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Fernando Broner, Daragh Clancy, Aitor Erce and Alberto Martin

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Fiscal Multipliers and Foreign Holdings of Public Debt*

Fernando Broner† Daragh Clancy‡ Aitor Erce§ Alberto Martin¶

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Abstract

This paper explores a natural connection between fiscal multipliers and foreign holdings of public debt. Although fiscal expansions can raise domestic economic activity through various channels, they can also have crowding-out effects if the resources used to acquire public debt reduce domestic consumption and investment. These crowding-out effects are likely to be weaker when governments have access to foreign savings when selling their debt. We test this hypothesis for the US in the post-war period and for a panel of 17 advanced economies from the 1980s to the present. To do so, we assemble a novel database of public debt holdings by domestic and foreign creditors for these countries. We combine this data with standard measures of fiscal policy shocks and show that, indeed, the size of fiscal multipliers is increasing in the share of public debt held by foreigners. In particular, the fiscal multiplier is smaller than one when the foreign share is low, such as in the U.S. in the 1950s and 1960s and Japan today, and larger than one when the foreign share is high, such as in the U.S. and Ireland today.

Keywords: sovereign debt, fiscal multiplier, foreign holdings of public debt.

JEL Classification: E62, F32, F34, F36, F41, F62, F65, G15, H63

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†CREi, Universitat Pompeu Fabra, and Barcelona GSE.

‡Central Bank of Ireland.

§Navarra Public University (UPNA).

¶CREi, and Barcelona GSE.

1 Introduction

Since the onset of the global financial crisis, fiscal policy has taken center stage in the policy debate. Given the magnitude of the crisis and the constraints faced by monetary policy as nominal interest rates approached zero, most countries initially responded with strong fiscal stimuli. However, many of them faced market pressures that forced them to backtrack and implement strict austerity measures shortly thereafter. These developments motivated a new wave of empirical research on the effects of fiscal policy, particularly on the size of fiscal multipliers.[1]

There is another aspect of fiscal policy that gathered attention in the aftermath of the crisis, especially in the euro-area periphery. Namely, the increase in the stock of public debt was largely absorbed by domestic banks, and the share of public debt held by foreigners declined. This prompted a growing literature seeking to understand the determinants and macroeconomic consequences of the distribution of public debt between domestic residents and foreigners.[2]

In this paper, we argue that there is a natural connection between fiscal multipliers and the foreign holdings of public debt. The intuition is simple. There are various channels through which fiscal expansions, either increases in public spending or reductions in taxes, can raise domestic economic activity.[3] But fiscal expansions can also have crowding-out effects on the domestic private sector. One direct source of crowding out is that the resources used by the domestic private sector to acquire public debt can detract from consumption and investment. This suggests that the crowding out effect of fiscal expansions are weaker and, thus, fiscal multipliers larger when governments have access to foreign savings when selling their debt.

The goal of this paper is to test this hypothesis. To do so, we assemble a novel database of public debt holdings by domestic residents and foreigners, and proxy governments' access to foreign savings with the share of public debt held by foreigners. Our main result is that, indeed, the fiscal multiplier is increasing in the foreign share of public debt. This result holds both for the United States during the post-war period, and for a panel of advanced (OECD) economies over the last few decades. According to our estimates the public spending multiplier in the United States was significantly smaller than one in the 1950s, when the foreign share was less than 5%, and significantly greater than one today, when the foreign share is close to 50%. Consistently, the estimated deficit multiplier in our sample of OECD economies also depends on the foreign share.

[1] See Ramey (2016a) for a recent survey.

[2] Arsanalp and Tsuda (2012), Broner, Erce, Martin and Ventura (2014) and Brutti and Saurè (2016) provide accounts of public debt developments during the European crisis.

[3] For a review of these channels, see Ramey (2011a).

In particular, it is smaller than one for low levels of the foreign share, such as Japan's 8%, and greater than one for high levels of foreign share, such as Ireland's 64%.

To derive our results, we follow existing methodologies regarding both the identification of fiscal shocks and the empirical specifications used to estimate their effects. To identify fiscal shocks we use two alternative approaches: (i) the narrative approach, based on government spending shocks for the United States from Ramey and Zubairy (2018a) and fiscal consolidations for a group of OECD economies from Guajardo et al. (2014a); and (ii) the structural VAR approach of Blanchard and Perotti (2002) to estimate government spending shocks for the United States. To estimate fiscal multipliers, we follow Ramey and Zubairy's (2018a) two-step procedure. First, we use the fiscal shocks described above to instrument the fiscal variable of interest, i.e., government spending or public deficit shocks. Second, we use this instrumented fiscal variable to estimate the corresponding multiplier. In both steps we use Jordà's (2005) local projection method.

We first estimate baseline, *unconditional*, multipliers. We then incorporate our measures of foreign debt holdings to estimate *conditional* multipliers. For the United States, data on public debt holdings by domestic residents and foreigners is available, at a quarterly frequency starting in 1951, from the Federal Reserve Economic Databank (FRED). For the panel of OECD economies, we constructed a novel annual dataset of the allocation of public debt between domestic residents and foreigners. The underlying data was collected from public sources, such as the Balance of Payments (Financial Accounts, International Investment Positions) and Monetary Surveys, and provided to us directly by Central Banks, Ministries of Finance and Statistical Offices.

