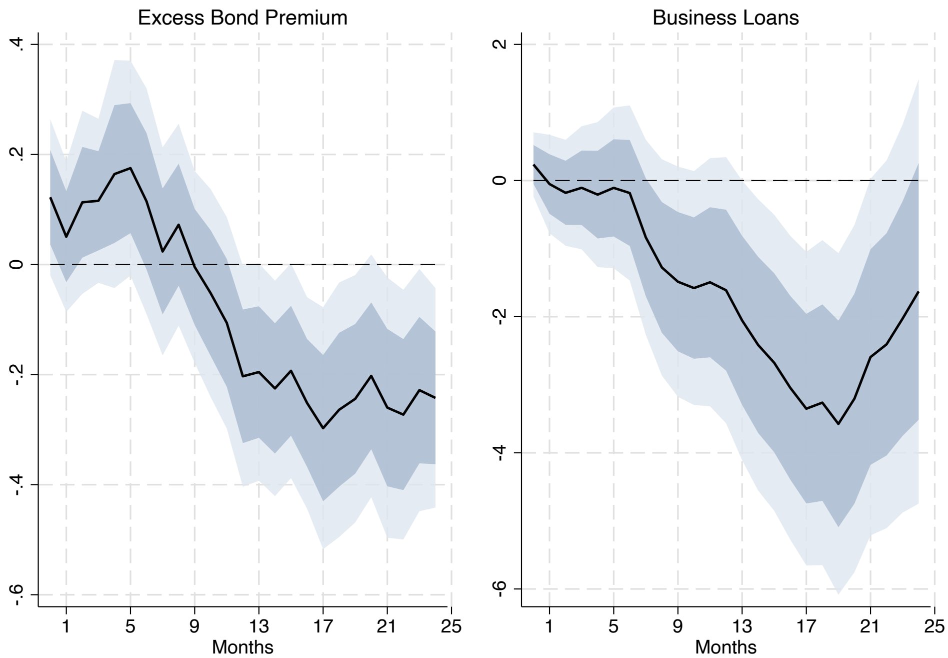


Figure C9: Credit conditions response

Note: this figure shows the results of estimating equation (3). The left panel shows the response of the Excess Bond Premium (Gilchrist and Zakrajsek, 2012); the right panel shows the response of the amount of business loans (all commercial and industrial loans outstanding). The x-axis shows days from the shock, while the y-axis shows the response in percentage points (changes) in the left (right) graph. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

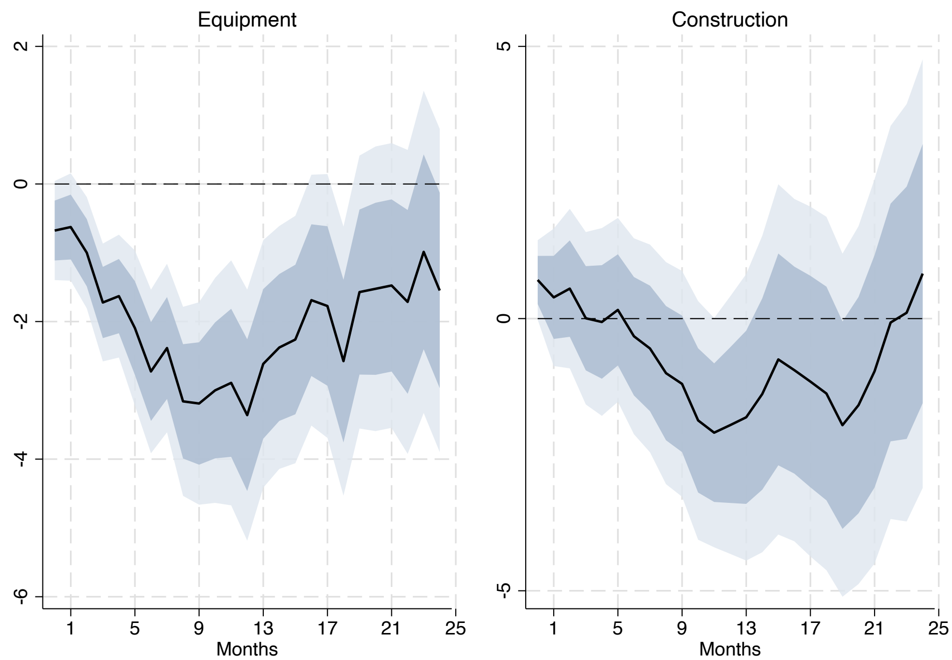


Figure C10: Investment response

Note: this figure shows the results of estimating equation (3). The left panel shows Equipment as in Figure 5; the right panel shows real construction investment (in nonresidential buildings and structures). The x-axis shows days from the shock, while the y-axis shows the response in percentage changes. The dark line represents the point estimate, while light and dark gray shaded areas represent 68% and 90% Newey-West confidence intervals.

Robustness checks.

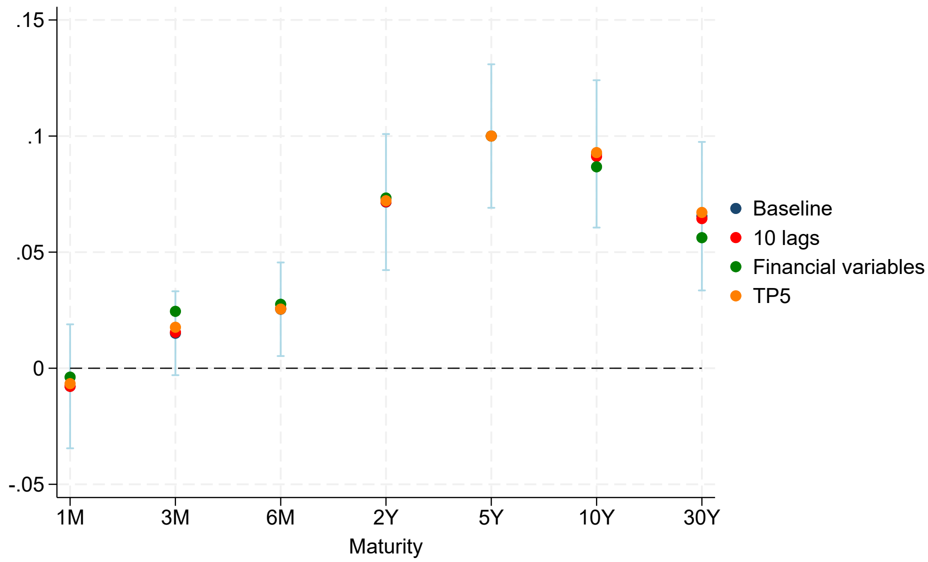


Figure C11: Different controls

Note: this figure replicates Figure 4, but changes the set of controls. Finacial variables include VIX, SP500 and CBOE/CBOT 10-year U.S. Treasury Note Volatility Index. TP5 refers to the term-premium on the 5-year zero-coupon bond available from FRED.

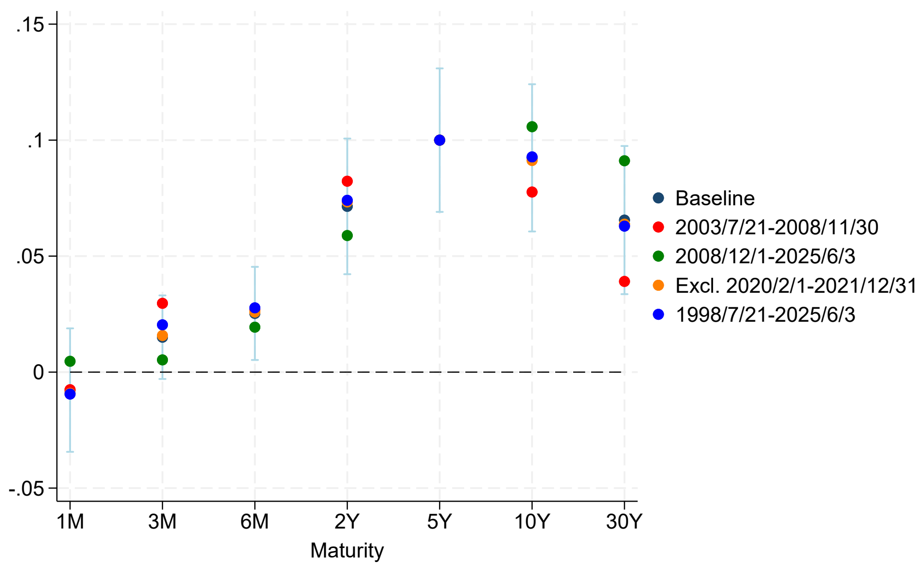


Figure C12: Different sample periods

Note: this figure replicates Figure 4, but changes the sample periods. Excl. 2020/2/1-2021/12/31 excludes the COVID years from our baseline sample of 2003/7/21 to 2025/6/3.

