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The Interest Rate Effect of Government Debt and Deficits: Does Domestic Borrowing Have a Different Impact Than Foreign Borrowing?*

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Abstract

This paper investigates the relationship between government debt and interest rates in advanced economies. We consider two separate, yet closely related puzzles in the data. Since the Global Financial Crisis, OECD countries have experienced a dramatic surge in government debt-to-GDP ratios, yet there was not a corresponding surge in sovereign bond yields. In addition, across countries there is no relationship between government debt levels and interest rates, and a country like Japan has the highest government debt level among advanced economies yet the lowest sovereign bond rates. To address both of these puzzles, we propose that the effect of government borrowing on interest rates depends critically on who finances that debt. We extend the work of previous studies that have estimated the effect of expected government debt or deficits on interest rates, and we add an international dimension by incorporating forecasts of the current account balance or net foreign asset position. We find that an increase in government debt financed from domestic savings has less of an effect on interest rates than an increase in government debt financed by foreign borrowing, and government debt has less of an effect on interest rates in a country that is a net international creditor than one that is a net international debtor.

JEL Classification: E6, F3, F4, H6

Keywords: government bond yields, government debt, current account

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1 Introduction

Government debt and deficits have surged dramatically since the Global Financial Crisis. As shown in the top panel of Figure 1, in both the 2008 crisis and the 2020 crisis, the average government budget deficit rose from near zero prior to the crisis to over 7% of GDP during the crisis. For the same countries the average government gross debt-to-GDP ratio rose from 58 percent in 2007 to 90 percent by 2023, after having increased only marginally (from 56 to 58 percent) during the two decades before 2007.

However, this debt explosion coincided with falling long-term interest rates, continuing a 40-year downward trend, as illustrated in the bottom-right hand panel of the figure. Apart from a few countries in the Eurozone periphery there was not a surge in government bond yields after the 2008 crisis, and bond yields stayed low after the 2020 crisis. Bond yields only began to rise once the post-pandemic surge in inflation came in 2022.

In addition, there is not a positive correlation between government debt levels and interest rates across countries. The chart of gross government debt levels shows a wide variation in debt levels across countries, but the bottom-right panel of Figure 1 plots average 10-year government bond yields against average gross government debt (1988-2023) for these 19 countries. Across countries there is a slight negative correlation between average government debt levels and average interest rates. Japan is the outlier on the upside in the chart of gross government debt and is the outlier on the downside in the chart of 10-year interest rates.

How can we reconcile massive government borrowing since 2008 with persistently low bond yields? How can we explain this lack of a cross-sectional relationship between the level of government debt and the level of interest rates?

One explanation might be that no link exists between government debt and long-term interest rates. However, this contradicts substantial empirical literature (see e.g. Laubach, 2009; Gruber and Kamin, 2012; Plante et al., 2026; Kay and Ehrlich, 2026). We therefore pose two separate but related questions. First, does government debt financed from domestic savings affect interest rates differently than debt financed through foreign borrowing? Second, does government debt have a different effect on interest rates in a country that is a net creditor with the rest of the world than a country that is a net debtor with the rest of the world?

Figure 2 provides suggestive evidence. It displays government net saving (the negative of budget deficits), private net saving, and the current account for G7 countries plus Australia.[1]

As a matter of accounting, the current account has 3 definitions. The first is the trade

[1] Appendix figures show similar data for 11 additional advanced economies. The government budget surplus is not exactly equal to government net savings, but it's close. So for the purpose of this figure, the budget surplus is a proxy for government net savings. Since the current account equals total net saving, private net savings can be calculated as the difference between the current account and government net saving.

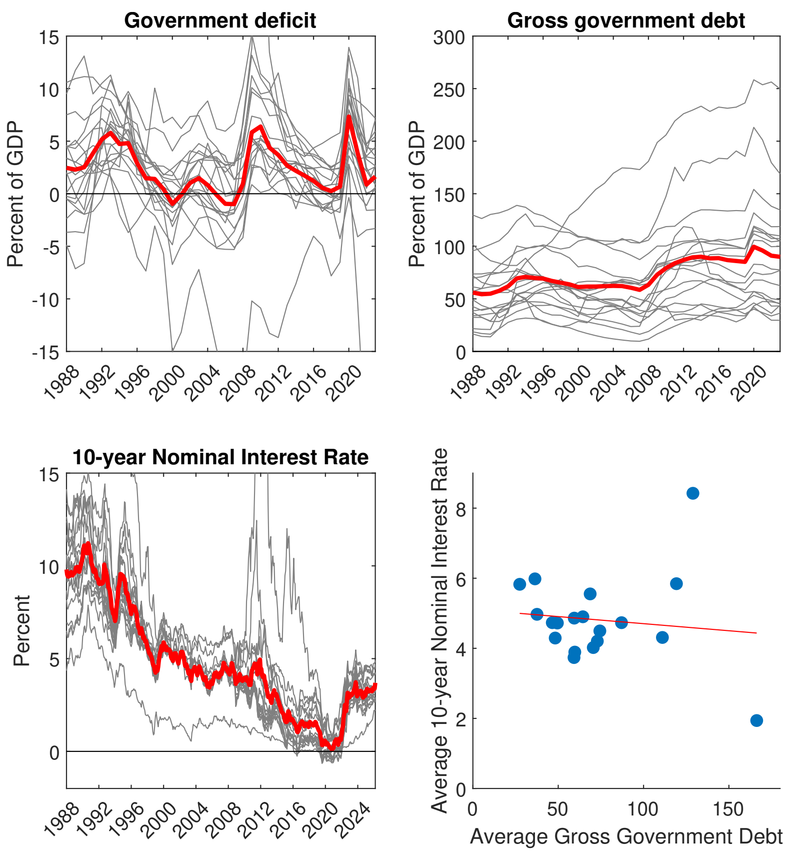
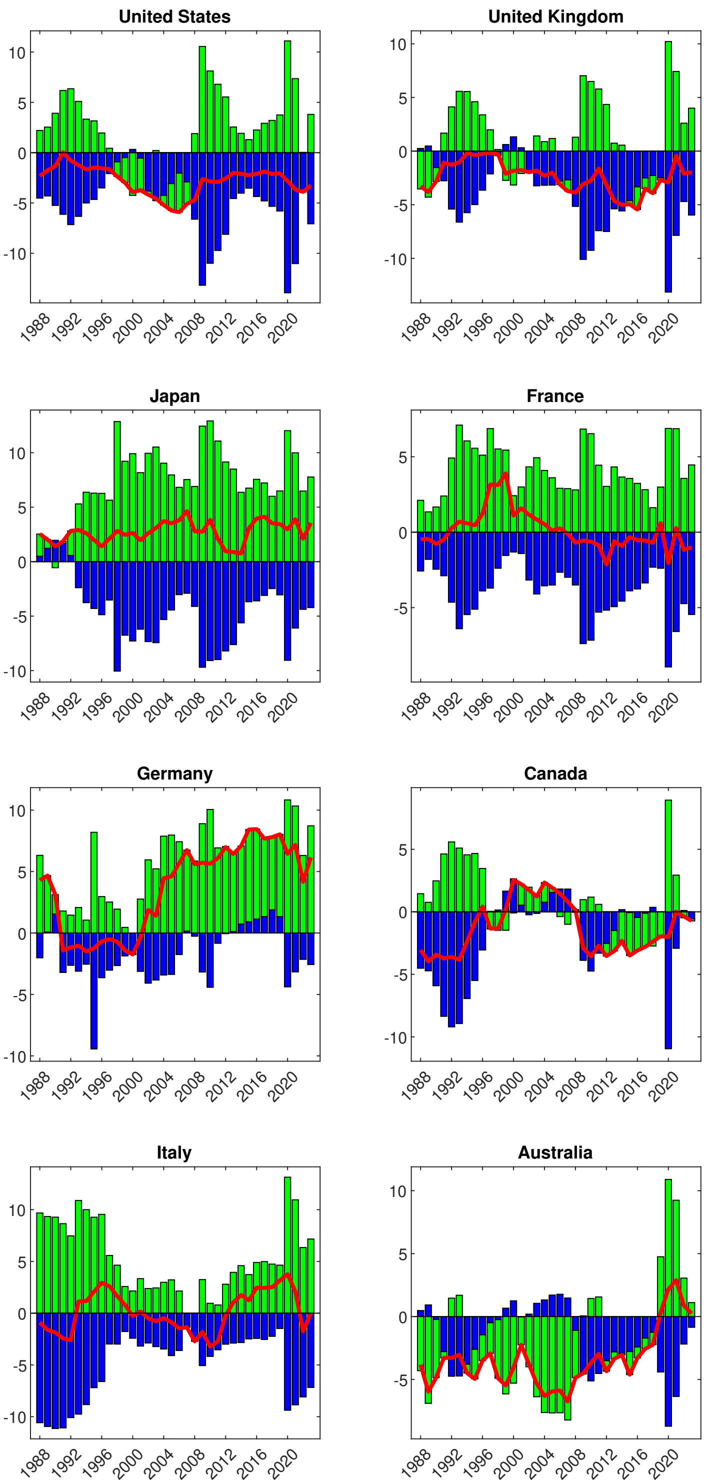