The data on foreign holdings of public debt reveals interesting patterns. First of all, there is significant variation across countries: in some, such as Canada and Japan, the share of public debt held by foreigners is consistently low, whereas in others, such as Finland and Austria, foreigners hold more than 75% of public debt towards the end of the sample. Over time, in line with the rise of financial globalization, the general pattern is one of increasing public debt in the hands of foreigners. In the United States, for instance, the share of public debt held by foreigners has increased from less than 5% in the 1950s to close to 50% today. Although this trend has been present across most OECD economies in our sample, it has not been uniform over time. During the recent European debt crisis, for instance, there was a decline in the share of debt held by foreigners in the euro periphery.

Conceptually, the size of fiscal multipliers should depend on the *marginal* foreign share of public debt, i.e., on the share of the change in public debt brought about by a fiscal shock that is absorbed by foreigners. Testing this empirically, however, is difficult because the marginal foreign share is not directly observable. One possibility would be to estimate it from the observed correlation between changes in foreign holdings of public debt and changes in total public debt over a window of time following fiscal shocks. But it is hard to establish causality from this correlation, because observed changes in foreign holdings are likely endogenous to ex-post economic conditions. Thus, we need an ex-ante measure of foreign share that is determined prior to the realization of the fiscal shock.[4] We find that the *average* foreign share, i.e., the share of public debt held by foreigners, provides such a measure. In particular, we show that the average foreign share at the time of a fiscal shock is a good predictor of the marginal foreign share in its aftermath.

Our findings suggest that the effects of fiscal policy depend crucially on governments' access to foreign savings when selling their debt. This insight is key for understanding the effects of the surge in public spending in response to the COVID-19 crisis, given the heterogeneity in governments' access to foreign savings. Moreover, our findings challenge the conventional Mundell-Fleming view on fiscal multipliers in open economies. According to this view, such multipliers are smaller in open economies because part of the effect of fiscal expansions on aggregate demand falls on foreign goods.[5] Our findings instead point to an alternative interpretation of this inflow of foreign goods: namely, they reflect capital inflows, which help finance fiscal expansions thereby minimizing their crowding-out effects on domestic investment. In a similar vein, the common perception is that there are positive trade-induced spillovers of fiscal policy, because a fiscal expansion in any one country raises its demand for foreign goods. Our findings instead point to a potentially negative spillover, induced by financial linkages: to the extent that fiscal expansions are financed via foreign borrowing, their crowding-out effects are exported and consumption and investment are reduced elsewhere.[6]

Literature review:

Our paper is closely related to two strands of literature. The first one is the literature on the

[4]For example, consider a fiscal expansion that leads to higher economic growth for reasons unrelated to the foreign share of public debt holdings. If this higher growth then results in an increase in foreign purchases of public debt, we would be classifying the event as having a high marginal foreign share. But it would be the expansionary effect of the fiscal shock that causes the high foreign share, and not the other way around.

[5]Strictly speaking, in the Mundell-Fleming model the effects of fiscal expansions are partly undone through currency appreciations. But the empirical literature tends to find that the exchange rate depreciates following a fiscal expansion and, in many estimates, there is actually no or little crowding out of net exports (e.g. Monacelli and Perotti 2010, Corsetti et al. 2012, Ravn et al. 2012, and Kim 2015). For additional evidence on the relationship between multipliers and trade, see Ilzetzki et al. (2013), and Cacciatore and Traum (2018).

[6]Broner et al. (2021) show how these negative spillovers can lead to excessive public spending in financially integrated economies.

effects of fiscal policy. On the empirical side, and in the wake of the financial crisis, much of the recent work has argued that fiscal multipliers appear to be larger than previously thought (e.g. Acconcia et al. 2014, Blanchard and Leigh 2013, Mertens and Ravn 2013). It has also argued that multipliers are state contingent, being relatively large during recessions (e.g. Auerbach and Gorodnichenko 2012), at the zero lower bound (e.g. Christiano et al. 2011 and Miyamoto et al. 2018), and for fiscal contractions (Barnichon et al. forthcoming). These findings have been partially challenged, though. Alesina and Ardagna (2013) for instance, argue that fiscal contractions can actually be expansionary.[7] Ramey and Zubairy (2018a), in turn, question the state-contingency of estimated multipliers.

More recently, the literature has emphasized that the effects of fiscal policy depend on whether governments have access to foreign markets to place their debt. This point has been made theoretically by Broner et al. (2014), Farhi and Werning (2016), and Priftis and Zimic (2021).[8] Of these, Priftis and Zimic (2021) are closest to us and they were the first to explore this issue empirically. Our work differs from theirs in terms of both methodology and scope, however. First, they use an SVAR as their empirical model, while we use local projections. Second, they use sign restrictions on ex-post changes in public debt holdings to identify spending shocks financed by domestic and foreign sources. Instead, we condition fiscal shocks on the ex-ante foreign share of public debt. As explained above, the use of ex-ante data significantly reduces endogeneity concerns. It also makes the analysis more relevant for policy, since the foreign share of debt holdings can be used to predict the effects of fiscal policy. Third, we substantially extend existing datasets on foreign and domestic holdings of public debt.