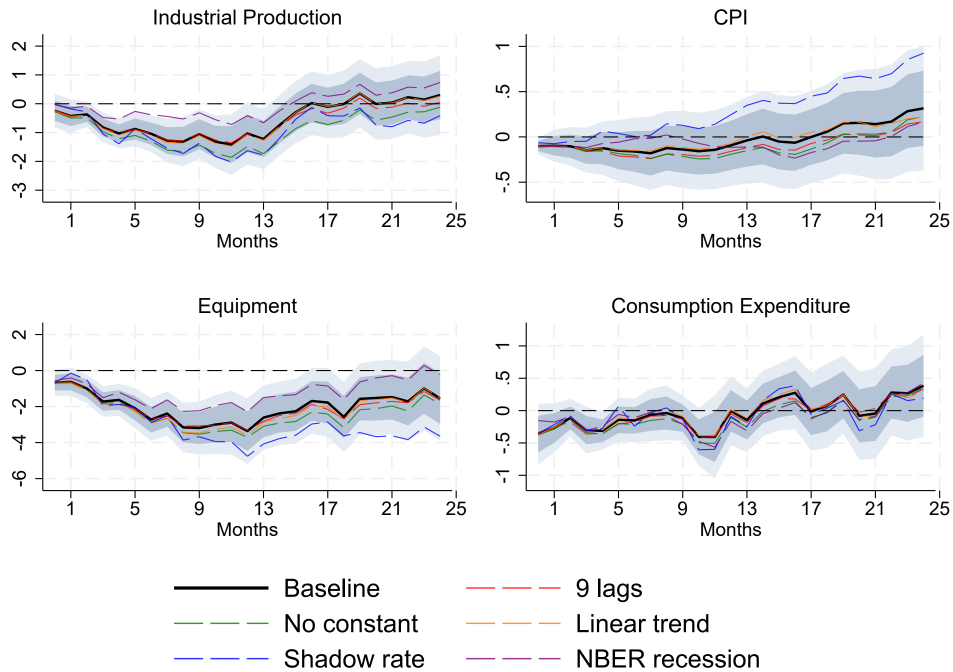


Figure C13: Different controls

Note: this figure replicates Figure 5, but changes the set of controls. The lines correspond to point estimates. The shadow rate is the shadow federal funds rate calculated by using the method of Wu and Xia (2016).

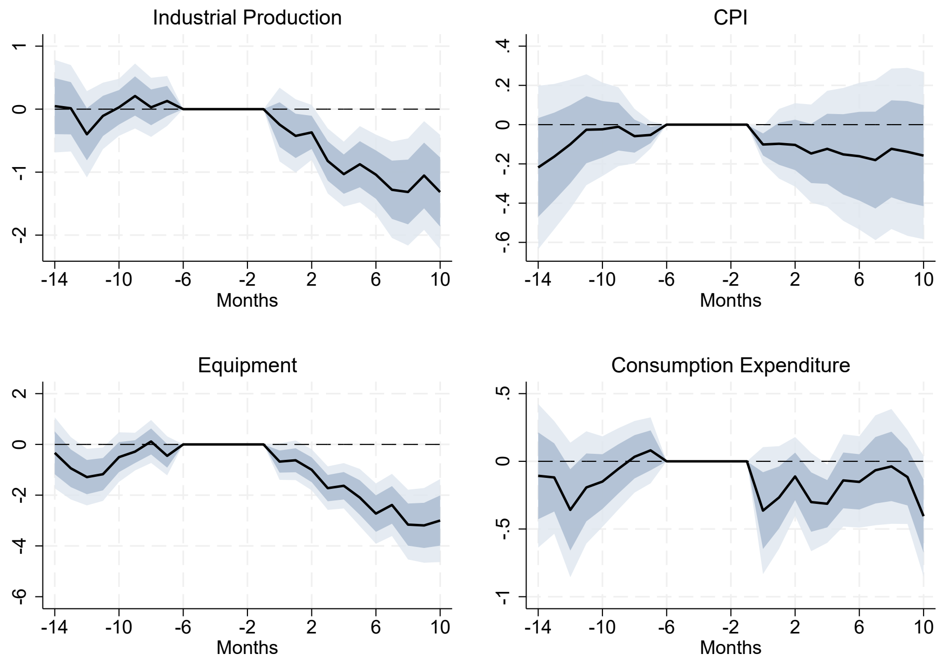


Figure C14: Checking for pre-trends

Note: this figure check for the presence of pre-trends in variables analyzed in Figure 5.

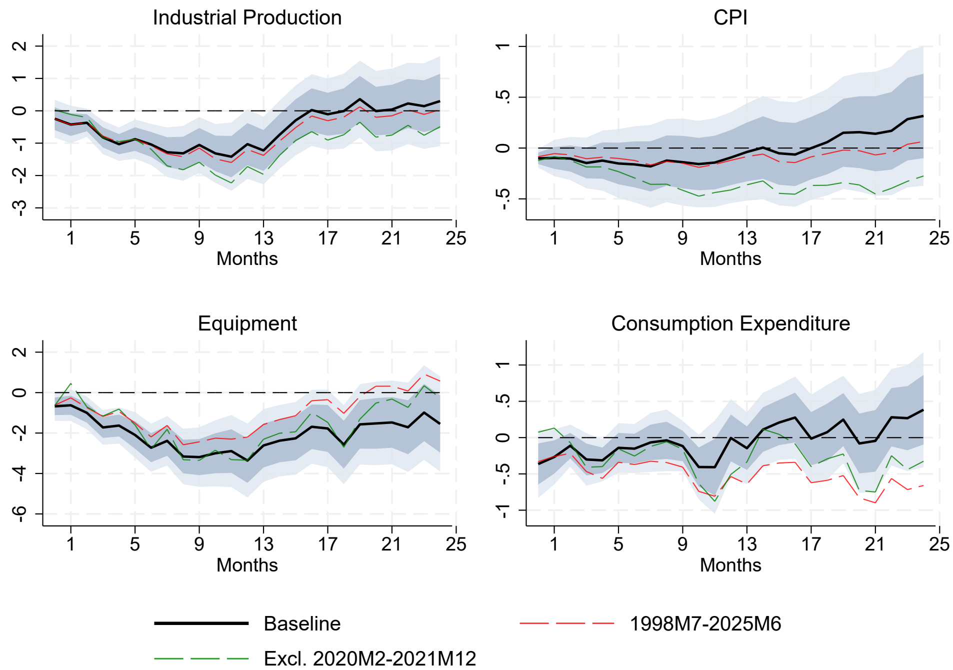


Figure C15: Different sample periods

Note: this figure checks the sensitivity of the result presented in Figure 5 to different sample periods. The lines correspond to point estimates.

Shock: window, aggregation, and other definitions. In this section, we show that our result is robust to different ways of constructing the shock. First, we change the high-frequency window around the announcement (Figure C16). Second, we change aggregation method and simply sum the daily surprises within a month ((Figure C17). Third, we orthogonalize the shock with respect to news available prior to the announcements (Figure C18). Fourth, we clean the shock from information effects following the Poor Man's approach as in Jarociński and Karadi (2020) (Figure C19).

