# The Causal Effect of Debt on Interest Rates

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June 9, 2026

**Abstract**

This paper uses a natural experiment to measure the causal effect of an expected debt-financed fiscal stimulus on interest rates. We find that a 1 percentage point increase in the expected US debt-to-GDP ratio leads to an increase of about 1-2 basis points in the longer-run neutral rate ($r^*$) and of about 2–3 basis points in the 10-year Treasury term premium. Our results validate estimates from a common time-series approach that regresses long-term forward interest rates on long-term projections of government debt, where the exclusion restriction does not apply.

Keywords: *government debt, Treasury yields, $r^*$, term premiums, and fiscal sustainability.*

JEL Classification: E43, E63, H63.

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# 1 Introduction

How are interest rates affected by the supply of government debt? Measurement of this elasticity is challenging: fiscal deficits co-move with the state of the economy, the demand for government debt shifts over time, and many factors other than debt supply affect interest rates. With government debt ratios rising across advanced economies, proper measurement of this elasticity is crucial to understanding the sustainability of fiscal policy and its effects on the long-run cost of capital. In addition, the extent to which the supply of longer-term debt affects term premiums through portfolio balance channels has important implications for the conduct of monetary policy when short-term interest rates are constrained by the effective lower bound.

This paper exploits a unique natural experiment to isolate the causal effect of an increase in government debt on yields. Following the 2020 United States elections, one party won the presidency and gained a majority of the House. As a result, nearly all policies of this new administration were priced into financial markets soon after November 7, 2020. Two Senate seats, however, were too close to call and went to runoff elections. In the event of a dual victory, the incoming administration would be granted a Senate majority. Because single-party legislation was likely to be blocked by the opposition through the filibuster, the sole potential legislative outcome of a dual victory was a one-time opportunity to pass fiscal stimulus through the budget reconciliation process. Crucially, the Senate runoffs therefore represented one of the only remaining sources of uncertainty about near-term fiscal policy, while expectations about monetary policy and broader macroeconomic conditions were otherwise little changed.

On the eve of the runoff result, prediction markets priced the probability of a dual victory as nearly even: a coin flip. The outcome—single party control of government by the Democrats—prompted a sharp upward revision in expected fiscal deficits and Treasury issuance. Building on the prior work of Mian, Straub, and Sufi (2022) and Hazell and Hobler (2025), we exploit this exogenous shock to identify the causal effect of an expected debt-

financed stimulus on Treasury yields, term premiums, and the longer-run neutral rate of interest ($r^*$).[1]

To capture the magnitude of the shock, we infer the change in expected Treasury issuance implied by the election outcome. In the week before the runoff, investment banks assessed that a Senate majority would unlock about $900 billion in additional fiscal stimulus, primarily through direct transfers (Hazell and Hobler, 2025). Given an even chance of victory, the result of the runoffs therefore represented a Treasury supply shock of roughly $450 billion, or about 2.1 percent of GDP.

To assess the impact of this event on interest rate movements, we examine changes in Treasury yields on the day of and the day after the January 5th runoff. We decompose these yield changes into movements in the real term premium and $r^*$ using the model-based framework of D'Amico, Kim, and Wei (2018) (DKW). We assess statistical significance using a bootstrap procedure that constructs placebo event dates from the previous five years of data.

We find that a 1 percentage point increase in the debt-to-GDP ratio leads to a 3-4 basis points rise in real 10-year Treasury yields, with about a 1-2 basis point rise in $r^*$ and a 2–3 basis point increase in the 10-year Treasury term premium, both statistically significant at conventional levels. However, a daily analysis may conflate these changes with developments that emerged on the afternoon of January 6, as yields partially retraced before market close. To address this concern, we turn to an intraday, higher-frequency approach that isolates yield movements occurring prior to noon of that day. Contributing to the literature on intraday risk premium dynamics (e.g., Aronovich and Meldrum 2021; Hordahl, Remolona, and Valente 2015), we filter 5-minute yield changes through the DKW model and find that our results remain robust.

We corroborate our findings in a complementary specification that exploits daily variation in the month leading up to the runoff election. Regressing daily changes in yields and

[1]We refer to the longer-run neutral rate of interest as the real short-term interest rate expected to prevail in the longer-run with stable inflation and an output gap of zero.

term premiums on the probability of Democratic victory yields similar magnitudes and significance, underscoring the robustness of our estimates across both high- and low-frequency identification.