Our paper is also related to the literature on the effects of public debt. The idea that public debt can crowd out private investment and that the extent of this crowding out depends on whether the private sector is financially constrained is of course very old (e.g. Diamond 1965 and Barro 1974). Consistent with this view, empirical studies have recently documented a negative cross-country correlation between high levels of public debt and growth (Reinhart and Rogoff 2010, Cecchetti et al. 2011), and a negative correlation between public debt and private investment both at the national and subnational levels (Huang et al. 2018 and Huang et al. forthcoming).

[7] The crowding-out effects emphasized in this paper are one potential reason why fiscal contractions may be expansionary, especially when governments rely heavily on domestic financial markets.

[8] In a related vein, Caballero et al. (2016) and Sin (2016) argue that if the increase in safe/liquid assets associated with fiscal expansions is absorbed by foreigners their associated benefits on the domestic economy might be smaller, leading to smaller multipliers. Also related is the finding of large multipliers from externally-financed transfers (Nakamura and Steinsson 2014; Corbi et al. 2019). We find similarly-sized multipliers when the foreign share of public debt is high.

The literature on public debt has also recently studied the connection between debt sustainability and the distribution of public debt holdings between domestic and foreign residents. One set of papers has emphasized the stabilizing role of domestic debt holdings ex ante, which raise incentives for debt repayment (e.g. Guembel and Sussman 2009, Broner and Ventura 2011, Gennaioli et al. 2014, and Chari et al. 2020). Another set of papers has instead emphasized the de-stabilizing role of domestic debt holdings ex post, which might generate feedback loops between the public and private sectors in times of crisis (e.g. Acharya et al. 2014, Farhi and Tirole 2018). Acharya et al. (2018), in particular, provide evidence that is consistent with the crowding-out effect of domestic debt holdings that is at the heart of our story: they document that, during the euro area sovereign debt crisis, purchases of sovereign debt by undercapitalized euro-area banks contributed to the decline in corporate lending.[9]

The paper is structured as follows. Section 2 describes the dataset that we use for the United States. Section 3 develops a simple model to explain the basic connection between the fiscal multiplier and foreign holdings of public debt. Section 4 and 5 respectively describe our empirical methodology and our main results for the United States. Section 6 does the same for our panel of OECD economies and Section 7 concludes.

2 US Data

We want to analyze the relationship between the foreign share of public debt holdings and the fiscal multiplier in the United States during the post-war period. To do so, we need to measure the distribution of public debt holdings between domestic residents and foreigners, and to identify fiscal shocks.

2.1 Public debt holdings

We obtained quarterly data on US public debt holdings by foreign residents from 1950 from the Federal Reserve Economic Databank (FRED). We highlight some of the key features of the data here, with the full details contained in Appendix A.

Figure 1 shows the time evolution of the foreign share for the US. The figure shows that during the Bretton Woods period the share of public debt in foreign hands was low, about 5%. The foreign

[9] A related literature has focused on the role of foreign investors in determining sovereign yields. Bernanke, Reinhart and Sack (2004), Wu (2005) and Warnock and Warnock (2009), for instance, provide evidence that treasury purchases by foreign creditors reduce long-term yields.

share increased sharply after the collapse of Bretton Woods in the early 1970s, and then hovered around 20% until the mid 1990s. Since then, the foreign share has increased steadily until reaching 50% today.

Figure 1: **Foreign share of U.S. public debt holdings**

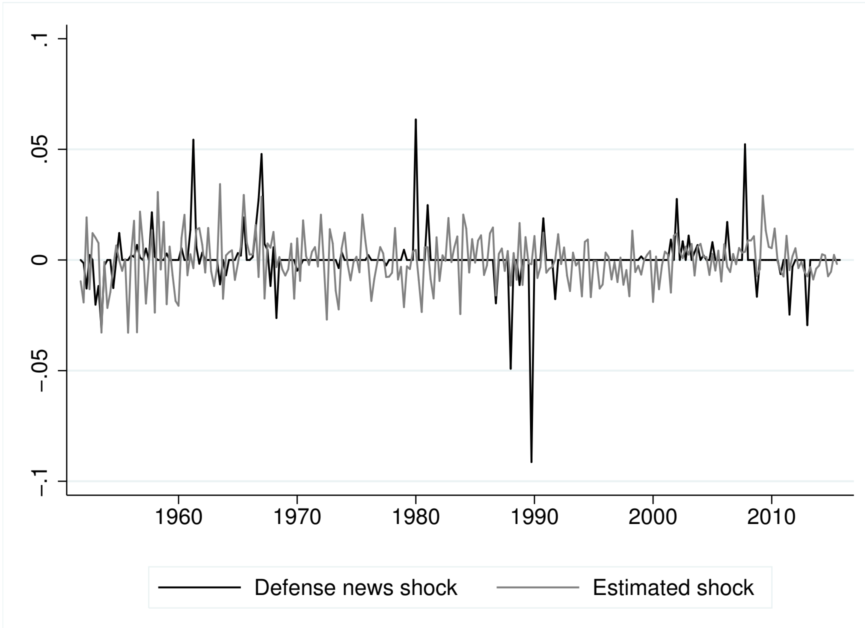
Notes: Foreign share is the rest of the world's holdings of U.S. federal government's treasury securities liabilities as a proportion of total.