Figure 1: Government debt levels and real long-term bond rates across time and countries

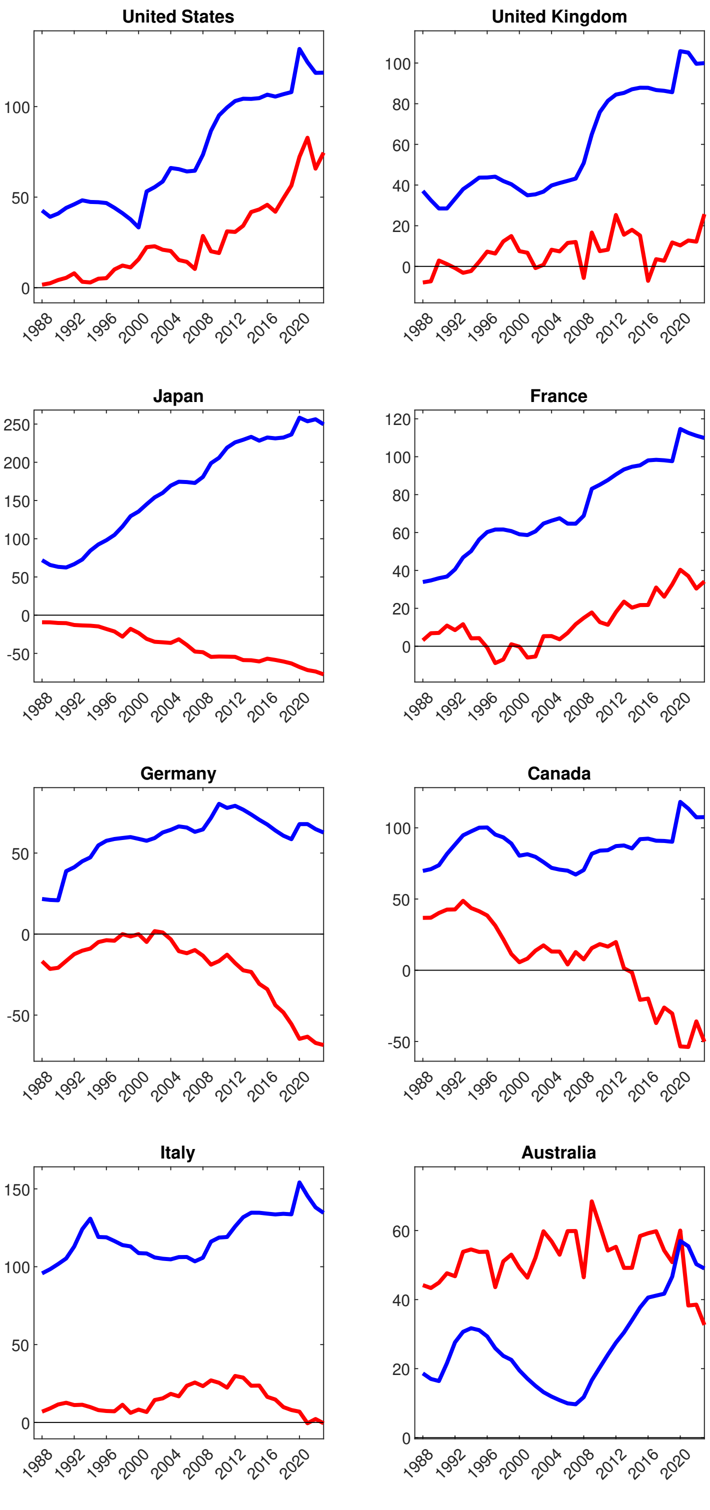
Notes: Top-left panel plots the government deficit-to-GDP ratio. Top-right panel plots the gross government debt-to-GDP ratio. Bottom-left panel plots nominal 10-year government bond yields. These three time-series charts present series for in 19 OECD countries (gray lines) and their cross-sectional simple average (red line). Bottom-right panel presents a scatter plot of 1988-2023 average 10-year nominal interest rates against average gross government debt-to-GDP ratios in these 19 countries.
Source: Global Macro Database (debt and deficits), OECD (interest rates)

Figure 2: Government net saving, private net saving, and current account (percent of GDP)



Notes: Blue bars represent government net saving (negative of budget deficit). Green bars show private net saving (current account minus government net saving). Red line indicates the current account.
Source: Global Macro Database from Müller et al. (2025).