While our event-study design delivers a causal estimate of the effect of expected debt on interest rates, it relies on estimates over a single well-identified episode. To assess the external validity of these estimates and connect them to the broader empirical literature, we revisit a widely used projection-based approach based on the seminal paper of Laubach (2009) that relates long-term interest rates to long-run debt forecasts. Although such regressions do not satisfy the exclusion restriction, as projected debt is plausibly correlated with other slow-moving determinants of yields such as expected productivity growth or demographic trends, the use of five-year-ahead projections isolates fiscal expectations less tightly linked to contemporaneous business cycle conditions.

Following Plante, Richter, and Zubairy (2026), we estimate this relationship in first differences to address concerns about non-stationarity. In contrast to the latter study's focus on the 5-year forward 5-year yield, we re-examine how changes in projected debt affect 5-year-forward 10-year (real) Treasury yields, the real term premium, and $r^*$. The estimates using the projection-based approach closely mirror those obtained from our event-study design, providing causal validation of the approach of Laubach (2009) and confirming prior estimates from the literature for the case of the US. Moreover, this time-series evidence indicates that debt supply is an important factor driving yields at a low frequency.

Our findings have important implications for the theoretical literature on debt and interest rates and for the conduct of monetary policy at the effective lower bound. A central empirical question is which components of long-term yields respond to increases in government debt supply. Theory has largely focused on the effects of government debt on $r^*$, whether by crowding out private capital (Aiyagari and McGrattan, 1998) or by affecting the safety and liquidity benefits of government securities (Krishnamurthy and Vissing-Jorgensen, 2012). In contrast, a literature revisited since the global financial crisis emphasizes that because fi-

nancial assets are imperfect substitutes, changes in the quantity and maturity composition of government debt can move equilibrium asset prices (Andres, López-Salido, and Nelson, 2004; Gertler and Karadi, 2011; Vayanos and Vila, 2021). In these environments, increases in longer-duration Treasury supply are absorbed only at higher required compensation, raising term premiums even when expected short rates are unchanged.

Across all of our empirical approaches, we find that the effects of higher debt supply are concentrated in term premiums rather than in $r^*$. Our results therefore indicate that the imperfect substitutability of government debt is an important determinant of the elasticity of the yield curve to debt supply. Prior research shows that the US Treasury systematically lengthens the maturity of its issuance in response to higher financing needs (Greenwood, Hanson, and Stein, 2015; Kim and Skaperdas, 2025). When such issuance behavior occurs in the presence of financial market frictions, anticipated increases in interest rate risk are priced into the yield curve through higher term premiums.

Our results also have important implications for the conduct of monetary policy. Since the global financial crisis, central banks have used the size and composition of their balance sheets to influence financial conditions and economic activity when short-term interest rates are constrained by the effective lower bound. Across samples and methodologies, prior literature has found wide ranges of uncertainty over the magnitude of the effects of asset purchases (Bhattarai and Neely, 2022). Because we find that the expected stock of government debt has significant causal effects on term premiums, our results imply that central banks retain scope to influence financial markets and macroeconomic activity by altering the public's debt holdings through asset purchases.

**Literature Review**

Our analysis builds on a broad literature linking fiscal policy, interest rates, and the demand for safe assets (see Krishnamurthy and Vissing-Jorgensen (2012), Blanchard (2019), Lorenzoni and Werning (2019), Brunnermeier, Merkel, and Sannikov (2024), Antolin-Diaz and Surico (2025)) while providing causal validation for time-series evidence showing that higher

expected debt levels raise long-term yields. Following Laubach (2009), many studies such as Engen and Hubbard (2004), Gamber and Seliski (2019), Neveu and Schafer (2024), and Plante, Richter, and Zubairy (2026) relate long-term yields to five-year-ahead CBO debt projections while controlling for macroeconomic fundamentals. Our findings lend direct causal support to the interpretation of these papers that higher expected debt levels raise yields and term premiums.

A complementary literature measures the elasticity of Treasury yields to supply structurally, estimating investor-level demand systems in the tradition of Koijen and Yogo (2019). Jansen, Li, and Schmid (2024) embed maturity-specific Treasury demand in a preferred-habitat model and find that supply effects operate through term premiums. Related research at the investor- or sector- levels identifies demand elasticities from monetary-policy surprises (Eren, Schrimpf, and Xia, 2026), granular instruments (Chaudhary, Fu, and Zhou, 2024), and auction bidding data (Somogyi, Wallen, and Xu, 2024). As compared to this literature, our approach provides a well-identified elasticity of the macroeconomic effect of debt supply on yields.