2.2 Fiscal shocks

Changes in fiscal policy are in general endogenous to current and expected economic conditions, making it difficult to identify exogenous fiscal shocks. The literature proposes two main approaches to overcome this difficulty. The first is the *narrative approach*, which identifies exogenous shocks to fiscal variables from official documents by selecting policy announcements driven by factors other than current economic conditions. The second approach identifies exogenous shocks to fiscal variables as the difference between observed levels and those predicted by estimated *fiscal rules*.

We use the narrative shocks to US government spending provided by Ramey and Zubairy (2018b), who build on Ramey's (2011b) defense news series. This series consists of news from magazines and newspapers on changes in US government defense spending. Crucially, the series includes changes in spending linked to political and military events and not to the state of the economy. The size of fiscal shocks reflect changes to the expected present discounted value of government spending. We depict the resulting defense news shocks in Figure 2.

Figure 2: **Identified U.S. fiscal shocks**



Notes: The defense news shocks are from Ramey and Zubairy (2018b). The estimated shocks are from Ramey (2016b). Both shocks are normalized by potential GDP.

One can also identify innovations to fiscal variables as the difference between their realized values and those predicted using either structural VARs or fiscal rules. These methodologies use the identifying assumption that fiscal variables do not respond contemporaneously to shocks to their macroeconomic determinants.[10] This seems reasonable for government spending, since it does not respond automatically to the state of the economy and its discretionary component is subject to decision and implementation lags. This is not the case for other components of the fiscal balance. Government investment is highly cyclical and taxes and transfers have large automatic components. The use of quarterly, rather than annual, data makes satisfying this identifying assumption more likely.

Blanchard and Perotti (2002) estimate shocks to government spending in this manner, using a structural VAR. Figure 2 displays the resulting estimated fiscal shocks according to their methodology. We also use these shocks, albeit through the methodology of Ramey and Zubairy (2018a), which we explain in detail in Section 4.

[10] Auerbach and Gorodnichenko (2012) use lagged expert forecasts to eliminate the predictable component of fiscal spending innovations. We chose not to do this because experts' forecasts do not cover all of our sample.

We combine the identified fiscal shocks with our data on public debt holdings to assess the empirical relation between the foreign share of public debt and the size of fiscal multipliers. Before doing so, we present a simple model to illustrate the mechanisms at play.

3 A stylized model of multipliers and sovereign debt

We develop a simple model to illustrate how the foreign share of public debt holdings affects the size of the fiscal multiplier. The goal of the model is to highlight the main economic forces at work, and to provide a conceptual context for our empirical strategy.

3.1 Preferences and technology

Consider a small open economy populated by a representative agent of mass one and a government. There are two periods, $t \in \{0, 1\}$. There is a single good that can be used for consumption and investment. Agents only consume at $t = 1$ and there is no uncertainty, so utility is given by

$$U_0 = C_1. \tag{1}$$

There are private and government production technologies. The agent receives an endowment of E_0 units of the good at $t = 0$. If she invests K at $t = 0$ she produces

$$Y_1^P = F(K) \tag{2}$$

at $t = 1$, where $F'(\cdot) > 0$ and $F''(\cdot) < 0$. The government receives no endowment at $t = 0$. If the government invests G at $t = 0$ it produces

$$Y_1^G = \gamma \cdot G \tag{3}$$

at $t = 1$.[11]

3.2 Financial markets

The representative agent and the government trade bonds among themselves and with an international financial market that is large and is willing to borrow and lend at a (gross) return of one.

[11] We assume that there are decreasing returns to scale in the private technology to ensure an interior solution. We assume that there are constant returns to scale in the public technology only to simplify the notation.

As a result, the equilibrium interest rate is

$$R = 1. \tag{4}$$

The representative agent can borrow and lend from the international financial market, but she can only pledge a fraction $\lambda \in [0,1]$ of her capital and of her public bond holdings. As a result, she faces the credit constraint

$$B^* \geq -\lambda \cdot \left(K + B^H\right), \tag{5}$$

where B^* and B^H are holdings of international and government bonds respectively, and $B^* < 0$ implies borrowing from the international financial market. Thus, Equation (5) says that borrowing from foreigners cannot exceed total pledgeable funds. Since these funds are known during youth, the credit obtained by the private sector is riskless. The private budget constraints at $t = 0$ and $t = 1$ are

$$K + B^H + B^* = E_0 \quad \text{and} \quad C_1 = Y_1^P + B^H + B^* + Y_1^G - T_1, \tag{6}$$

where T_1 are taxes at $t = 1$. We assume taxes are zero at $t = 0$.[12]