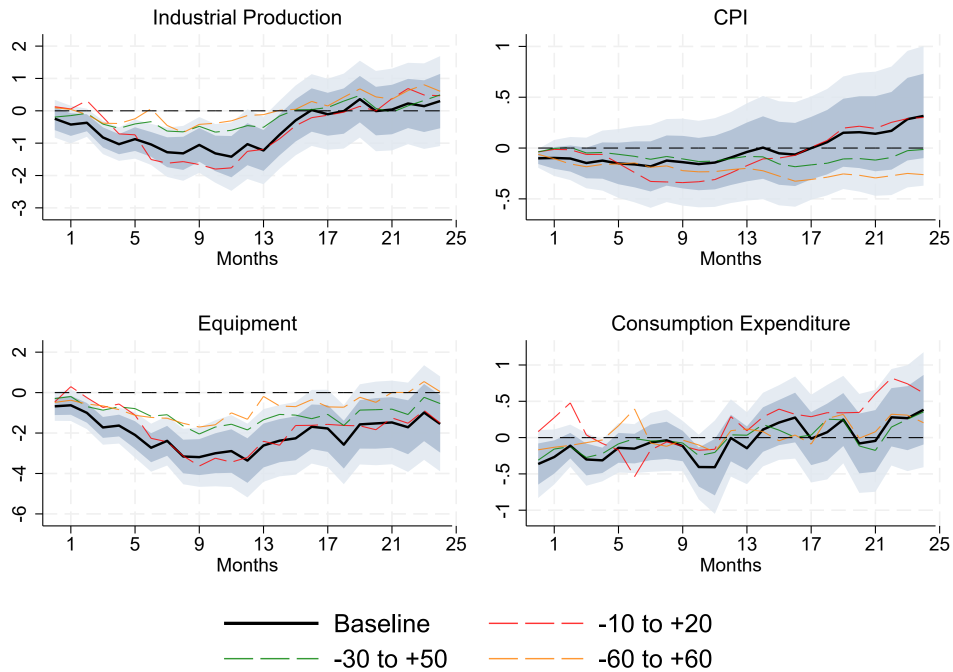


Figure C16: Different windows around auction announcements

Note: this figure checks the sensitivity of the result presented in Figure 5 to the use of different time windows around auction announcements. The lines correspond to point estimates.

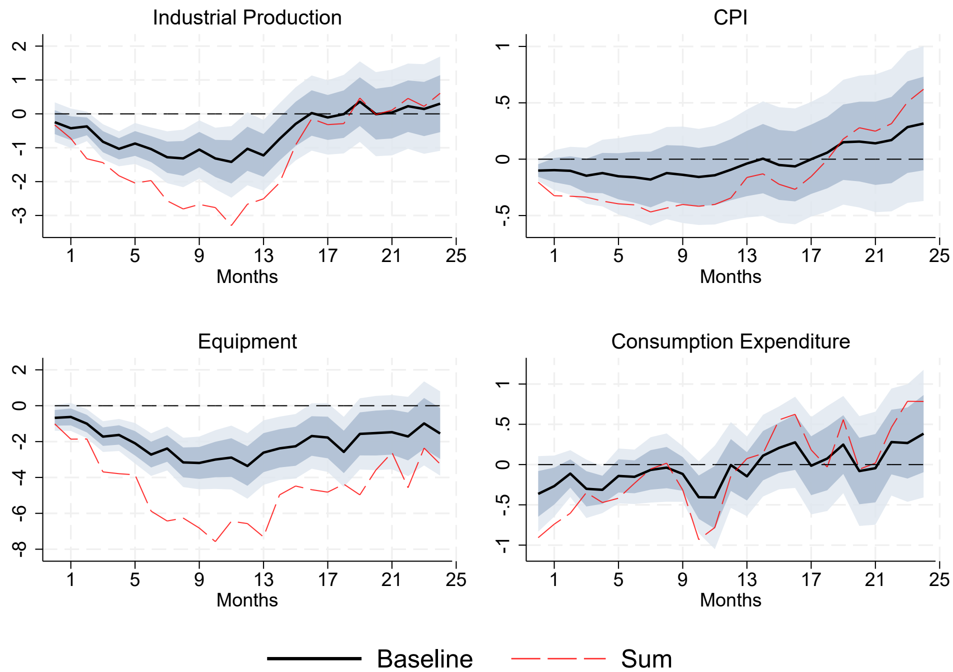


Figure C17: Different aggregation methods

Note: this figure checks the sensitivity of the result presented in Figure 5 to different temporal aggregation methods. The lines correpsponds to point estimates.

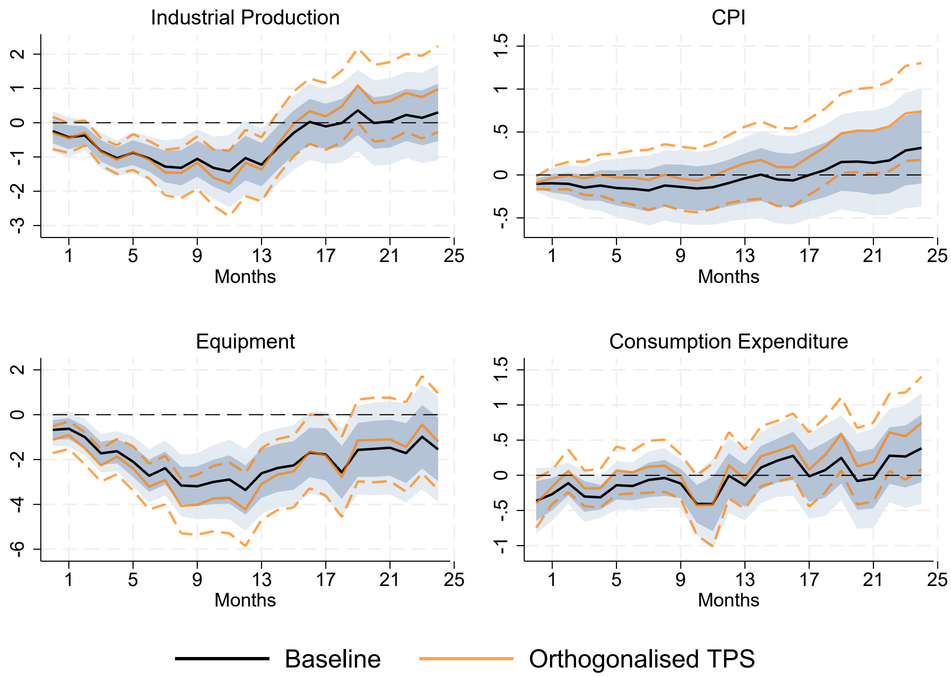


Figure C18: Orthogonalizing the shock with respect to news

Note: this figure checks the sensitivity of the result presented in Figure 5 with respect to the use of orthogonalized Treasury policy shocks defined as the residual from column (1) of Table A4. The solid orange lines are the point estimates and the orange dashed lines are 68% confidence bands.

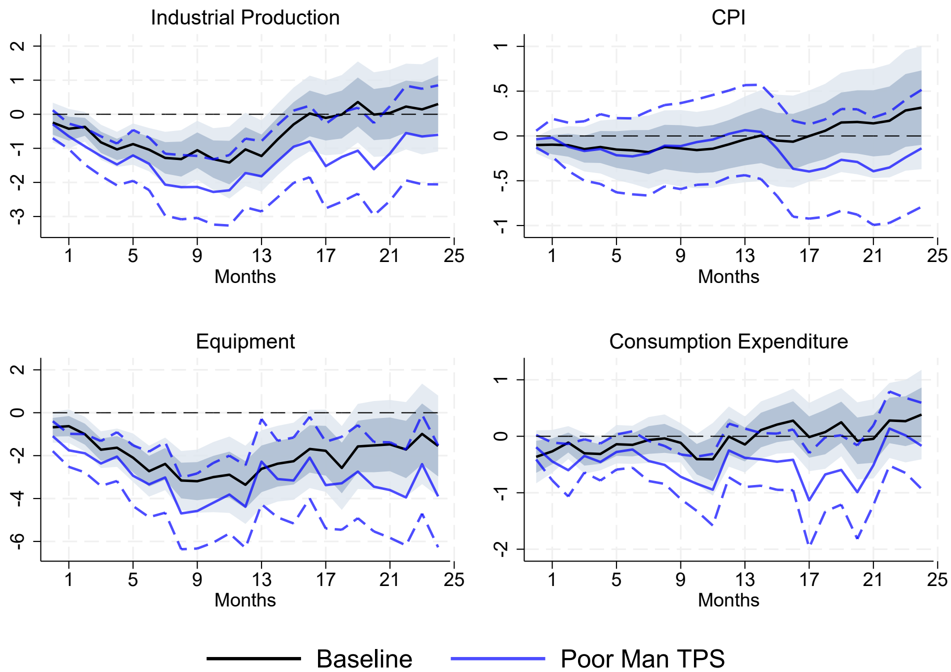


Figure C19: Poor Man's approach

Note: this figure checks the sensitivity of the result presented in Figure 5 with respect to the adoption of Poor Man's approach of Jarociński and Karadi (2020). We set to zero observations with a strictly positive correlation between the high-frequency change in the first principal component and the S&P 500 futures price. The solid blue lines are the point estimates and the blue dashed lines are 68% confidence bands.