Our findings also relate to recent work exploiting fiscal news shocks at higher frequencies. Cotton (2024) and Wiegand (2025) identify changes in expected debt using large samples of congressional budget resolution revisions and find significant effects on Treasury yields at daily horizons. Bi, Phillot, and Zubairy (2026) examines Treasury auction announcements, finding that a 1 percent increase in the debt-to-GDP ratio raises the 10 year term premium by 1.5 basis points. Our analysis complements these approaches by focusing on a single, precisely identified shock that is isolated up to the intraday frequency and is associated with no contemporaneous change in short-term interest rates or near-term monetary policy expectations.[2] In another related study that uses international (non-US) data, Ehrlich, Kay, and Thapar (2026) use parliamentary election outcomes to identify the effects of public debt

[2]In addition, many of the identified shocks in Cotton (2024) and Wiegand (2025) occur during earlier periods—such as the 1980s and 1990s—when increases in debt were more plausibly associated with potential future repayment, whereas our setting captures a recent episode in which debt expansion was primarily perceived as a one-time increase in the long-run debt-to-GDP ratio.

on interest rates and find slightly larger elasticities than those implied by our estimates.

As noted, there are at least two other studies that examine effects of the Georgia Senate runoff elections. In an online appendix, Mian, Straub, and Sufi (2022) document the response of the 10-year TIPS yield over the week following the election and compare it to the ex-post realization of the $1.9 trillion stimulus package that was ultimately passed. Hazell and Hobler (2025) focus instead on the effects of expected deficits on inflation, strengthening measurement of deficit expectations using ex-ante reports from investment banks. Our paper contributes to the literature by using this unique natural experiment to analyze the precise elasticity of yields to debt supply using ex-ante expectations, while also leveraging high-frequency identification to provide sharp measurement and a term structure model to decompose yield curve movements into $r^*$ and term premium components. More broadly, both our high-frequency identification of the elasticity of yields to expected debt supply and our decomposition of longer-term Treasury yields are novel to the literature on debt supply and interest rates.[3]

The rest of the paper is structured as follows: Section 2 presents the event study focus of the paper, including a discussion of the exclusion restriction, Section 3 presents time-series evidence using the approach of Laubach (2009), and Section 4 concludes.

## 2 A Narrative Event Study

The focus of our event study is the 2021 Georgia Senate runoff for both of the state's Senate seats. Prior to the election, market participants predicted substantial additional fiscal stimulus conditional on a dual Democratic victory, with the perceived odds of a dual victory around 50%. We use this expected fiscal shock to compute elasticities with respect to yields and the responses of their components. We find statistically and economically significant responses of yields, driven primarily by real term premiums. These responses

[3]We are not aware of any previous studies that examine DKW model–based term premium estimates at an intraday frequency, nor of any work that decomposes yields at a comparable duration.

remain robust under an intraday specification that excludes effects stemming from the riots on January 6th, and an odds-based, daily regression approach in the weeks leading up to the election.

## 2.1 Event Background: Motivation

In November 2020, Democratic nominee Joseph Biden won the presidency, with Democrats securing a majority in the US House of Representatives but failing to do so in the Senate, with effective control of only 48 out of 100 seats. Two races were yet to be settled, both in Georgia. Georgia law requires that the victor secure more than 50% of the electorate, but with no candidate crossing this threshold, the top two candidates in each race advanced to runoffs to be held on January 5th, 2021: one race between Democrat Jon Ossoff and Republican David Perdue and another between Democrat Raphael Warnock and Republican Kelly Loeffler.

Although legislative approval in the Senate requires a supermajority of 60 votes to break the filibuster, this does not apply to fiscal policy that is passed through the budget reconciliation process, which only requires a simple majority. As a result, Democratic victory in both seats would secure a majority in the Senate through the Vice President's tiebreaking vote, allowing them to bypass Republican lawmakers on fiscal policy.

In the aftermath of the November 2020 election, Democrats were not favored to win both seats. Republican David Perdue had only fallen short by 0.27% of the 50% threshold in the November general election and had secured 88,000 more votes than Democrat Jon Ossoff. However, in the following weeks, the issue of additional pandemic-related transfer payments became central to the runoff elections.

**Additional stimulus.** In December 2020, the US Congress passed Consolidated Appropriations Act of 2021, which approved an additional $900 billion in stimulus. This was composed of 70% in transfer payments, including stimulus checks of $600. Shortly after, however, Democrats sought an increase to the approved stimulus payments to $2,000. Al-

though then Republican President Donald Trump signaled support for this increase, Republican Senate Majority Leader Mitch McConnell blocked this initiative. Both Democrats Raphael Warnock and Jon Ossoff publicly committed and campaigned on additional transfer payments, supporting the $2,000 check. This public commitment was further echoed by then President-elect Joseph Biden just days before the runoff. Democratic victory, therefore, would ensure additional stimulus, whereas Republican victory in either seat would lead to no additional stimulus.