Figure 3: Government debt and net foreign liability position (percent of GDP)



Notes: Blue line shows gross government debt, and the red line shows the net foreign asset position. Source: Global Macro Database from Müller et al. (2025) and External Wealth of Nations Database from Lane and Milesi-Ferretti (2007).

balance plus net primary and secondary income (net income from foreign investments plus net unilateral transfers like foreign aid and remittances). The second is net capital outflows (the value of foreign assets purchased by domestic residents minus the value of domestic assets purchased by foreign residents). The third is net national saving (saving minus investment). For the purposes of this figure and this study, it is the third definition of the current account that we will focus on, since net national saving is simply equal to the sum of net savings across all the sectors of the economy.

All countries experienced a surge in government borrowing during the 2020 COVID crisis, with most showing similar spikes during and after the 2008 Global Financial Crisis. However, these sharp declines in government net saving did not translate into similar declines in total economy net saving, as increased private sector saving offset government borrowing during these crises. This suggests that during these crisis periods, increased government borrowing was financed by increased domestic savings.

Again it's interesting to note how Japan is an outlier. Since the early 1990s, Japan has run substantial government deficits, yet Japanese private saving has consistently exceeded these deficits, resulting in positive net saving for the overall economy.

Figure 3 shows the stock equivalent of the flow picture in Figure 2, plotting gross government debt and net foreign liabilities as shares of GDP. Like the current account, the net foreign asset position (the negative of net foreign liabilities) has multiple definitions. The first is the stock of foreign assets held by domestic residents minus the stock of domestic assets held by foreign residents, the second is the sum of the net asset position across all sectors of the economy.

While government debt increased dramatically in nearly all countries since 2008 (except Germany), net foreign liability positions remained relatively stable and even declined in some cases.

Again we see that for Japan, despite accumulating the largest government debt among advanced economies, Japan remains a net creditor to the rest of the world, with negative net foreign liabilities.

The empirical literature on government debt's effect on interest rates shows varying results. Engen and Hubbard (2004) highlight the wide range of findings, with some studies finding no effect and others reporting large positive effects. Engen and Hubbard (2004) and Laubach (2009) demonstrate that model specification matters significantly, particularly whether forward-looking expectations or current fiscal measures are used as independent variables. Due to the endogeneity of government debt, they argue that forecasts of government debt or deficits make better independent variables than current values.

Both studies show that in the U.S., a one percentage point increase in expected future debt raises long-term interest rates by 3-4 basis points, while a one percentage point increase in the expected deficit-to-GDP ratio increases forward rates by 20-30 basis points. Gale and Orszag (2004) find similar results, with a 1 percentage point increase in the expected deficit-to-GDP leading to a 25-35 basis point increases in long-term rates.

More recent studies find slightly smaller effects. Gamber and Seliski (2019), using data through 2017, estimate that a one percentage point increase in expected debt raises long-term rates by 2-3 basis points. Neveu and Schafer (2024), with data through 2023, find approximately a 2 basis point effect, at the lower end of earlier estimates.

Plante et al. (2026) argue that debt non-stationarity complicates estimation, particularly in a more recent sample. They recommend estimating in differences rather than levels. Their differenced regression finds a more precise 3 basis point effect from a one percentage point debt increase, and a 16 basis point effect for every 1 percentage point increase in the deficit.

Using a different approach and instead using the results from parliamentary elections and the formation of coalition governments as a predictor of future government debt levels, Kay and Ehrlich (2026) estimate that a 1 percentage point increase in government debt leads to a 5.6 basis point increase in long-term interest rates.

International studies show similar patterns. Using OECD country panel data, Gruber and Kamin (2012) apply Laubach (2009)'s methodology with two-year-ahead projections of government debt and deficits. They also find significant effects on long-term interest rates, though slightly smaller than U.S.-focused studies.

All of these papers treat debt and borrowers as homogeneous. They estimate the effect of debt or deficits on interest rates, but they do not distinguish whether that debt was financed with foreign savings or foreign borrowing. They do not distinguish between debt in a country that is a net debtor with the rest of the world and one that it a net creditor.

Our paper extends the approach of these earlier papers by adding forecasts of a country's current account or net foreign asset position. This allows us to observe whether an increase in government borrowing is accompanied by an increase in total foreign borrowing. It also allows us to observe whether the country is a net creditor or net debtor with the rest of the world.

We follow Gruber and Kamin (2012)'s approach by using forecasts from 19 OECD countries. This allows us to take advantage of the fact that across countries there is considerable variation in current account and net foreign asset positions.

The estimation specification in these earlier papers allows for one marginal effect of government debt on interest rates. In this paper the marginal effect of government borrowing on interest rates will instead be a function of a country's overall external position and whether new government borrowing is financed by domestic savings or increased foreign borrowing.

This approach helps answer the two questions posed earlier. We show that an increase in government debt or deficits that is financed by domestic savings (leaving the current account or net foreign asset position unchanged) has less of an effect on bond yields than an increase in government borrowing that results in more foreign borrowing (leading to a fall in the current account or net foreign asset position). This distinction helps explain why interest rates haven't responded to the significant increase in government borrowing over the past 15-20 years. Furthermore we show that regardless of how it's financed, an increase in government borrowing in a country that is a net creditor with the rest of the world has less of an effect on bond yields than the same increase in government borrowing in a country that is a net debtor. This distinction helps explain why Japan has the highest stock of government debt among the advanced economies, yet it also has the lowest interest rates.

Roughly speaking, across regression specifications, we find that the marginal effect on long-term interest rates of an increase in debt or deficits financed at home is about half the marginal effect of debt or deficits financed abroad. Similarly, the marginal effect of an increase in debt or deficits in a net international creditor is about half the marginal effect in a net international debtor.

While this paper is empirical, it is helpful understand the various channels through which government borrowing can lead to higher interest rates. Gruber and Kamin (2012) list the following:

1. Crowding out: Larger deficits create greater resource competition, raising equilibrium interest rates.
2. Portfolio balance: Investors may demand higher rates to devote a larger share of their portfolio to government debt.
3. Inflation expectations: Fears of debt monetization can increase inflation premiums (see e.g. Brandao-Marques et al., 2024).
4. Default risk: Larger debts may increase expectations of government default, raising risk premiums.