The government also borrows in order to invest at $t = 0$. Since taxes are zero at $t = 0$, the government's budget constraints at $t = 0$ and $t = 1$ are

$$G = B \quad \text{and} \quad B = T_1. \tag{7}$$

We assume that a fraction θ of bonds issued by the government are purchased by the international financial market, so

$$B^F = \theta \cdot B \quad \text{and} \quad B^H = (1 - \theta) \cdot B. \tag{8}$$

We take the "foreign share" θ as exogenous in this simple model, but there is a growing literature on the determinants of public debt holdings.[13] Broadly speaking, there are two opposing forces at work. On the one hand, risk diversification pushes agents away from holding too many domestic government bonds. On the other, there are forces that push in the opposite direction, such as favored treatment of domestic agents in case of default, financial repression, macroprudential regulation,

[12]This is without loss of generality in our setting. Even if the government could raise taxes at $t = 0$, it would not do so because the crowding-out effects of taxation are greater than those of debt.

[13]Broner et al. (2014), for instance, highlight the role of discrimination to account for the reduction in the foreign share of public debt holdings during the recent European crisis. Reinhart and Sbrancia (2015) document the use of financial repression to deal with public debt in the post-war period. See Dell'Ariccia et al. (2018) for a general discussion on the drivers of domestic debt holdings.

asymmetric information, costs of buying foreign assets, and capital controls.[14] In any case, we are not concerned with the source of foreign share here, but rather on its effect on the size of the fiscal multiplier.

3.3 Equilibrium and the fiscal multiplier

Under these assumptions, it is straightforward to show that the representative agent solves

$$\max_{K} F(K) - K + E_0 + Y_1^G - T_1 \tag{10}$$

$$\text{s.t.} \quad K \leq \frac{E_0}{1-\lambda} - B^H,$$

taking Y_1^G, T_1, and B^H as given. The first term in the constraint is the maximum amount of resources that the agent can invest in capital and government bonds. It equals the endowment times a financial multiplier, which is increasing in the pledgeability of investments λ.[15] If the constraint is not binding, private investment is such that the return to capital is equal to the international interest rate. Thus,

$$K = \min\left\{\frac{E_0}{1-\lambda} - B^H, K^*\right\} \tag{11}$$

where $F'(K^*) \equiv 1$.

Total output at $t = 1$ is therefore

$$Y = Y^P + Y^G = F\left(\min\left\{\frac{E_0}{1-\lambda} - (1-\theta)\cdot B, K^*\right\}\right) + \gamma \cdot B. \tag{12}$$

To calculate the fiscal multiplier we take the derivative of output Y with respect to either govern-

[14] As an example, consider the effect of financial repression on debt sustainability. We can do so through a simple extension of our model in which the government is benevolent and can choose to default on its debt in period 1. Suppose, moreover, that there are no costs to defaulting on foreigners but each unit that is defaulted on a domestic agent generates a cost of κ. In this case, assuming that default is non-discriminatory, the government repays its debt if and only if

$$\kappa \cdot (1-\theta) \cdot B \geq \theta \cdot B \Leftrightarrow \theta \leq \frac{1}{1+\kappa}. \tag{9}$$

This condition is very intuitive: the larger the cost of defaulting on domestic agents, the lower the amount of debt that they must hold to make repayment credible.

Of course, the representative agent does not internalize the effects of its debt holdings on enforcement, and will not willingly hold public debt if she is constrained. In this case, we can interpret $1-\theta$ as a "financial repression" threshold, which determines the minimum amount of domestic public debt that the representative agent is forced to hold. See Chari et al. (2020) for a related model.

[15] This expression is particularly simple because we assume that capital and government bonds are equally pledgeable. Our results are robust as long as neither capital nor government bonds are fully pledgeable.

ment spending G or the deficit B.[16] Assuming that the credit constraint is binding, i.e., $K < K^*$, the multiplier equals

$$M \equiv \frac{dY}{dG} = \frac{dY}{dB} = \gamma - (1-\theta) \cdot F'(K). \tag{13}$$

When the credit constraint is binding the multiplier has two terms. The first term, which is positive, is the direct effect of an increase in public spending on public output. The second term, which is negative, is the financial crowding-out effect. As long as $\theta < 1$, part of the increase in public debt is absorbed by the private sector, which crowds out private investment. This effect is decreasing in the foreign share θ and is the crucial element of our story. To sum up, a higher foreign share θ is associated with a higher fiscal multiplier. This is what we want to test in the empirical section.

3.4 Foreign demand for public debt: A discussion

Before turning to the empirical analysis, there is one question we need to address: what is the empirical counterpart to the foreign share θ? In the model, θ is equal to both the average foreign share, B_t^F/B_t, and the marginal foreign share, dB_t^F/dB_t. In practice, this need not be the case. If they are different, it should be the marginal share that determines the size of the fiscal multiplier.[17] That is, we would like to compare fiscal expansions that cause a large increase in foreign holdings of public debt (i.e., high dB_t^F/dB_t) to those that do not (i.e., low dB_t^F/dB_t).