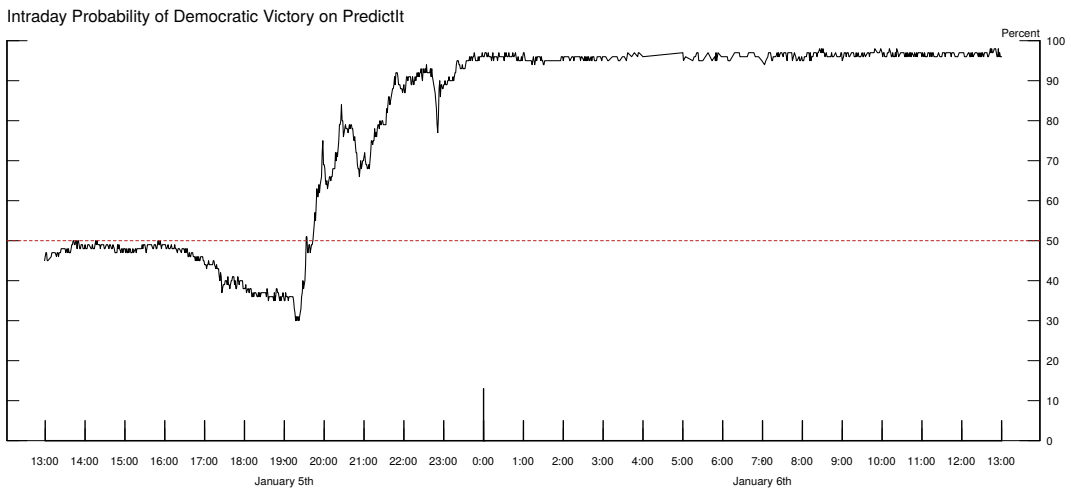



Figure 1: **Intraday Probability of Democratic Victory on PredictIt**

This figure shows the intraday probability of Democratic victory according to PredictIt for the Georgia Senate runoff on January 5 through January 6, 2021.
Source: PredictIt.org

**Market resolution and yield response.** In the lead up to the election, the probability of Democratic victories in both races, reflected in betting markets, gradually increased and neared 50% in just the days prior (See Figure 1). By the very early morning of January 6th, news media confirmed that Democrat Raphael Warnock had won, with Democrat Jon Ossoff leading his race. While Ossoff's election was only called in the late afternoon, betting markets priced in nearly a 100 percent chance of victory early in the day. Financial markets reacted swiftly to the resolution of both races, which implied higher expected future deficits.

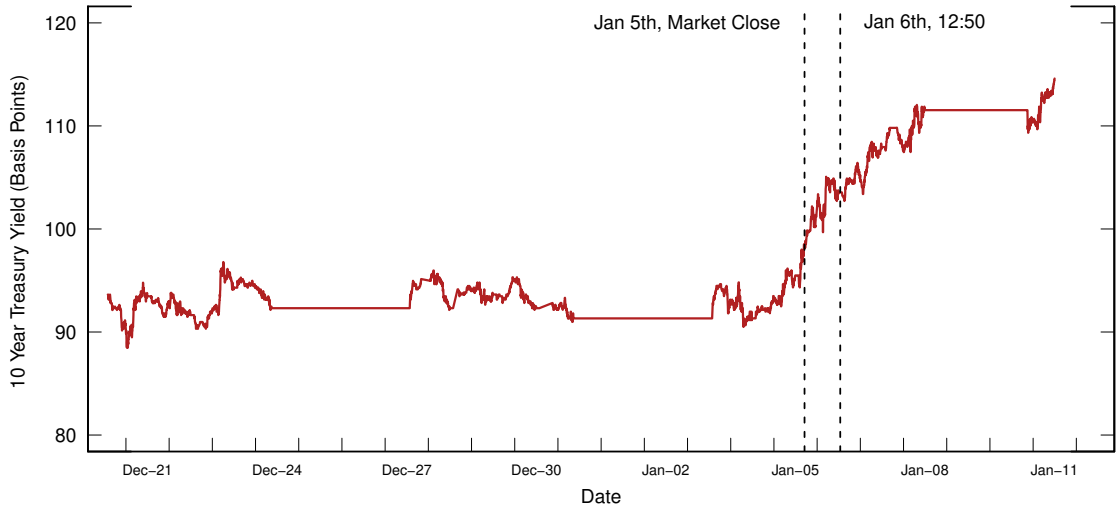



Figure 2: **Intraday Changes in the 10-year Treasury Yield**

This figure shows the intraday developments for the on-the-run 10-year Treasury yield from December 21, 2020 through January 11, 2021. The flat portions of the line correspond to holidays and weekends.
Source: Bloomberg (USGG10YR)

Within one day, the 10-year Treasury yield rose discretely by about 10 basis points (see Figure 2).