All of these channels would potentially be mitigated if the government's debt were held by domestic residents. For the crowding out channel: if government deficits are used to finance increased transfer payments to domestic residents, then increased government spending doesn't entail increased resource use, just the transfer from one sector to another.[2] For the portfolio balance channel: a government deficit that finances increased domestic transfers or lower domestic taxes would increase the overall size of the portfolio of private domestic investors, so a greater quantity of government bonds does not lead to as much of an increase

[2] Davis and Derr (2025) show that across OECD countries, much of the increase in government deficits in the 2008 crisis and all of the increase in government deficits in the Covid crisis were due to increased transfers to domestic residents.

in the share of investor portfolios dedicated to government bonds. For the inflation expectations channel: a central bank would be more reluctant to monetize a debt if that debt is held by its own citizens than if that debt were held by foreigners. For the default risk channel: a government with taxing power has the power (if not the political will) to recoup debt and interest payments made to citizens.

While this argument relates to Ricardian equivalence, which Barro (1989) supported by noting the weak correlation between government deficits and current accounts shown in Figure 2, we take no prior position on this theory. Instead, we empirically investigate whether the effect of expected government borrowing on interest rates depends on expected changes in total national borrowing.

In the next section, we present the econometric methodology and discuss the data. We discuss some of the key econometric issues that led to the specification in Laubach (2009) or Gruber and Kamin (2012). We present the results in section 3, and here we include a special discussion of how using projected net foreign asset positions or current accounts in this specification can help answer the two questions raised earlier in Figure 1. Finally section 4 concludes.

2 Data and Methodology

Our methodology is largely built upon that of Gruber and Kamin (2012). They follow Engen and Hubbard (2004) and Laubach (2009) in introducing fiscal variables as forecasts instead of current values in a regression of interest rates on government debt or deficits.

Both the interest rate and fiscal variables are endogenous with respect to the business cycle. In a downturn fiscal deficits and debt tend to increase and at the same time the monetary authority cuts interest rates. This leads to a negative correlation between the fiscal variable and the interest rate that would obscure the positive effect of higher debt leading to higher interest rates. In their review of the literature, Engen and Hubbard (2004) find that empirical studies regressing current interest rates on current levels of government debt or deficits lead to inconclusive results. Because of this endogeneity, Engen and Hubbard (2004) and Laubach (2009) introduce fiscal variables as forecasts, 5-year ahead forecasts from the CBO.

In a panel regression using annual data, Gruber and Kamin (2012) regress the long-term government bond interest rate on 2-year ahead projections of real GDP growth, inflation, government debt, government deficits from the OECD Economic Outlook. To then consider how a country's external balance would affect these estimated effects of government debt and deficits, we add 2-year ahead projections of the current account and net foreign asset position.

This potential endogeneity of current government debt or deficits will add a negative bias to any estimates of the effects of fiscal positions on interest rates. U.S. based studies are able to use 5-year ahead forecasts. In international data, 2-year ahead forecasts are the best available, and the international estimates from Gruber and Kamin (2012), while statistically significant, are smaller than the U.S. estimates from Laubach (2009). While the 2-year ahead forecast is not ideal, the wealth of variation in the current account and net foreign asset position that come from international data makes this reduced forecast horizon worth it.

We estimate the following panel data regression

$$i^{lt}_{j,t} = \alpha_t + \alpha_j + \beta_1 i^{lt}_{j,t-1} + \beta_2 i^{st}_{j,t} + \beta_3 g^{e,2}_{j,t} + \beta_4 \pi^{e,2}_{j,t} + \beta_5 D^{e,2}_{j,t} + \beta_6 F^{e,2}_{j,t} D^{e,2}_{j,t} + \beta_7 F^{e,2}_{j,t} + \epsilon_{j,t} \quad (1)$$

where $i^{lt}_{j,t}$ is the yield on the 10-year government bond in country j in year t, $i^{st}_{j,t}$ is the yield on 3-month government debt, $g^{e,2}_{j,t}$ is the forecasted real GDP growth rate in two years from the OECD Economic Outlook (December version), $\pi^{e,2}_{j,t}$ is the forecast for inflation in two years, and $D^{e,2}_{j,t}$ is the forecasted government deficit or debt in two years (either gross government debt/GDP, net government debt/GDP, the government budget balance/GDP, or the primary government budget balance/GDP).

All terms in this regression through β_5 appear in Gruber and Kamin (2012). We add a sixth and seventh term, $F^{e,2}_{j,t} \times D^{e,2}_{j,t}$ and $F^{e,2}_{j,t}$, where F is a measure of the forecasted external deficit or debt. In the regression that includes the government overall or primary deficit in the variable D, the variable F is the forecasted current account/GDP ratio in two years from the OECD Economic Outlook. In the regression specification that includes the government gross or net debt in the variable D, the variable F is the forecasted net external asset/GDP ratio in two years.[3] In the estimation all interest rate variables are expressed in basis points. The GDP growth, inflation, government debt and deficit, net foreign asset, and current account variables are all written as percentage points.

Plante et al. (2026) argue that debt non-stationarity complicates estimation using the Laubach (2009) specification and recommend estimating in differences rather than levels.

[3] The projection of the net external asset position is not directly reported by the OECD, but a projection can be constructed from the current net foreign asset position and the other OECD forecasts we are using. If nfa_t is the net external asset position as a share of GDP calculated from the Lane and Milesi-Ferretti (2007) External Wealth of Nations database (December 2024 update), then using the forecasts from the OECD, the forecast of the net external asset position in year $t+1$ based on information known in year t, $nfa^{e,1}_t$ is $nfa^{e,1}_t = \frac{nfa_t}{(1+.01*g^{e,1}_t)(1+.01*\pi^{e,1}_t)} + ca^{e,1}_t$, where $g^{e,1}_t$ is the year t OECD forecast for real GDP growth in year $t+1$, $\pi^{e,1}_t$ is the year t OECD forecast for inflation in year $t+1$, and $ca^{e,1}_t$ is the year t OECD forecast for the current account in year $t+1$. After calculating $nfa^{e,t}_{t+1}$, the $t+2$ forecast, $nfa^{e,2}_t$ is $nfa^{e,2}_t = \frac{nfa^{e,1}_t}{(1+.01*g^{e,2}_t)(1+.01*\pi^{e,2}_t)} + ca^{e,2}_t$

Thus as an alternative specification we can estimate the previous equation in year-over-year differences

$$\Delta i^{lt}_{j,t} = \alpha_t + \alpha_j + \gamma_2 \Delta i^{st}_{j,t} + \gamma_3 \Delta g^{e,2}_{j,t} + \gamma_4 \Delta \pi^{e,2t}_{j,t} + \gamma_5 \Delta D^{e,2}_{j,t} + \gamma_6 \Delta \left(F^{e,2}_{j,t} D^{e,2}_{j,t} \right) + \gamma_7 \Delta F^{e,2}_{j,t} + \epsilon_{j,t} \quad (2)$$

Note that to avoid an endogeneity problem, when estimating the model using differences we do not include the lag of the dependent variable on the right-hand side of the regression.