In practice, however, we cannot directly observe the marginal foreign share. One possibility would be to estimate it based on the correlation between changes in foreign holdings of public debt and changes in total debt over a window of time following fiscal shocks. But in this case it would be hard to establish causality, because observed changes in foreign holdings are likely endogenous to ex-post economic conditions. For example, consider a fiscal expansion that leads to higher economic growth for reasons unrelated to the foreign share in public debt holdings. If this higher growth then results in an increase in foreign purchases of public debt, we would be classifying the event as having a high marginal foreign share. But it would be the expansionary effect of the fiscal shock that causes the high foreign share, and not the other way around.[18] In other words, a positive correlation between effectiveness of expansions and ex-post foreign share can be due to

[16] The two multipliers are the same in this model because of the assumption that there is no taxation at $t = 0$. Our results always hold for dY/dB. They also hold for dY/dG as long as $dT/dG < 1$, i.e., as long as increases in G lead to increases in B.

[17] For example, even if $B_t^F = 0$ so that the average foreign share equals zero, a fiscal expansion will have no crowding-out effects if $dB_t^F/dB_t = 1$.

[18] This concern is especially relevant given the positive correlation between economic conditions and foreign holdings of domestic assets in the data. For evidence of this correlation, see Broner et al. (2013) and, for the case of public debt in the context of the recent European crisis, Broner et al. (2014).

reverse causality. Thus, we need an ex-ante measure of foreign share that is determined prior to the realization of the fiscal shock.

As it turns out, the ex-ante average foreign share B^F_{t-1}/B_{t-1} is both directly observable and a very good proxy for the marginal foreign share. To see this, we run the following regression,

$$\Delta B^F_t = \beta_1 + \beta_2 \cdot \Delta B_t + \beta_3 \cdot X_{t-1} + \beta_4 \cdot X_{t-1} \cdot \Delta B_t + \upsilon_t,$$

where $X_{t-1} = B^F_{t-1}/B_{t-1}$ denotes the average foreign share, $\Delta B^F_t = B^F_t - B^F_{t-1}$, and $\Delta B_t = B_t - B_{t-1}$. The regression results are in Table 1, both for the US and for the cross-section of OECD economies we analyze in Section 6. The table shows that the estimated coefficient on the interaction $X_{t-1} \cdot \Delta B_t$ is statistically significant and close to one. This means that the ex-ante average foreign share is indeed a good proxy for the marginal foreign share. Given this result, from now on whenever we speak of the foreign share we will refer to the ex-ante average foreign share, understanding that it is a proxy for the (unobserved) marginal foreign share.[19]

Table 1: **Predictive ability of average foreign share**

	United States	International Panel
	Δ Foreign holdings	Δ Foreign holdings
Δ Total debt	-0.013	0.134***
	(0.038)	(0.059)
Foreign share	-0.000	-0.631***
	(0.000)	(0.135)
Δ Total debt $\cdot$ Foreign share	0.921***	0.767***
	(0.111)	(0.125)
Time trend	Yes	No
Year dummies	No	Yes
Country fixed effects	No	Yes
Observations	253	421

Notes: Foreign holdings and total debt are measured as a percentage of GDP. Foreign share is our measure of foreign holdings of public debt as a percentage of total public debt. Standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

[19] Our result that the average foreign share is a good predictor of the marginal share is consistent with the results on average and marginal international portfolios in Kraay and Ventura (2000).

4 Empirical Methodology

We now address the main objective of our paper and analyze how the distribution of public debt holdings affects the size of fiscal multipliers. Our empirical methodology follows the approach introduced by Ramey and Zubairy (2018a), which conceptually consists of two steps. First, we use both fiscal shocks described above to instrument cumulative shocks to the fiscal variable of interest. Second, we estimate the effects of these instrumented fiscal shocks on cumulative output. The use of cumulative shocks and output allows for a direct interpretation of the IV effects as fiscal multipliers. In both steps we use local projections (Jordà 2005).

We begin by estimating a baseline specification to obtain unconditional multipliers. We then incorporate our measures of foreign share to estimate conditional multipliers.

4.1 Baseline specification

We use the defense news shocks and government spending to instrument for the cumulative sum of real government spending between $t+1$ and $t+h$, where h is the horizon of the multiplier:

$$\sum_{j=1}^{h} g_{t+j} = \alpha_h + \beta_h^N \cdot \epsilon_t^N + \beta_h^V \cdot g_t + \phi_h \cdot Z_{t-1} + \upsilon_{t,h}, \tag{14}$$

where ϵ_t^N is the narrative fiscal shock, g_t is government spending in period t and Z_{t-1} is a vector of controls that includes lags of GDP, of government spending, and of the narrative fiscal shocks. All variables are scaled by potential GDP, computed as HP-filtered real GDP.[20]

It is important at this point to clarify one simple aspect of Equation (14). We have said before that we use both, the narrative and the Blanchard-Perotti shocks to instrument cumulative government spending, yet it would seem that only the narrative shock shows up in Equation (14). The reason is that, just as in Ramey and Zubairy (2018a), we capture the Blanchard-Perotti fiscal shock by including current government spending as a regressor while controlling for lagged GDP and government spending (both of which are included in Z_{t-1}).[21]

From Equation (14), we obtain an instrumented measure of the cumulative sum of government

[20]We set the λ-parameter in the HP filter to 25600. This leads to a similar series for potential GDP as the 6th degree polynomial method employed by Ramey and Zubairy (2018a). Our results are unaffected by the choice of method used to estimate potential output.