**Discussion of the exclusion restriction.** Our identification strategy relies on the exclusion restriction that the runoff outcome affected longer-term interest rates primarily through its effect on the expected path of federal debt, rather than through other channels. Several features of the event support this restriction. Contemporaneous market commentary and investment-bank analyses focused overwhelmingly on the fiscal implications of the runoff, with limited discussion of alternative channels (Hazell and Hobler, 2025). This focus was warranted: the presidency and House majority had already been resolved in November 2020 and were largely priced into financial markets soon thereafter. The January 5, 2021 elections concerned only the two Georgia Senate seats that would determine control of the Senate. The filibuster sharply limited the scope for a narrow Senate majority to enact non-budgetary legislation, leaving budget reconciliation as the primary channel through which unified party control could affect policy. The budget reconciliation process would allow a one-time debt-

financed fiscal expansion to proceed on party lines, but implied few other immediate changes relevant for the long-run path of interest rates. The discrete overnight movement of yields further limits the plausibility of alternative explanations, since slow-moving determinants of longer-term yields, such as productivity or population growth, are less likely to have been directly affected by Senate control and sharply repriced by market participants overnight.

## 2.2 Shock Magnitude

Hazell and Hobler (2025) provide an estimate of the size of the shock from this event. Based on investment bank reports in the immediate lead up to the election, the median expectation of financial market participants was for an additional fiscal stimulus of $900 billion if Democrats gained control of the Senate versus 0 for a divided government.

Consistent with both media reporting and betting markets, investment banks additionally viewed the prospect of Democratic control of the Senate as a "toss-up". One betting market, PredictIt, reflected a rising probability of Democratic control of the Senate in the weeks leading up to the runoff but remained around 50% the night before the runoff elections. On the eve of the election result, the Democratic victory therefore represented a deficit shock of $450 billion, around 2% of 2021:Q1 nominal GDP, that markets reacted to in the immediate aftermath of the runoff results:

$$\Delta\text{Deficit Expectation} \approx 50\% \times 900\text{B} \rightarrow 100\% \times 900\text{B} = 450\text{B}$$

Investment bank reports further suggested that markets expected the stimulus to be predominantly composed of transfer payments, with the median investment bank forecasting 70% share of transfers. This composition was consistent with the central issue emphasized during the election: additional support through stimulus checks. Finally, investment banks expected that nearly all of the additional stimulus would be financed through debt issuance rather than taxes.

## 2.3 Framework and Data

Our baseline results use the five-year-forward 10-year Treasury rate (5f10y) and 10-year Treasury rate (10y) as our yields of interest. We obtain zero-coupon nominal Treasury yields and Treasury Inflation-protected securities (TIPS) yields with maturities of 5, 10, and 15 years from Gürkaynak, Sack, and Wright (2007, 2010).[4] From these we construct five-year-forward 10-year Treasury yields using the following standard formula:

$$5f10y_t = \frac{(15 * 15y_t - 5 * 5y_t)}{10}$$

This formula holds for continuously compounded zero-coupon yields such as those produced by the Svensson curve. We focus specifically on the five-year-forward 10-year (5f10y) Treasury yield for three primary reasons: First, the 5-to-15 year horizon extends beyond the point where short-term factors are likely to affect the yield curve, thus isolating fiscal effects from short-term cyclical and monetary policy effects. Second, the 5f10y captures expectations for the 10-year benchmark yield, which carries significantly higher duration risk than shorter forward rates. This greater risk makes the 5f10y a more sensitive and robust detector of debt-supply effects on the term premium. Finally, selecting the 5f10y aligns with the standard adopted by the canonical Laubach (2009) framework, which facilitates direct comparison and integration with the existing literature.