The model is estimated over two different time periods: 1988-2007 and 1988-2023. Both time periods begin in 1988 due to data availability. The former time period ends in 2007 so that our results can be compared to those in Gruber and Kamin (2012) and because this period precedes both the Global Financial Crisis in 2008 and the COVID-19 crisis in 2020.

Each regression is an unbalanced panel and includes data from the following 19 countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, the United Kingdom, and the United States. Due to the effects of the Eurozone debt crisis in the second half of our sample, with large swings in debt levels, spikes in interest rates, and forced austerity, we exclude the Eurozone periphery countries: Greece, Ireland, Spain, and Italy, during the post-2008 sample period.

Gruber and Kamin (2012) find that the estimated value of β_5 is positive and statistically significant, indicating that higher government debt or deficits raises the long term interest rate. By adding external debt or deficit forecasts to the regression, we allow the marginal effect of government debt or deficits, D, on the interest rate to depend on a country's external debt or deficit position, F. Take the derivative of equation (1):

$$di^{lt}_{j,t} = \beta_1 di^{lt}_{j,t-1} + \beta_5 dD^{e,2}_{j,t} + \beta_6 F^{e,2}_{j,t} dD^{e,2}_{j,t} + \beta_6 D^{e,2}_{j,t} dF^{e,2}_{j,t} + \beta_7 dF^{e,2}_{j,t} + ... \quad (3)$$

where for brevity we are only showing the derivatives related to D or F. For concreteness, consider a country that is a net creditor with $F^{e,2}_{j,t} = \bar{F}$ versus a country that is a net debtor with $F^{e,2}_{j,t} = -\bar{F}$. Also consider the case where a country finances an increase in government debt or deficits through external borrowing, $dF^{e,2}_{j,t} = -dD^{e,2}_{j,t}$ versus the case where a country finances an increase in government borrowing from domestic savings, leaving external borrowing unchanged, $dF^{e,2}_{j,t} = 0$. Then for a country with a level of government debt or deficit $D^{e,2}_{j,t} = \bar{D}$, the marginal effect of an increase in government borrowing on the interest rate, $\frac{di^{lt}_{j,t}}{dD^{e,2}_{j,t}}$ will depend on whether the country is an external debtor or creditor and whether that increase in borrowing was financed at home or abroad.

Using the fact that $\Delta \left(F^{e,2}_{j,t} D^{e,2}_{j,t} \right) \approx F^{e,2}_{j,t} \Delta D^{e,2}_{j,t} + D^{e,2}_{j,t} \Delta F^{e,2}_{j,t}$, the regression specification using differences instead of levels leads to identical marginal effect expressions.

Levels Regression:

	Creditor	Debtor
Financed Home	$\frac{\beta_5+\beta_6\bar{F}}{1-\beta_1}$	$\frac{\beta_5-\beta_6\bar{F}}{1-\beta_1}$
Financed Abroad	$\frac{\beta_5+\beta_6\bar{F}+\beta_6\bar{D}-\beta_7}{1-\beta_1}$	$\frac{\beta_5-\beta_6\bar{F}+\beta_6\bar{D}-\beta_7}{1-\beta_1}$

Difference Regression:

	Creditor	Debtor
Financed Home	$\gamma_5+\gamma_6\bar{F}$	$\gamma_5-\gamma_6\bar{F}$
Financed Abroad	$\gamma_5+\gamma_6\bar{F}+\gamma_6\bar{D}-\gamma_7$	$\gamma_5-\gamma_6\bar{F}+\gamma_6\bar{D}-\gamma_7$

where these marginal effects in the levels regression incorporate the effect of the lag in the dependent variable, given by the parameter β_1 (thus these marginal effects are what Gruber and Kamin call long-run effects).

In the introduction we posed two separate, but related questions. First, is the effect of government borrowing on the interest rate different for external creditor and external debtor countries? The previous table shows that in this regression specification the answer to that question depends on the sign and significance of β_6. Second, does the effect of an increase in government borrowing on the interest rate depend on whether that borrowing was financed through domestic or foreign borrowing? The table above shows that the answer to that question depends on the sign and significance of β_6 and β_7.

3 Results

The estimation results from the 1988-2007 sample period used in Gruber and Kamin (2012) are presented in Tables 1 and 2. Table 1 presents the results from the regression in levels in equation (1) and Table 2 presents the results from the regression in differences in equation (2).

Tables 3 and 4 present the same results over the 1988-2023 sample period.

The odd numbered columns in the tables replicate the exercise from Gruber and Kamin (2012). They did not consider the role of the current account or net foreign asset position, so in terms of the regression model in (1), their specification sets $\beta_6 = \beta_7 = 0$. As in Gruber and Kamin (2012), government debt or deficits have a positive and significant effect on the 10-year government bond interest rate.

Moving to the even numbered columns we see the effect of adding the external balance, either the net foreign asset position or the current account, and its interaction with government debt or deficits. In the next section we will compute the marginal effects of an increase in government debt or deficits, but for now we can see that in every regression, the interaction between the measure of government balance and the total external balance, the β_6 coefficient in equation (1) is negative and significant, indicating that the marginal effect of the same government debt or deficits is lower in a country that is a net external creditor than a country that is a net external debtor.

Table 2 presents the results from the same 1988-2007 sample, but in a regression of first-differences, not levels. Again we see that the coefficient on the interaction between the total external balance and the government balance is negative and significant, indicating that the same increase in government debt or deficits has a smaller effect on interest rates when the country is a net external creditor.

Table 3 extends the original Gruber and Kamin specification through 2023, and Table 4 presents the results from the regression in first differences over this sample period. The results are very similar to those from the original sample period, and most notably the statistically significant negative coefficient on the interaction between the government balance and the total external balance continues to hold.