[21]According to Ramey and Zubairy (2018a), this is equivalent to regressing directly on the shocks obtained from the VAR system with the same lagged variables and adjusting standard errors for generated regressors.

spending,

$$G_{t,h} \equiv \alpha_h + \beta_h^N \cdot \epsilon_t^N + \beta_h^V \cdot g_t + \phi_h \cdot Z_{t-1}.$$

Finally, we regress the cumulative sum of real output between $t+1$ and $t+h$ on $G_{t,h}$:

$$\sum_{j=1}^{h} y_{t+j} = \alpha_h^Y + \beta_h^Y \cdot G_{t,h} + \phi_h^Y \cdot Z_{t-1} + \upsilon_{t,h}^Y, \tag{15}$$

where the multiplier at horizon h is given by

$$m_h \equiv \beta_h^Y, \tag{16}$$

namely, m_h measures the derivative of the cumulative change in output during the h periods following a fiscal shock, with respect to the same-period cumulative change in government spending. In other words, the cumulative multiplier at horizon h is defined as the integral of the output response over h periods divided by the integral of government spending over the same h periods following the initial shock.[22]

Before concluding, we address one final methodological question: why follow Ramey and Zubairy (2018a) and use both, the narrative and the Blanchard-Perotti fiscal shocks to instrument public spending? As we show in the online appendix, our main results remain valid if we use only the Blanchard-Perotti shocks as instruments, but this is not true of the narrative shock on its own. In fact, even the baseline fiscal multiplier in Equation (16) is not statistically significant when government spending is identified using only the narrative shock. This is recognized by Ramey and Zubairy (2018a), who nonetheless argue that the narrative shock adds valuable information, especially at longer horizons. In particular, they show that the narrative shock is a weak instrument at short horizons but gains relevance at long horizons, whereas the opposite is true of the Blanchard-Perotti shock. In line with our strategy of minimizing methodological deviations from the existing literature, we use both fiscal shocks throughout the paper.

4.2 Foreign share of public debt

To assess how public debt holdings affect the size of fiscal multipliers, we add the interaction between the instrumented fiscal shock and the foreign share to the baseline regression. The foreign

[22]See also Mountford and Uhlig (2009), Uhlig (2010), and Fisher and Peters (2010).

share X_{t-1} is defined as

$$X_{t-1} = \frac{B^F_{t-1}}{B_{t-1}},$$

where B_{t-1} is the total stock of public debt and B^F_{t-1} is public debt held by foreigners.

Formally, the first-stage regressions are now

$$\sum_{j=1}^{h} g_{t+j} = \alpha_h + \beta_h^N \cdot \epsilon_t^N + \beta_h^{NX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^V \cdot g_t + \beta_h^{VX} \cdot g_t \cdot X_{t-1} + \\ \beta_h^X \cdot X_{t-1} + \phi_h \cdot Z_{t-1} + \phi_h^X \cdot Z_{t-1} \cdot X_{t-1} + \upsilon_{t,h}, \tag{17}$$

$$\sum_{j=1}^{h} g_{t+j} \cdot X_{t-1} = \alpha_h^I + \beta_h^{IN} \cdot \epsilon_t^N + \beta_h^{INX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^{IV} \cdot g_t + \beta_h^{IVX} \cdot g_t \cdot X_{t-1} + \\ \beta_h^{IX} \cdot X_{t-1} + \phi_h^I \cdot Z_{t-1} + \phi_h^{IX} \cdot Z_{t-1} \cdot X_{t-1} + \upsilon_{t,h}^I, \tag{18}$$

since we need to estimate separately how the fiscal shocks and their interaction with foreign share affect the cumulative sum of government spending and its interaction with foreign share.[23] The instrumented variables are now

$$G_{t,h} \equiv \alpha_h + \beta_h^N \cdot \epsilon_t^N + \beta_h^{NX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^V \cdot g_t + \beta_h^{VX} \cdot g_t \cdot X_{t-1} + \\ \beta_h^X \cdot X_{t-1} + \phi_h \cdot Z_{t-1} + \phi_h^X \cdot Z_{t-1} \cdot X_{t-1},$$

$$GX_{t,h} \equiv \alpha_h^I + \beta_h^{IN} \cdot \epsilon_t^N + \beta_h^{INX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^{IV} \cdot g_t + \beta_h^{IVX} \cdot g_t \cdot X_{t-1} + \\ \beta_h^{IX} \cdot X_{t-1} + \phi_h^I \cdot Z_{t-1} + \phi_h^{IX} \cdot Z_{t-1} \cdot X_{t-1}.$$