**Decomposition.** To decompose the 5f10y rate into expected real rates and real term premiums, we use the term structure model of D'Amico, Kim, and Wei (2018) (DKW). As shown by Hazell and Hobler (2025), the runoff election result we examine had significant implications for expected inflation. The DKW model is therefore particularly useful in our context, as it allows us to remove the effects of expected inflation in order to focus on effects

[4]See https://www.federalreserve.gov/econres/feds/the-us-treasury-yield-curve-1961-to-the-present.htm.

on real yields.[5] While previous studies have leveraged the DKW model's outputs to consider effects on the 10-year Treasury yield and the 5f5y Treasury yield, we extend the framework to generate novel model-based decompositions specifically for the 5f10y, a horizon that has not been previously decomposed in the literature. Moreover, we provide intraday estimates of these decompositions for different maturities, which to our knowledge, are also novel.

To estimate the response of yields and their components to a 1% debt-to-GDP shock, we observe changes in yields and their components after January 5th, 2021. We divide these changes by a magnitude close to 2 to represent the size of the shock realized by the election results. The resulting numbers then reflect the elasticities of yields and their components to a 1 percentage point Debt/GDP shock.

To assess the statistical likelihood of obtaining these estimates by chance, we report p-values using a placebo test approach. We construct a set of placebo dates from January 1st, 2016, to January 4th, 2021. We sample these days 10,000 times and assign each day a randomly selected investment bank deficit expectation, as available in Hazell and Hobler (2025), conditioning on a Democratic victory. We observe the response of these yields and their components to the placebo debt shock by measuring the one-day change divided by the size of the shock. This approach results in a set of 10,000 observations of the null hypothesis of a zero effect of debt on yields, from which we construct the likelihood of obtaining January 6th estimates by chance. We report the statistical significance of January 6th observations as a p-value compared to this placebo distribution.

## 2.4 Results

Table 1 reports our baseline estimates of the elasticity of real interest rates to Treasury supply. In response to a 1 percentage point shock to the debt/GDP ratio, 10-year Treasury (real) TIPS yields are estimated to increase by about 2 basis points, while five-year-ahead 10-year Treasury TIPS yield are estimated to increase by about 3-4 basis points. Our preferred

[5] As Hazell and Hobler (2025) examine effects of the shock on expected inflation, we do not report the DKW decompositions for expected inflation, the inflation risk premium, or the TIPS liquidity premium.

measure of yield curve movements is at the five-year-forward horizon, as they more accurately reflect the longer-run relationship between expected debt and interest rates and are less prone to capturing short-run factors related to the effects of the fiscal shock.

Turning to the component of these elasticities, DKW model estimates imply that the changes in real yields are primarily driven by the real term premium, with increases of about 2-3 basis points.[6] The $r^*$ component accounts for a movement of roughly 1-2 basis points. All the DKW components are significant at conventional levels as compared to the distribution generated by our placebo bootstrap approach.

| | 10 Year | | | 10 Year, 5-Years-Forward | | |
|---|---|---|---|---|---|---|
| Window | TIPS | Exp. $r*$ | Real T.P. | TIPS | Exp. $r*$ | Real T.P. |
| One Day | 2.58 | 1.20* | 1.71** | 3.96* | 1.64** | 2.61** |
| Bootstrap $p$-val | (0.11) | (0.06) | (0.02) | (0.05) | (0.02) | (0.01) |
| Narrow (Intraday) | 2.61 | 0.94 | 1.67 | 3.80 | 1.28 | 2.52 |

Table 1: **Event Study Elasticities for 1 % pt. Debt/GDP Shock (basis points)**

Note that elasticities are in basis points per 1 percentage point increase in debt/GDP. Components from DKW filter and TIPS. Asterisks denote significance by placebo bootstrap: ** $p < 0.05$, * $p < 0.10$. Bootstrap sample: 01/01/2016-01/04/2021. Significance not available for intraday window.

Because movements in interest rates shortly following the election outcome could have been driven by the January 6th Capitol riots, we also present elasticities in Table 1 from a more narrow window that ends at 12:50 pm on January 6th before news about the riots was reported. The estimated elasticities and DKW components are nearly identical; with the $r^*$ component estimated at 1 basis point over the narrower window. In support of a satisfied exclusion restriction over the narrow study, we observe essentially no movements in yields between market open and 12:50 pm on January 6th.

[6]The DKW model combines nominal and TIPS yields with survey forecasts of inflation and short-term interest rates to identify the components of yield movements driven by real-rate expectations, expected inflation, and the inflation risk premium. Intuitively, the model attributes to the real term premium movements in longer-term yields not matched by changes in these three components.