Different estimation strategy. As an alternative estimation method, we estimate a vector autoregression model (VAR) using the internal instrument approach (Plagborg-Møller and Wolf, 2021).

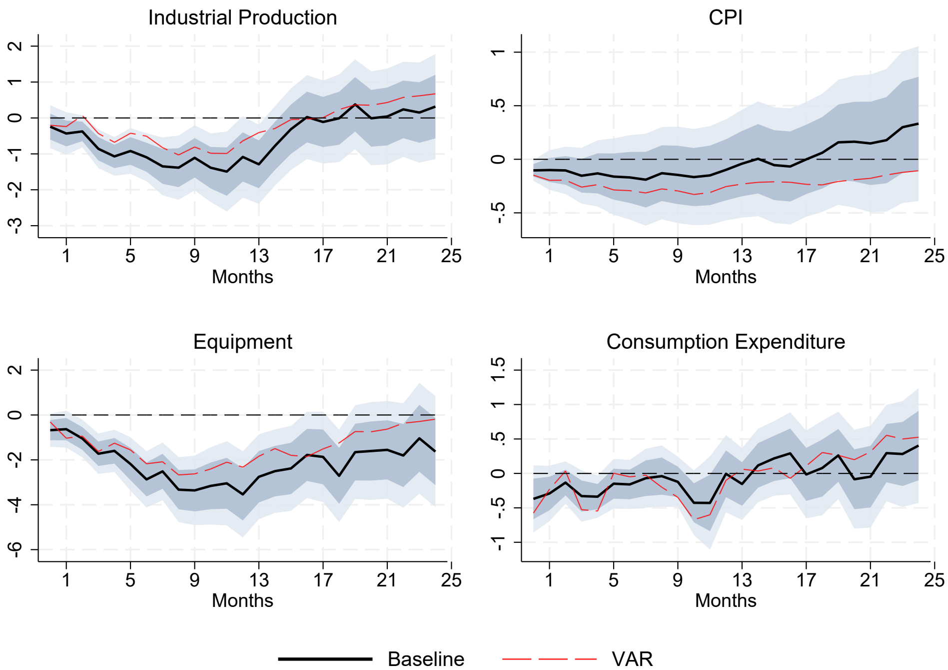


Figure C20: Different estimation method (VAR)

Note: this figure examines the sensitivity of the result presented in Figure 5 to the use of VAR instead of local projection. The black solid line and the gray confidence bands correspond to the response of variables to a Treasury policy shock using local projections. The red dashed lines correspond to the point estimate from the VAR.

C.3 Treasury and monetary policy shocks

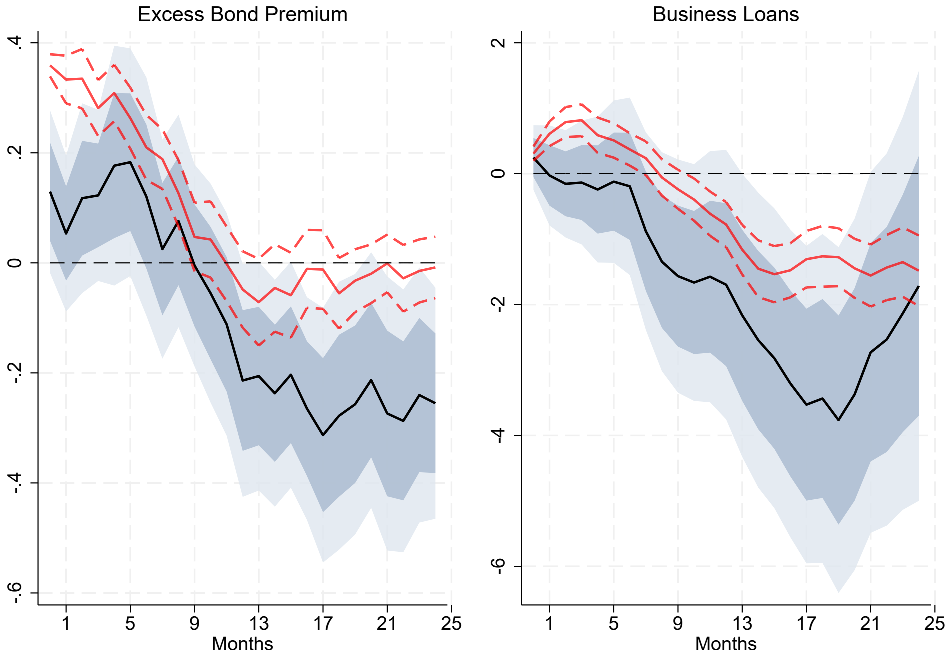


Figure C21: Credit responses to Treasury and monetary policy shocks

Note: the black solid line and the gray confidence bands correspond to the response of credit variables to a Treasury policy shock. The red solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The structural shock is obtained from a proxy SVAR where we use as an instrument the monetary policy surprise from Bauer and Swanson (2023). We follow the methodology suggested by Cloyne et al. (2023) to retrieve the structural shock. The x-axis shows months from when the shock hits, while the y-axis the percentage points (changes) for the left (right) graph. The estimation sample is 1988:M1 - 2020:M2 for the monetary policy shock; 2003:M7 - 2025:M2 for the Treasury policy shock.

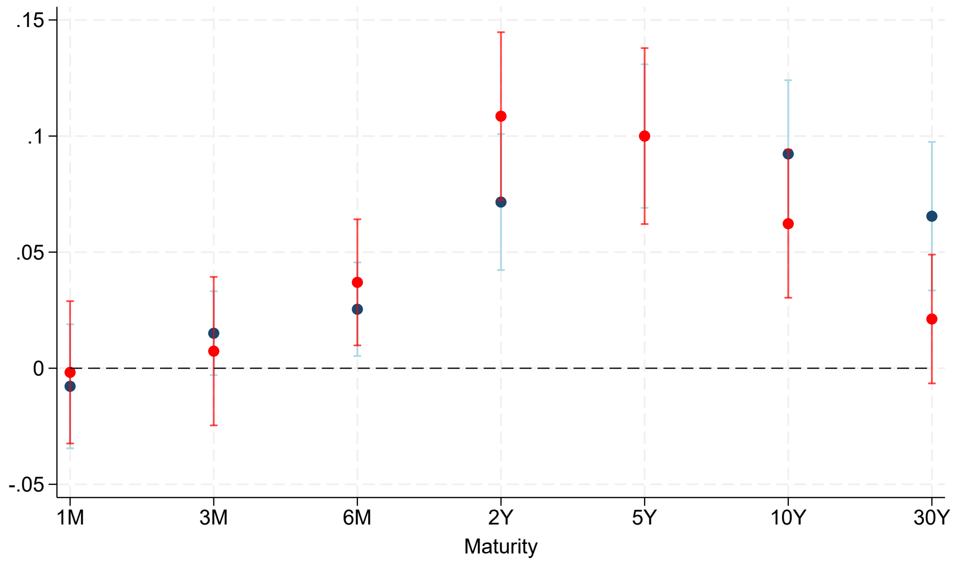


Figure C22: Yield curve response on sample 2003:M7 to 2020:M2

Note: this figures replicates Figure 6 but uses the common sample period of 2003:M7 to 2020:M2 for Treasury and monetary policy shocks. Blue dots are the response of Treasury rates to a Treasury policy shock. Red dots are the response to a monetary policy shock from Bauer and Swanson (2023). The x-axis shows the maturity of each security, while the y-axis the percentage points change. Vertical bars represent 90% Newey-West confidence intervals.