Table 1: Regression in levels, 1988-2007

	Dependent Variable: i_t^{lt}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i_t^{st}	0.216***	0.219***	0.220***	0.235***	0.216***	0.225***	0.222***	0.231***
	(0.021)	(0.032)	(0.025)	(0.044)	(0.021)	(0.031)	(0.024)	(0.038)
i_{t-1}^{lt}	0.473***	0.477***	0.466***	0.436***	0.451***	0.429***	0.455***	0.447***
	(0.031)	(0.041)	(0.042)	(0.064)	(0.031)	(0.042)	(0.034)	(0.046)
$g_t^{e,2}$	7.822	8.211	8.100	10.070	6.007	6.579	5.869	7.014
	(4.799)	(5.774)	(5.551)	(6.794)	(4.561)	(5.133)	(5.325)	(6.309)
$\pi_t^{e,2}$	21.285***	21.895***	21.018***	23.119***	22.237***	23.211***	21.603***	21.335**
	(4.756)	(7.859)	(5.309)	(8.410)	(4.631)	(7.842)	(5.251)	(8.608)
$D_{gross,t}^{e,2}$	0.381**	0.445***						
	(0.170)	(0.173)						
$D_{gross,t}^{e,2} F_{nfa,t}^{e,2}$		-0.005*						
		(0.003)						
$D_{net,t}^{e,2}$			0.297*	0.698***				
			(0.153)	(0.180)				
$D_{net,t}^{e,2} F_{nfa,t}^{e,2}$				-0.007***				
				(0.002)				
$D_{Def,t}^{e,2}$					4.240***	8.016***		
					(1.203)	(1.966)		
$D_{Def,t}^{e,2} F_{CA,t}^{e,2}$						-0.582***		
						(0.116)		
$D_{Pri,t}^{e,2}$							3.009**	6.254***
							(1.446)	(2.154)
$D_{Pri,t}^{e,2} F_{CA,t}^{e,2}$								-0.570***
								(0.145)
$F_{NFA,t}^{e,2}$		0.343*		0.319**				
		(0.185)		(0.139)				
$F_{CA,t}^{e,2}$						-1.772*		-1.647
						(0.976)		(1.292)
R2	0.974	0.974	0.971	0.972	0.974	0.976	0.970	0.971
Obs.	344	344	292	292	345	345	291	291

The dependent variable in each regression is the 10 year interest rate i_t^{lt}. i_t^{st} is the 3m interest rate, $g_t^{e,2}$ is the expectation for real GDP growth in two years, $\pi_t^{e,2}$ is the expectation for inflation in two years, $D_{gross,t}^{e,2}$ is the expectation for the level of gross government debt in two years, $D_{net,t}^{e,2}$ is the expectation for the level of net government debt in two years, $D_{Def,t}^{e,2}$ is the expectation for the level of the government budget deficit in two years, $D_{Pri,t}^{e,2}$ is the expectation for the level of the government primary budget deficit in two years, $F_{NFA,t}^{e,2}$ is the expectation for the level of the net foreign asset position in two years, and $F_{CA,t}^{e,2}$ is the expectation for the level of the current account in two years. Standard errors clustered by country in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Regression in differences, 1988-2007

	Dependent Variable: Δi_t^{lt}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δi_t^{st}	0.219***	0.221***	0.217***	0.218***	0.220***	0.221***	0.207***	0.211***
	(0.029)	(0.029)	(0.039)	(0.039)	(0.028)	(0.028)	(0.034)	(0.034)
$\Delta g_t^{e,2}$	2.279	1.408	6.214	5.296	3.129	2.902	-3.240	-2.536
	(5.754)	(5.974)	(7.330)	(7.358)	(5.739)	(5.497)	(7.319)	(7.153)
$\Delta \pi_t^{e,2}$	17.530***	17.700***	19.398***	18.906***	18.343***	17.017***	21.380**	20.743***
	(6.159)	(6.207)	(7.263)	(7.156)	(6.193)	(5.774)	(8.471)	(7.829)
$\Delta D_{gross,t}^{e,2}$	0.447	0.560						
	(0.350)	(0.371)						
$\Delta D_{gross,t}^{e,2} F_{nfa,t}^{e,2}$		-0.012**						
		(0.006)						
$\Delta D_{net,t}^{e,2}$			0.211	0.341				
			(0.272)	(0.278)				
$\Delta D_{net,t}^{e,2} F_{nfa,t}^{e,2}$				-0.010***				
				(0.004)				
$\Delta D_{Def,t}^{e,2}$					4.265	5.862**		
					(2.774)	(2.972)		
$\Delta D_{Def,t}^{e,2} F_{CA,t}^{e,2}$						-0.491***		
						(0.142)		
$\Delta D_{Pri,t}^{e,2}$							3.012	5.132*
							(2.391)	(2.939)
$\Delta D_{Pri,t}^{e,2} F_{CA,t}^{e,2}$								-0.349**
								(0.147)
$\Delta F_{NFA,t}^{e,2}$		0.243		-0.133				
		(0.261)		(0.213)				
$\Delta F_{CA,t}^{e,2}$						-3.958***		-3.827**
						(1.264)		(1.520)
R2	0.842	0.845	0.839	0.841	0.842	0.848	0.854	0.857
Obs.	338	338	267	267	340	340	235	235

See notes to Table 1.

Table 3: Regression in levels, 1988-2023

	Dependent Variable: i_t^{lt}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i_t^{st}	0.213***	0.219***	0.220***	0.228***	0.217***	0.224***	0.223***	0.233***
	(0.017)	(0.028)	(0.021)	(0.037)	(0.017)	(0.027)	(0.020)	(0.033)
i_{t-1}^{lt}	0.490***	0.489***	0.495***	0.467***	0.480***	0.466***	0.477***	0.467***
	(0.025)	(0.035)	(0.034)	(0.053)	(0.025)	(0.035)	(0.028)	(0.038)
$g_t^{e,2}$	6.795**	6.692*	5.631	5.631	5.497*	6.096	3.512	6.395
	(3.348)	(3.987)	(4.092)	(4.925)	(3.250)	(3.823)	(3.926)	(4.846)
$\pi_t^{e,2}$	16.658***	18.110***	14.935***	16.698***	18.359***	18.428***	16.438***	17.501***
	(3.303)	(5.502)	(3.948)	(6.298)	(3.372)	(5.540)	(3.938)	(6.177)
$D_{gross,t}^{e,2}$	0.377***	0.434***						
	(0.089)	(0.103)						
$D_{gross,t}^{e,2} F_{nfa,t}^{e,2}$		-0.003*						
		(0.002)						
$D_{net,t}^{e,2}$			0.137*	0.478***				
			(0.076)	(0.132)				
$D_{net,t}^{e,2} F_{nfa,t}^{e,2}$				-0.003***				
				(0.001)				
$D_{Def,t}^{e,2}$					3.670***	5.748***		
					(0.822)	(1.350)		
$D_{Def,t}^{e,2} F_{CA,t}^{e,2}$						-0.342***		
						(0.077)		
$D_{Pri,t}^{e,2}$							1.725*	4.724***
							(1.005)	(1.605)
$D_{Pri,t}^{e,2} F_{CA,t}^{e,2}$								-0.411***
								(0.099)
$F_{NFA,t}^{e,2}$		0.165		-0.003				
		(0.124)		(0.110)				
$F_{CA,t}^{e,2}$						-1.007		-1.333*
						(0.670)		(0.777)
R2	0.984	0.984	0.980	0.981	0.984	0.984	0.980	0.980
Obs.	575	575	455	455	581	581	454	454

See notes to Table 1.