Finally, we conduct an analysis to gauge the sensitivity of our estimates to the expected size of the deficit shock. We take the 25th and 75th percentile of deficit expectations from investment bank estimates and re-estimate the elasticities. The estimated effects on the five-year-forward ten-year $r^*$ and real term premiums components remain statistically significant and between 1 and 2 basis points and 2 and 3 basis points, respectively.[7]

## 2.5 Alternative Specification: Daily Regression Estimates

A drawback of the event study specification is its reliance on a single powerful albeit precisely identified observation. We therefore additionally present estimates from an alternative regression-based identification strategy as in Hazell and Hobler (2025). We estimate yield elasticities to end-of-day probabilities of Democratic Senate control from betting market platform PredictIt, which carry news about expected future deficits. So long as other factors affecting yields are not systematically correlated with the expected probabilities of Democratic runoff victories, one should recover similar estimates as in the event study approach. Our OLS specification is as follows:

$$y_t = \beta_0 + \beta_1[\text{probability}_t] + \epsilon_t \tag{1}$$

We again examine TIPS yields and relevant components from the DKW model. Daily probabilities are rescaled such that the coefficient $\beta_1$ captures the effect of an expected 1 percentage point increase in the debt to GDP ratio.[8] Our sample runs from 12/14/2020 to 1/8/2021. We choose this estimation period as a trade-off between bias and variance: on the one hand, a larger estimation window means that results are likely biased by deficit expectations that may be larger or smaller than those collected in the week before election;

[7]The 25th and 75th percentiles result in deficit shock sizes of \$375 and \$500 billion, respectively, as compared to the median expectation of \$450 billion. Results for this sensitivity analysis are available in the replication package.

[8]For a 100 percent probability of Democratic victory, we assign a 4 percentage point increase in the expected Debt-to-GDP ratio in line with the median investment bank's forecast.

on the other hand, a smaller estimation window provides less statistical power.

Table 2 reports the estimated elasticities to a 1 percentage point debt-to-GDP shock in basis points. The $r^*$ and real term premium elasticities are estimated to be between 1-2 and 2-3 basis points, respectively; nearly identical to the estimated elasticities with the event study approach.[9] The estimates are also statistically significant at conventional levels.

While our event study approaches provide well-identified estimates, they rely on a single episode. In the next section, we therefore present further evidence on the debt/interest rate relationship that has the drawback of less credible identification but that is estimated over a much longer sample. Importantly, this evidence reflects the fiscal and macroeconomic environment of the past few decades, and therefore does not exclude the possibility that investors could demand higher compensation for holding government debt under a different regime—for example, one characterized by weaker perceived fiscal discipline.

| | 10 Year | | | 10 Year, 5-Years-Forward | | |
|---|---|---|---|---|---|---|
| | TIPS | Exp. $r*$ | Real T.P. | TIPS | Exp. $r*$ | Real T.P. |
| Elasticity | 0.63 | 1.18** | 1.83** | 4.32** | 1.82** | 3.08** |
| | (1.00) | (0.36) | (0.54) | (1.44) | (0.53) | (0.87) |
| Observations | 18 | 18 | 18 | 18 | 18 | 18 |

Table 2: **Daily Regression Elasticities for 1 % Debt/GDP Shock (basis points)**

Elasticities in basis points per 1 percentage point increase in debt/GDP. Components from DKW filter and TIPS. Asterisks denote significance using Newey-west standard errors: ** $p < 0.05$, * $p < 0.10$. Sample: 12/14/2020-1/8/2021.

[9]While the estimated elasticities of the 10-year and 5-year-forward 10-year TIPS yields differ from our first event study approach, the estimates are driven by the inflation and liquidity components of the DKW model decomposition.

# 3 A Comparison to Projection-Based Estimates

## 3.1 Methodology

In order to assess the impact of government debt on interest rates, Laubach (2009) introduced a seminal approach relying on 5-year ahead projections for publicly-held debt. These forward-looking projections are less likely to be impacted by business cycle dynamics than the simple association between current debt and interest rates. In a re-examination of Laubach (2009), Plante, Richter, and Zubairy (2026) discover evidence of non-stationary residuals in updated data and suggest a regression specification of first differences. We follow Plante, Richter, and Zubairy (2026) but use the 5-year forward 10-year horizon as opposed to the 5-year forward 5-year and estimate:

$$\Delta E_t[y_t^{5y10y}] = \beta_0 + \beta_1 \Delta E_t[\text{fiscal}_{t+5}] + \beta_2 \Delta[\text{Fed}_t] + \beta_3 \Delta[\text{Foreign}_t] + \beta_4 \Delta E_t[\pi_{t+10}] + \epsilon_t \quad (2)$$