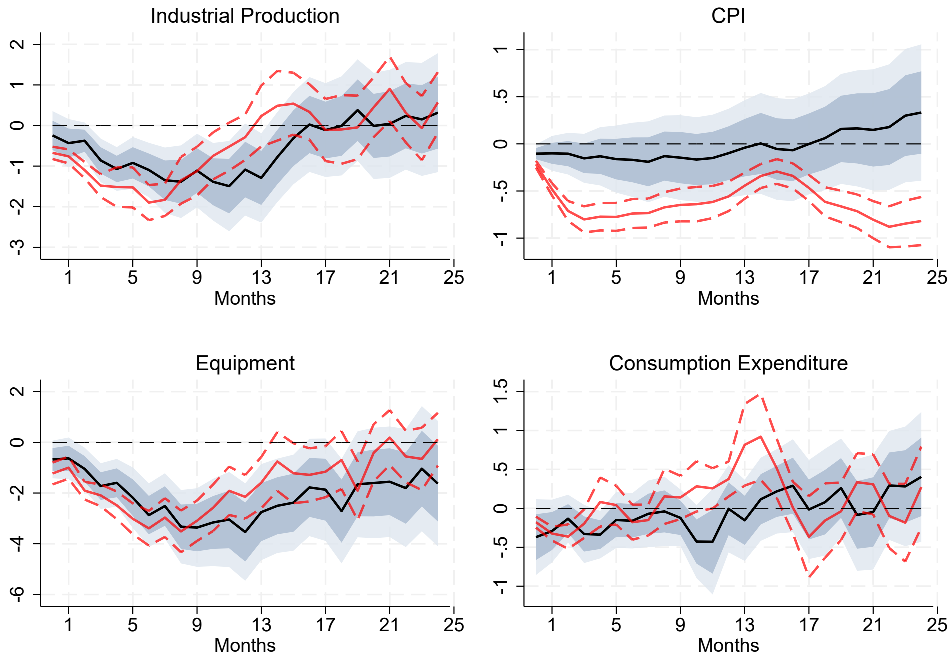


Figure C23: Real effects estimated on sample 2003:M7 to 2020:M2

Note: the black solid line and the gray confidence bands correspond to the response of real variables to a Treasury policy shock. The red solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The structural shock is obtained from a proxy SVAR where we use as instrument the monetary policy surprise from Bauer and Swanson (2023). We follow the methodology suggested by Cloyne et al. (2023) to retrieve the structural shock. The x-axis shows months from when the shock hits, while the y-axis the percentage changes. Estimation sample is 2003:M7 - 2020:M2 for both shocks.

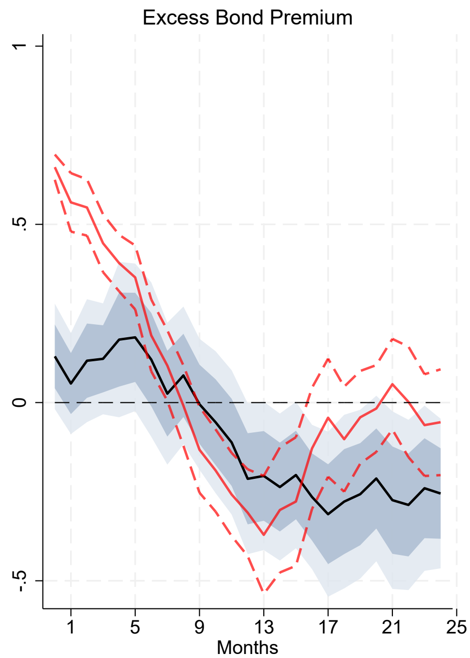


Figure C24: Credit effects estimated on sample 2003:M7 to 2020:M2

Note: the black solid line and the gray confidence bands correspond to the response of credit variables to a Treasury policy shock. The red solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The structural shock is obtained from a proxy SVAR where we use as instrument the monetary policy surprise from Bauer and Swanson (2023). We follow the methodology suggested by Cloyne et al. (2023) to retrieve the structural shock. The x-axis shows months from when the shock hits, while the y-axis the percentage points (changes) for the left (right) graph. Estimation sample is 2003:M7 - 2020:M2 for both shocks.

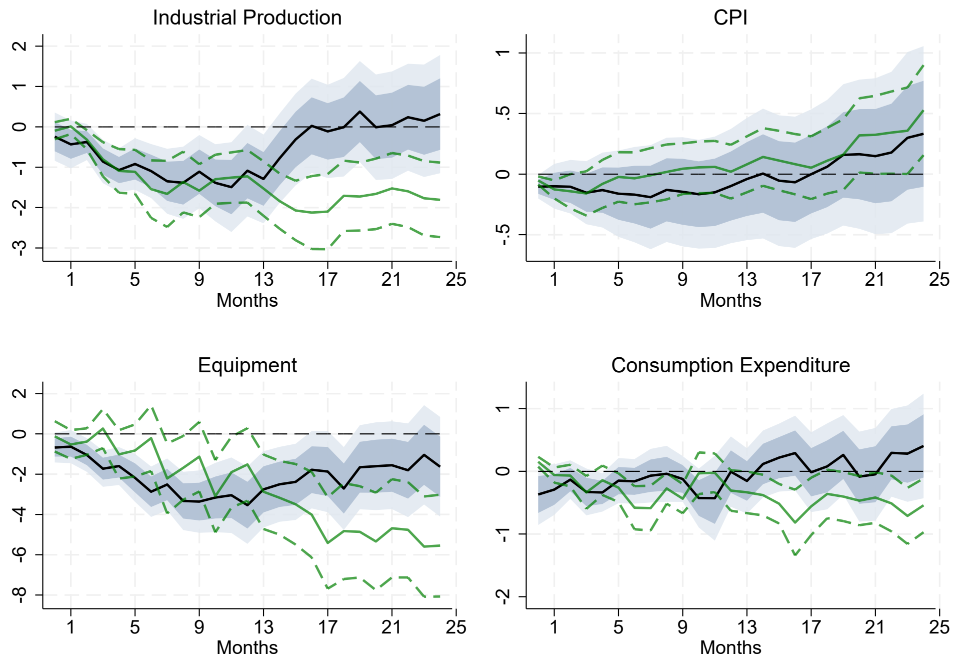


Figure C25: Comparison in real variables with monetary policy surprise

Note: the black solid line and the gray confidence bands correspond to the response of real variables to a Treasury policy shock. The green solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The shock is the orthogonalized monetary policy surprise directly from Bauer and Swanson (2023). The x-axis shows months from when the shock hits, while the y-axis the percentage changes. Estimation sample is 1988:M1 - 2020:M2 for the monetary policy shock; 2003:M7 - 2025:M2 for the Treasury policy shock.