Table 4: Regression in differences, 1988-2023

	Dependent Variable: Δi_t^{lt}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δi_t^{st}	0.224***	0.224***	0.227***	0.226***	0.226***	0.227***	0.213***	0.215***
	(0.027)	(0.027)	(0.037)	(0.037)	(0.027)	(0.027)	(0.032)	(0.032)
$\Delta g_t^{e,2}$	1.688	1.332	2.150	1.748	2.374	2.887	-3.206	-2.193
	(3.572)	(3.618)	(4.707)	(4.690)	(3.459)	(3.489)	(4.544)	(4.600)
$\Delta \pi_t^{e,2}$	16.073***	16.093***	15.212***	15.238***	16.248***	15.376***	14.361**	14.170**
	(4.646)	(4.648)	(5.567)	(5.536)	(4.582)	(4.423)	(6.019)	(5.706)
$\Delta D_{gross,t}^{e,2}$	0.175	0.231						
	(0.212)	(0.226)						
$\Delta D_{gross,t}^{e,2} F_{nfa,t}^{e,2}$		-0.004						
		(0.003)						
$\Delta D_{net,t}^{e,2}$			0.021	0.110				
			(0.242)	(0.248)				
$\Delta D_{net,t}^{e,2} F_{nfa,t}^{e,2}$				-0.004**				
				(0.002)				
$\Delta D_{Def,t}^{e,2}$					2.684*	3.354*		
					(1.407)	(1.713)		
$\Delta D_{Def,t}^{e,2} F_{CA,t}^{e,2}$						-0.157		
						(0.102)		
$\Delta D_{Pri,t}^{e,2}$							0.851	2.386
							(1.260)	(1.994)
$\Delta D_{Pri,t}^{e,2} F_{CA,t}^{e,2}$								-0.203*
								(0.116)
$\Delta F_{NFA,t}^{e,2}$		-0.085		-0.398**				
		(0.196)		(0.186)				
$\Delta F_{CA,t}^{e,2}$						-2.167**		-2.332*
						(0.973)		(1.196)
R2	0.846	0.847	0.820	0.823	0.846	0.847	0.830	0.832
Obs.	567	567	428	428	574	574	396	396

See notes to Table 1.

3.1 Marginal effect of an increase in debt or deficits

As discussed in section 2, in the original Gruber and Kamin (2012) specification, the marginal effect of an increase in government debt or deficits on interest rates is the same for all countries. But in our specification this marginal effect becomes a function of a country's external position (the net foreign asset position or the current account), and how much that external position is expected to change in response to an expected change in government debt or deficits.

While this marginal effect lies on a continuum, given by equation (3), for concreteness we can calculate the marginal effect in four cases, whether a country is a net creditor or net debtor, and whether the increase in government borrowing was financed at home or abroad.[4]

These estimated marginal effects from the 1988-2007 sample period are shown in Table 5, and those from the 1988-2023 sample period are shown in Table 6. Each table presents the marginal effects as estimated from the levels regression on the left and the effects estimated from the difference regression on the right. Going top to bottom in the table they show the marginal effect of a 1 percentage point of GDP increase in gross government debt, net government debt, overall government budget deficit, and primary government budget deficit.

Starting with the regressions on gross and net government debt, in the 1988-2007 sample in Table 5, the effect of a 1 percentage point of GDP increase in gross government debt ranges from statistically indistinguishable from zero for net creditors to as much as +1.8 basis points for a net debtor that finances the increase in debt from foreign borrowing. In the levels regression that does not distinguish between home and foreign borrowing, Gruber and Kamin (2012) estimate the effect to be 0.8 basis points. The marginal effect for the representative net debtor is about 1.0-1.4 basis points higher than the marginal effect for the representative net creditor. The marginal effect of a 1 percentage point increase in debt financed by foreign borrowing is 0.4 to 0.7 basis points higher than the same debt financed from domestic savings.

The marginal effects of a 1 percentage point increase in net government debt are similar, if a little smaller. Again, the marginal effect for the representative net creditor is statistically indistinguishable from zero, while for the net debtor it is as much as 1.2 basis points. Gruber and Kamin (2012) estimate the marginal effect of an increase in net debt to be around 0.6

[4]When presenting marginal effects results, we need to put a numerical value on the initial value of $\bar{F}$. Using a simple average of the absolute value of the net foreign asset position or current account across the countries in our sample, we define a representative net creditor to be a country with a net foreign asset position equal to +40% of GDP or a current account equal to +3% of GDP. A representative net debtor is the opposite, with a net foreign asset position equal to -40% and a current account equal to -3%. At the same time, to calculate the marginal effect of an increase in debt or deficits financed abroad we need to pin down the initial value of government debt or deficits, $\bar{D}$. Using the simple average across the countries in our sample, in the regression of gross debt, $\bar{D} = 81\%$, in the regression of net debt, $\bar{D} = 35\%$, in the regression of the overall budget deficit $\bar{D} = 1.5\%$, and in the regression of the primary deficit, $\bar{D} = -0.8\%$.

basis points. We find that the marginal effect for the representative debtor is about 0.8 basis points higher than the marginal effect for the representative creditor.

Comparing the average value across the bottom row of each table to the average value across the top row of each table, we find that in all but one case (net debt, levels regression), the marginal effect of debt financed at home is about 60% less than the marginal effect of debt financed abroad. Similarly, comparing the average of the left-hand column to the average of the right-hand column, shows that the marginal effect of an increase in debt for a net international creditor is less than half the marginal effect for a net international debtor.

The bottom half of the table reports the marginal effects from an increase in the government budget deficit. The marginal effect ranges from statistically indistinguishable from zero for a representative net creditor financing the deficit from home savings to 12-19 basis points for a net debtor financing the deficit from foreign borrowing. Gruber and Kamin (2012) estimate that a 1 percentage point increase in the deficit/GDP ratio raise the interest rate by about 8 basis points. We find that the marginal effect of a deficit financed from foreign borrowing is about 5 basis points higher than one financed from domestic savings. Furthermore the marginal effect for the representative net debtor is about 3-6 basis points higher than the marginal effect for the net creditor.