where $\Delta E_t[y_t^{5y10y}]$ is the change in the 5-year forward 10-year yield, real term premium, or $r^*$. We use the 5f10y horizon because it is a more sensitive and robust detector of debt-supply effects on the term premium and is consistent with the standard adopted by the canonical Laubach (2009) framework. As explanatory variables, we include the change in the CBO's five-year ahead debt forecast, the change in Treasury holdings by the Federal Reserve, the change in foreign official Treasury holdings, and the change in the 10-year inflation expectation.[10] Data series other than inflation expectations are expressed as a share of GDP. Federal Reserve and foreign official holdings of Treasury securities as well as inflation expectations are on a quarterly frequency and matched with the quarter in which each CBO forecast is released. Nominal yields are the monthly average of the 5-year forward 10-year interest rate in the month of each CBO forecast.

[10] We use the following equation to obtain the 5-year-forward 10-year yield $5y10y_t = (15*15y_t - 5*5y_t)/10$. Federal Reserve holdings are from the H.4.1 release, with values prior to 2018:Q2 collected from Fries (2018). Foreign official holdings are from the Federal Reserve Z.1. release and retrieved from FRED. Inflation expectations are from the FRB/US model's database (PTR).

## 3.2 Results for Projection-Based Approach

| | 10 Year, 5-Years-Forward | | |
|---|---|---|---|
| Dependent Variable | ΔYield (1) | ΔExp. $r*$ (2) | ΔReal T.P. (3) |
| $\Delta$Debt/GDP$_{(t+5)}$ | 3.95*** | 1.24*** | 1.74*** |
| | (1.14) | (0.39) | (0.56) |
| $\Delta$Foreign Holdings$_{(t)}$ | −21.50*** | −9.11*** | −7.41** |
| | (6.49) | (2.17) | (3.10) |
| $\Delta$Federal Reserve Holdings$_{(t)}$ | −1.60 | −0.78 | −0.46 |
| | (4.80) | (1.61) | (2.42) |
| $\Delta$Expected Inflation$_{(t+10)}$ | 118.98** | 31.60** | 43.04** |
| | (46.69) | (14.88) | (18.82) |
| Constant | −4.07 | −1.22 | −2.06 |
| | (6.11) | (2.06) | (2.77) |
| Observations | 84 | 84 | 84 |
| R-squared | 0.22 | 0.22 | 0.17 |

Table 3: **Projection-Based Approach, 5-Year-Forward 10-year Treasury Yield**

Heteroskedasticity-robust standard errors are in parentheses. Sample: February 1985-January 2025.

Table 3 presents our regression results. A 1 percentage point increase in the projected five year ahead debt-to-GDP raises the 5-year-forward 10-year yield by about 4 basis points.[11] Taking into account the control for 10-year ahead inflation expectations, the exhibited elasticity is the same as the event study's 5-year ahead 10-year real TIPS yield response. Likewise, Columns (2) and (3) reflect estimates strikingly close to our event study approaches: $r^*$ is estimated to rise by about 1 basis point, while the real term premium is estimated to increase by close to 2 basis points.[12] Our event-study design therefore validates the projection-based estimates in Table 3, which confirms the empirical relevance of debt supply for yields at a semi-annual frequency.

[11] In an online appendix, Plante, Richter, and Zubairy (2026) find that a 1 percentage point increase in the debt/GDP ratio raises the 5-year-forward 10-year yield by about 3 basis points.

[12] We obtain nearly identical estimates when omitting foreign and Federal Reserve holdings from the regressions.

# 4 Conclusion

This paper provides causal evidence on how government debt supply affects long-term interest rates, exploiting a natural experiment from the 2021 Georgia Senate runoffs. An increase in expected debt of 1 percent of GDP raises longer-term real yields by 3–4 basis points. Consistent with models featuring imperfect asset substitutability and preferred-habitat demand (Vayanos and Vila, 2021), this response is driven primarily by increases in real term premiums, with a more modest contribution from changes in the longer-run neutral rate ($r^*$).

We further show that these causal estimates are nearly identical to those obtained from a projection-based approach in the tradition of Laubach (2009), providing direct causal validation for that approach in the US. Both semiannual time-series and high-frequency causal evidence demonstrate that government debt meaningfully raises the long-run cost of capital. Our decomposition results imply that fiscal debt management decisions and central bank balance sheet policies affect term premiums by altering the supply of longer-duration debt.

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