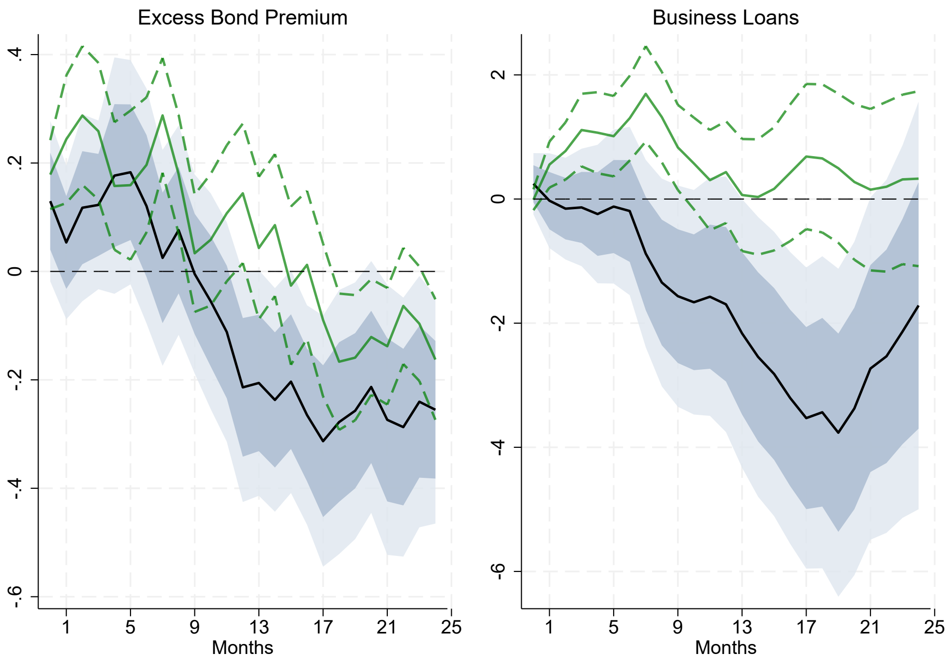


Figure C26: Comparison in credit conditions with monetary policy surprise

Note: the black solid line and the gray confidence bands correspond to the response of credit variables to a Treasury policy shock. The green solid line and the dashed lines correspond to the point estimate and 68% confidence bands of the response to a monetary policy shock. The shock is the orthogonalized monetary policy surprise directly from Bauer and Swanson (2023). The x-axis shows months from when the shock hits, while the y-axis the percentage points (changes) for the left (right) graph. Estimation sample is 1988:M1 - 2020:M2 for the monetary policy shock; 2003:M7 - 2025:M2 for the Treasury policy shock.

C.4 Fed's response to Treasury policy

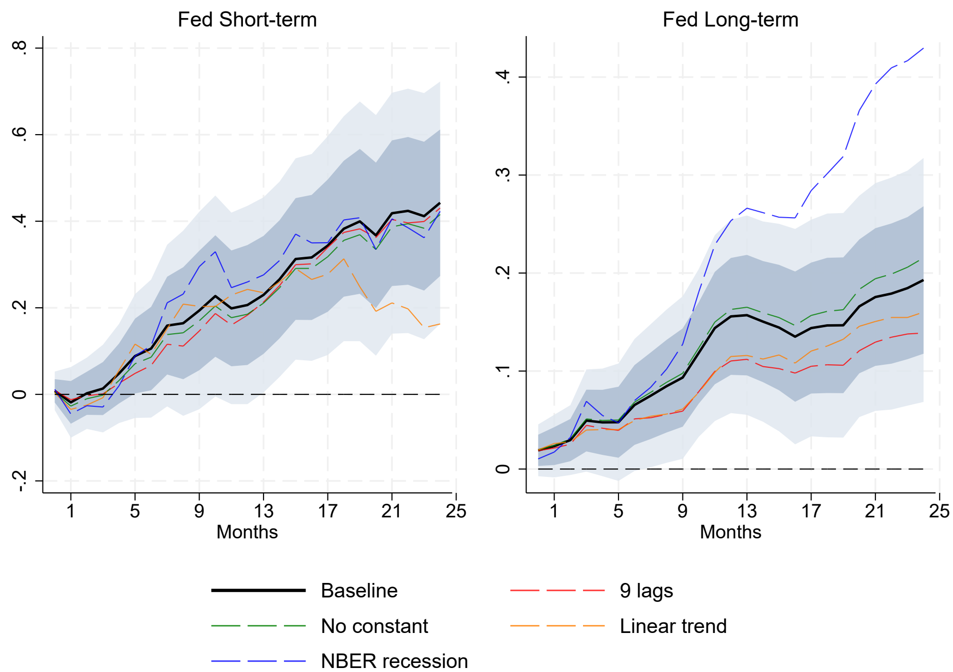


Figure C27: Fed's Treasury holdings response

Note: this figure checks the sensitivty of Figure 8 with respect to different controls. The lines correspond to point estimates. In every specification, we already control for the shadow rate from Wu and Xia (2016).

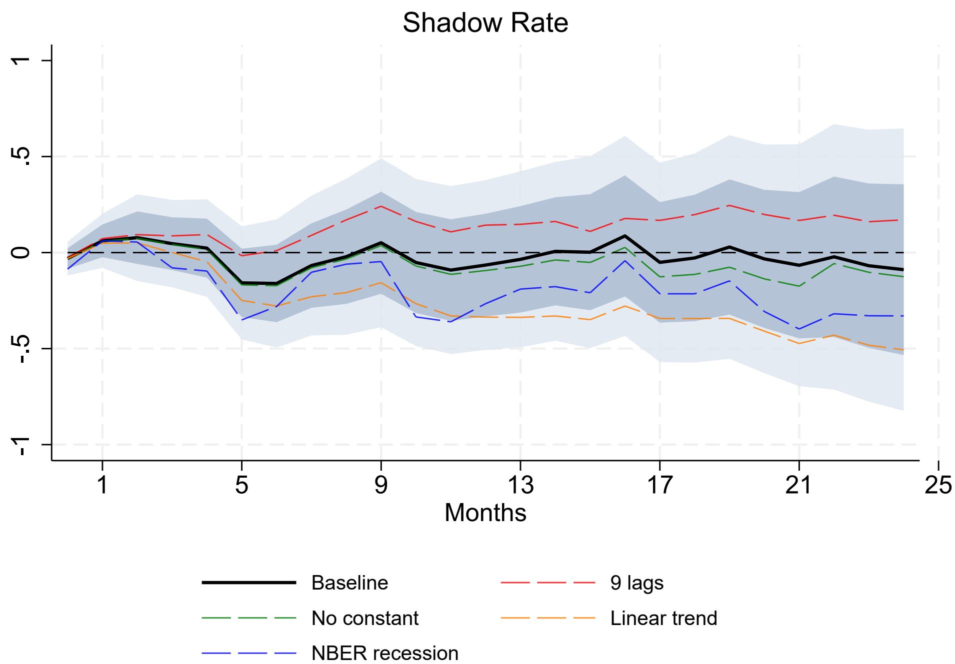


Figure C28: Fed's policy rate response

Note: this figure checks the sensitivty of Figure 9 with respect to different controls. The lines correspond to point estimates.

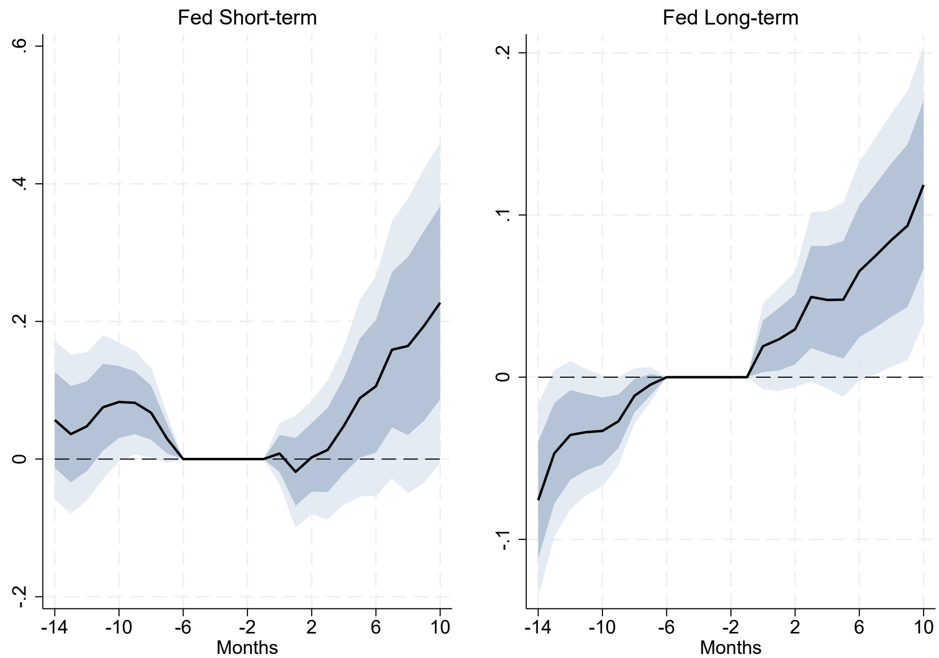


Figure C29: Pre-trends in the Fed's Treasury holdings

Note: this figure checks the pre-trend for Figure 8.