The estimated marginal effects for an increase in the primary deficit are similar to those for the overall deficit. The effect ranges from statistically indistinguishable from zero for a net creditor financing from domestic savings to 15 basis points for a net debtor financing from foreign borrowing. The marginal effect of a deficit financed from foreign borrowing is about 4 basis points higher than the marginal effect of a deficit financed from domestic savings, and the marginal effect for the net debtor is 2-6 basis points higher than the marginal effect for the net creditor.

Comparing the average value across the bottom row of each table to the average value across the top row of each table, we find that in every specification the marginal effect of a deficit financed at home is about 40% less than the marginal effect of a deficit financed abroad. Similarly, comparing the average of the left-hand column to the average of the right-hand column, we find that the marginal effect of an increase in the deficit in a net international creditor is around 40% less than the marginal effect in a net international debtor.

Turning now to the effects for the full 1988-2023 sample in Table 6. The marginal effects in the levels regressions are very similar to those in the 1988-2007 in Table 5. The estimates in the difference regression are smaller than those from the 1988-2007 sample, but we still find a significant difference between the marginal effects between the top and bottom or left and right of the table.

While the numerical values of the marginal effects in the differences regression over the

1988-2023 sample period are smaller, the relative changes in the marginal effects between debt financed at home and debt financed abroad, or between a net creditor and a net debtor, are the same as in the early sample. Comparing the top row in each table to the bottom row in each table, we find that across specifications, the marginal effect of debt or deficits financed at home is about half the marginal effect of debt or deficits financed abroad. Similarly, comparing the left-hand column of the table to the right-hand column shows that across specifications, the marginal effect of an increase in debt or deficits for a net creditor is nearly half the marginal effect for a net debtor.

Table 5: Marginal effect of increase in government debt or deficit, 1988-2007

Levels:

Gross Debt:

	Creditor	Debtor
Financed Home	0.476	1.226***
Financed Abroad	0.579	1.328**
Difference top to bottom	0.103	
Difference left to right	0.750*	

Net Debt

	Creditor	Debtor
Financed Home	0.763***	1.714***
Financed Abroad	0.602*	1.553***
Difference top to bottom	-0.161	
Difference left to right	0.951***	

Deficit

	Creditor	Debtor
Financed Home	10.969***	17.084***
Financed Abroad	15.599***	21.715***
Difference top to bottom	4.630**	
Difference left to right	6.115***	

Primary Deficit

	Creditor	Debtor
Financed Home	8.215**	14.394***
Financed Abroad	10.369***	16.547***
Difference top to bottom	2.154	
Difference left to right	6.179***	

Difference:

Gross Debt:

	Creditor	Debtor
Financed Home	0.079	1.042*
Financed Abroad	0.811*	1.774**
Difference top to bottom	0.732**	
Difference left to right	0.963**	

Net Debt

	Creditor	Debtor
Financed Home	-0.047	0.729*
Financed Abroad	0.425	1.201**
Difference top to bottom	0.472	
Difference left to right	0.776***	

Deficit

	Creditor	Debtor
Financed Home	4.388	7.336**
Financed Abroad	9.083***	12.032***
Difference top to bottom	4.695***	
Difference left to right	2.949***	

Primary Deficit

	Creditor	Debtor
Financed Home	4.084	6.179*
Financed Abroad	7.631**	9.727**
Difference top to bottom	3.547**	
Difference left to right	2.095**	

Computes the marginal effects from the regression equations using the specification in the table in section 2. Left-hand panel is from the levels regression results in Table 1 and the right-hand panel is from the differences regression results in Table 2. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Marginal effect of increase in government debt or deficit, 1988-2023

Levels:

Gross Debt:

	Creditor	Debtor
Financed Home	0.630***	1.068***
Financed Abroad	0.750***	1.188***
Difference top to bottom	0.120	
Difference left to right	0.438*	

Net Debt

	Creditor	Debtor
Financed Home	0.674***	1.121***
Financed Abroad	0.870***	1.317***
Difference top to bottom	0.196	
Difference left to right	0.447***	

Deficit

	Creditor	Debtor
Financed Home	8.845***	12.689***
Financed Abroad	11.692***	15.536***
Difference top to bottom	2.847**	
Difference left to right	3.844***	

Primary Deficit

	Creditor	Debtor
Financed Home	6.548**	11.182***
Financed Abroad	8.431***	13.065***
Difference top to bottom	1.883	
Difference left to right	4.633***	

Difference:

Gross Debt:

	Creditor	Debtor
Financed Home	0.090	0.372
Financed Abroad	0.461*	0.743*
Difference top to bottom	0.371**	
Difference left to right	0.282	

Net Debt

	Creditor	Debtor
Financed Home	-0.040	0.261
Financed Abroad	0.489	0.790**
Difference top to bottom	0.529**	
Difference left to right	0.301**	

Deficit

	Creditor	Debtor
Financed Home	2.884*	3.825**
Financed Abroad	5.286***	6.228***
Difference top to bottom	2.402**	
Difference left to right	0.941	

Primary Deficit

	Creditor	Debtor
Financed Home	1.778	2.994
Financed Abroad	3.948*	5.163*
Difference top to bottom	2.170*	
Difference left to right	1.215*	

Computes the marginal effects from the regression equations using the specification in the table in section 2. Left-hand panel is from the levels regression results in Table 3 and the right-hand panel is from the differences regression results in Table 4. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4 Conclusion

We provide evidence that the effect of government debt on long-term interest rates depends on whether the borrower is a net international creditor or net international debtor, and whether new debt is financed by domestic savers or foreign borrowers. This finding helps resolve two apparent paradoxes in the data: why countries like Japan maintain low interest rates despite extraordinarily high government debt levels, and why interest rates remained low in most countries despite surges in government borrowing during the 2008 crisis and the Covid crisis.

We show that these distinctions hold across multiple types of government debt (both gross and net debt) and multiple types of government deficits (both overall and primary deficits), and in a regression in levels and one in first differences. In most cases, the marginal effect of an increase in government debt or deficits is statistically indistinguishable from zero in a net creditor country financing from domestic savings. Across specifications, the marginal effect of an increase in debt or deficits financed at home is about half the marginal effect of debt or deficits financed abroad. Similarly, the marginal effect of an increase in debt or deficits for a net international creditor is about half the marginal effect for a net international debtor.

While our findings do not diminish the importance of fiscal sustainability over the long term, they provide a more nuanced framework for analyzing the short and medium-term effects of fiscal policy, particularly during economic crises when domestic saving tends to increase. Government borrowing need not always crowd out private investment or trigger higher interest rates—its effects depend critically on whether that borrowing is offset by changes in private saving behavior and external borrowing patterns.

Future research could further explore how these relationships might evolve in different monetary policy regimes or vary across different types of government spending programs. Additionally, investigating how changes in global capital mobility might alter these dynamics would provide additional insights.

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