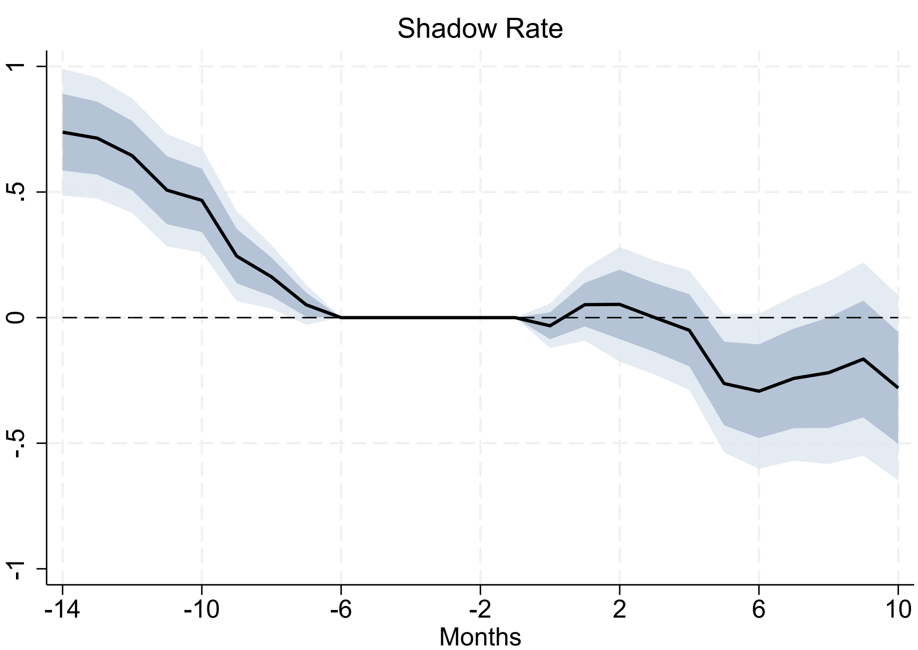


Figure C30: Pre-trends in the Fed's policy rate

Note: this figure checks the pre-trend for Figure 9.

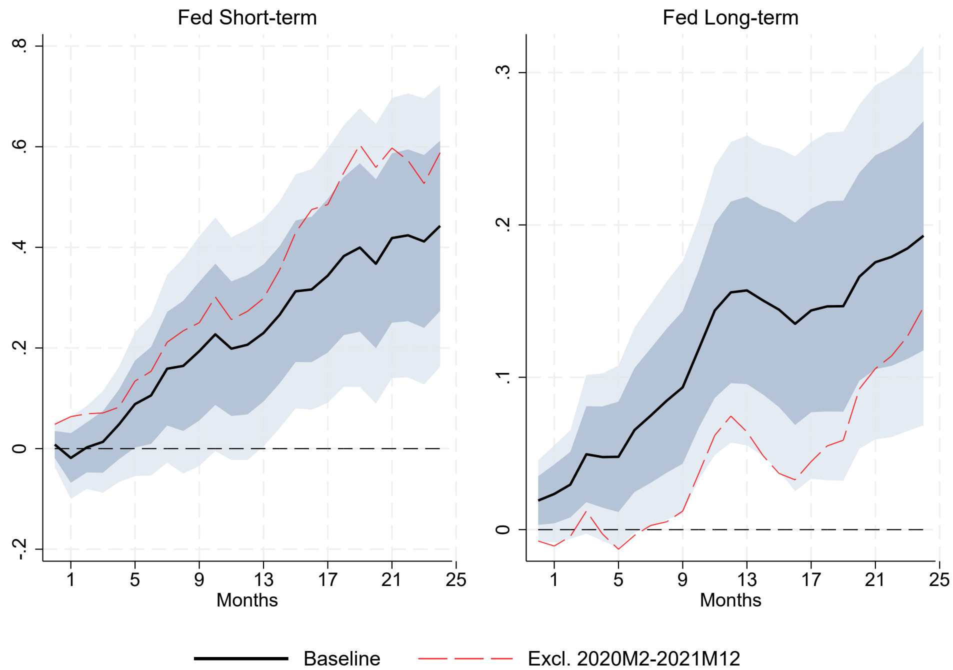


Figure C31: Different samples for Fed's Treasury holdings reponse

Note: this figure checks the sensitivty of Figure 8 with respect to different sample periods. The lines correspond to point estimates. We do not include sample period starting from 1998M7 since the Fed holdings data is only available from 2003M7.

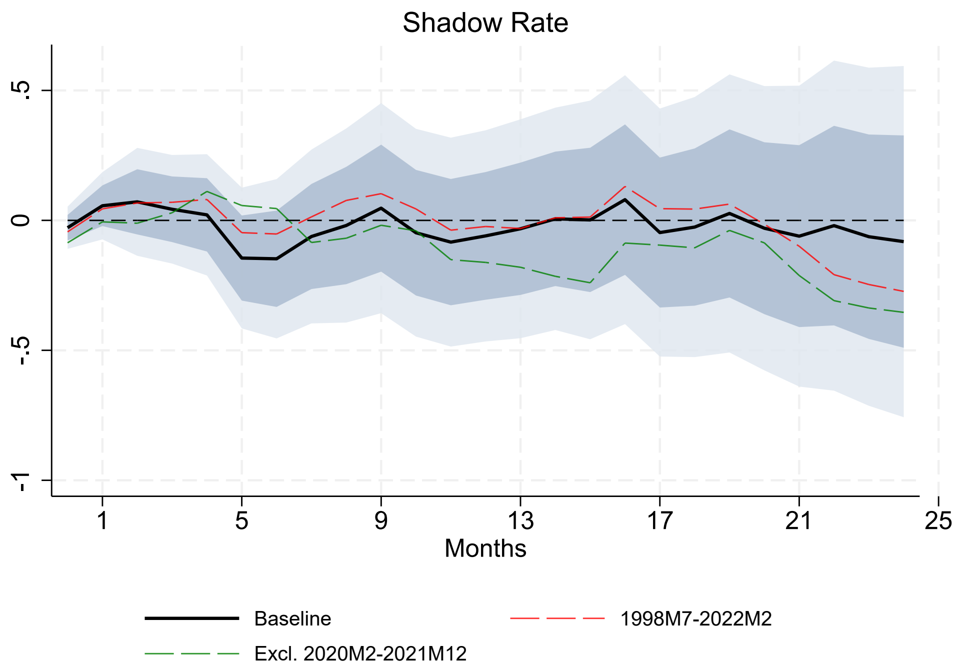


Figure C32: Different samples for Fed's policy rate response

Note: this figure checks the sensitivty of Figure 9 with respect to different sample periods. The lines coresopnd to point estimates.

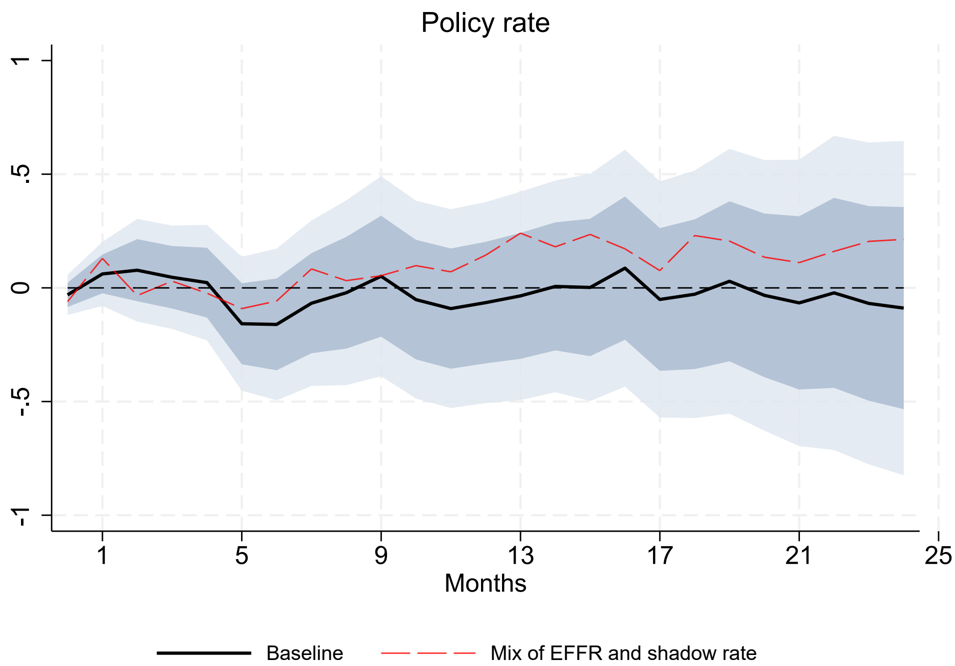


Figure C33: Different definition of policy rate

Note: this figure checks the sensitivity of Figure 9 with respect to an alternative measure of Fed policy stance. The mix of EFFR and shadow rate is a policy stance measure that uses the effective federal funds rate during periods when ELB is not binding and augments it with Wu and Xia (2016) during the ELB period of 2009M1 to 2015M12.

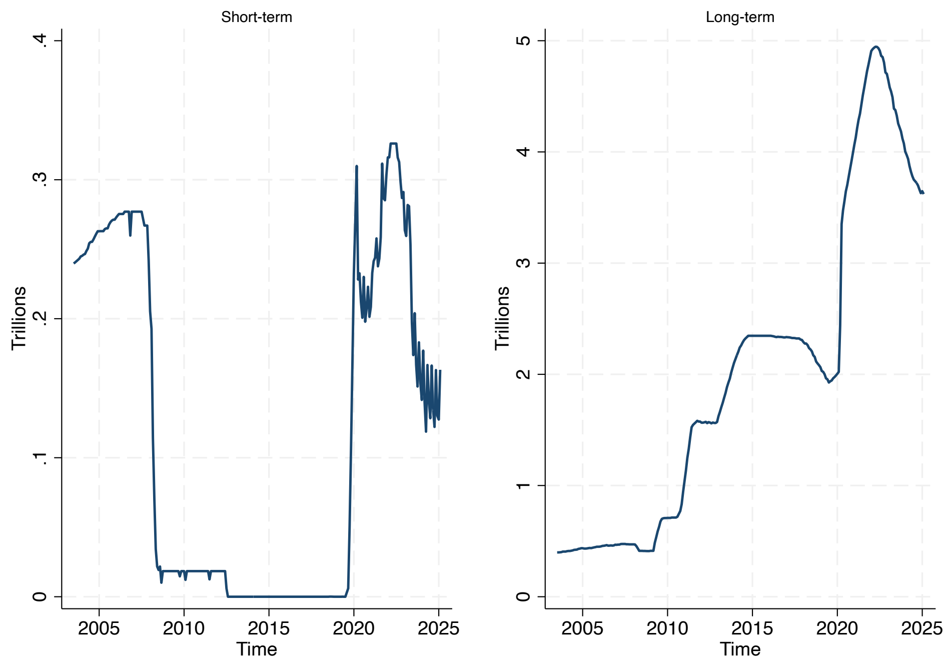


Figure C34: Evolution over time of the Fed's Treasury holdings

Note: this figure shows the evolution over time of the Fed's Treasury holdings. The left panel shows the Fed's holdings of short-term debt (with maturity of one year or lower); the right panel shows long-term debt (maturity of two years or longer). The x-axis shows years, while the y-axis shows the quantity in trillions of U.S. dollars.

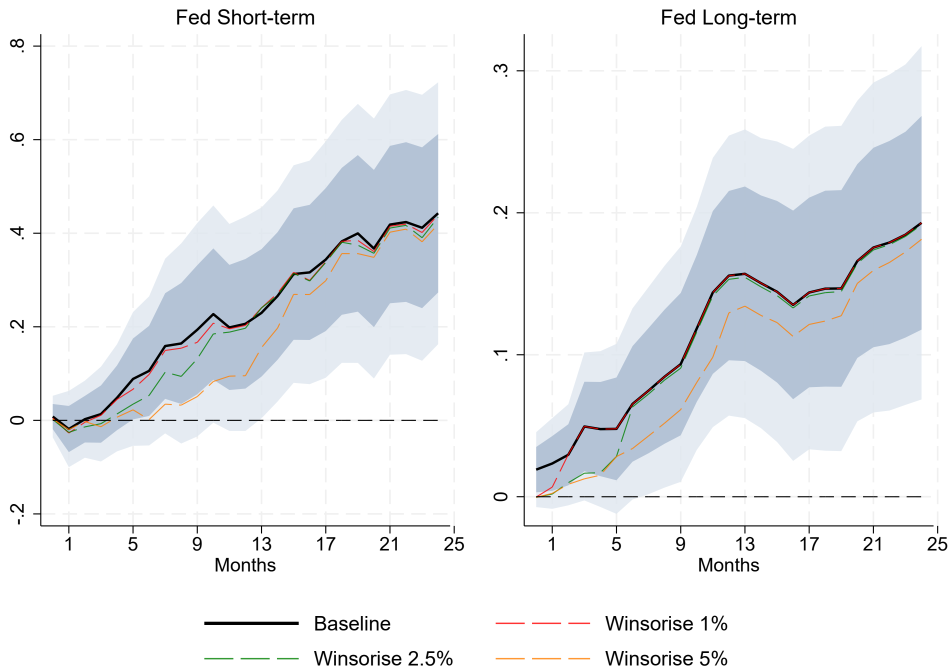


Figure C35: Winsorizing the Fed's Treasury holdings variables

Note: this figure checks the sensitivty of Figure 8 with respect to outliers. "Winsorise 1%" means replacing values below the 0.5th percentile with the 0.5th-percentile value, and replacing values above the 99.5th percentile with the 99.5th-percentile value.

D Anecdotal evidence

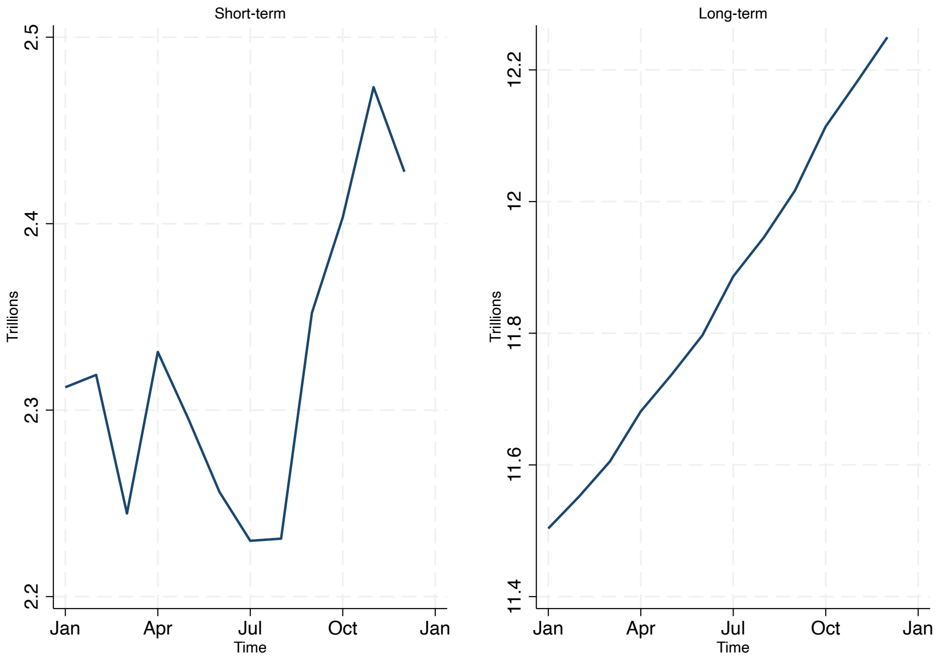


Figure D1: Short and long-term debt in 2019

Note: this figure shows the evolution over time of total debt in 2019. The left panel shows the short-term debt (with maturity of one year or lower); the right panel shows long-term debt (maturity of two years or longer).