Finally, we regress the cumulative sum of real output between $t+1$ and $t+h$ on $G_{t,h}$ and $GX_{t,h}$:

$$\sum_{j=1}^{h} y_{t+j} = \alpha_h^Y + \beta_h^{YG} \cdot G_{t,h} + \beta_h^{YGX} \cdot GX_{t,h} + \beta_h^{YX} \cdot X_{t-1} + \\ \phi_h^Y \cdot Z_{t-1} + \phi_h^{YX} \cdot Z_{t-1} \cdot X_{t-1} + \upsilon_{t,h}^Y, \tag{19}$$

[23]Differently from Ramey and Zubairy (2018a), we use a continuous variable to separate amongst states.

where the multiplier at horizon h is now a function of foreign share and is given by

$$m_h(X_{t-1}) \equiv \beta_h^{YG} + \beta_h^{YGX} \cdot X_{t-1}. \tag{20}$$

5 Multipliers and the foreign share of US public debt

In this section, we run the regressions in Equations (15) and (19) and report the results. We first show that our baseline regressions replicate the results obtained in the literature. We then show how the size of fiscal multipliers depends on the foreign share. We have devoted a significant effort to evaluate the validity of our instruments. Throughout this section, however, we report only the second-stage results, i.e., the estimates of the multiplier. We present all first-stage results, which relate to the effect of fiscal shocks on actual spending, in Appendix B. There we also provide details of the instrument-relevancy tests we conducted.

5.1 Baseline specification

Table 2 and Figure 3 respectively show the regression results and the cumulative multipliers that emerge from our baseline regression.[24] Table 2 reports the coefficients β_h^Y for $h \leq 8$ quarters, i.e., up to a two-year horizon, whereas Figure 3 plots the cumulative multipliers for $h \leq 16$ quarters, i.e., up to a four-year horizon. In all figures, we also plot the 90-percent confidence bands.

The estimated multiplier is 0.9 for the first quarter and declines to 0.4 after two years. It is statistically significant at the 1% level for the first four quarters. These results are in line with the existing literature. Applying the same methodology to a longer time sample, Ramey and Zubairy (2018a) also report a cumulative multiplier of 0.4 for a two-year horizon.

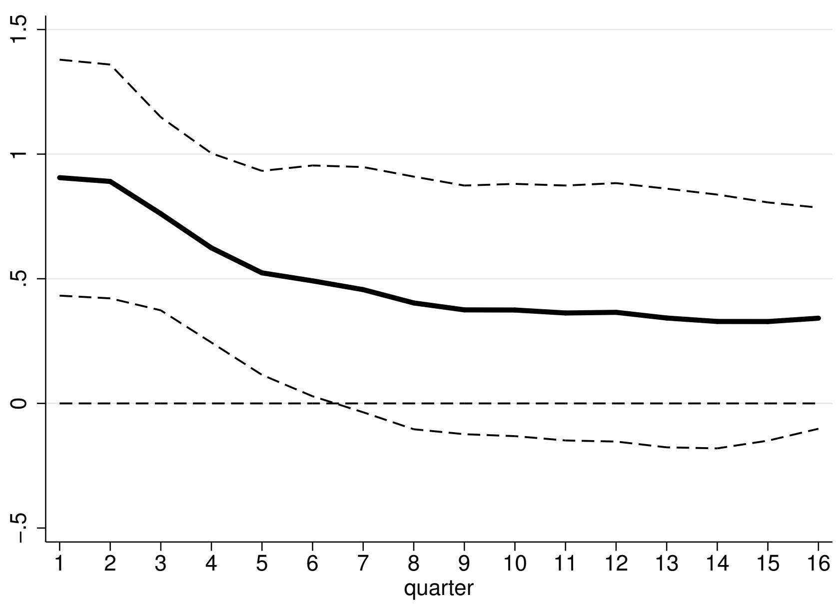
[24]Due to the inherent serial correlation in the local projections approach, we use Newey-West standard errors throughout.

Table 2: **Baseline model: U.S. output multiplier**

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock_t	0.91***	0.89***	0.76***	0.62***
	(0.29)	(0.29)	(0.24)	(0.23)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock_t	0.52**	0.49*	0.46	0.40
	(0.25)	(0.28)	(0.30)	(0.31)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Figure 3: **Baseline model: U.S. output multiplier**



Notes: Cumulative GDP multiplier from a government expenditure shock equal to 1% of GDP. The (dashed lines) confidence bands represent significance at the 10% level.

5.2 Foreign share of public debt

We now turn to our main results on the role of the foreign share, which are obtained by running the regression in Equation (19). Table 3 reports the estimated coefficients β_h^{YG} and β_h^{YGX} for $h \leq 8$ quarters. The main result is that the interaction coefficient β_h^{YGX} is statistically significant at the 1% level for $h \leq 5$ quarters and at the 10% level for $h \leq 8$ quarters.

Table 3: **Foreign share: U.S. output multiplier**

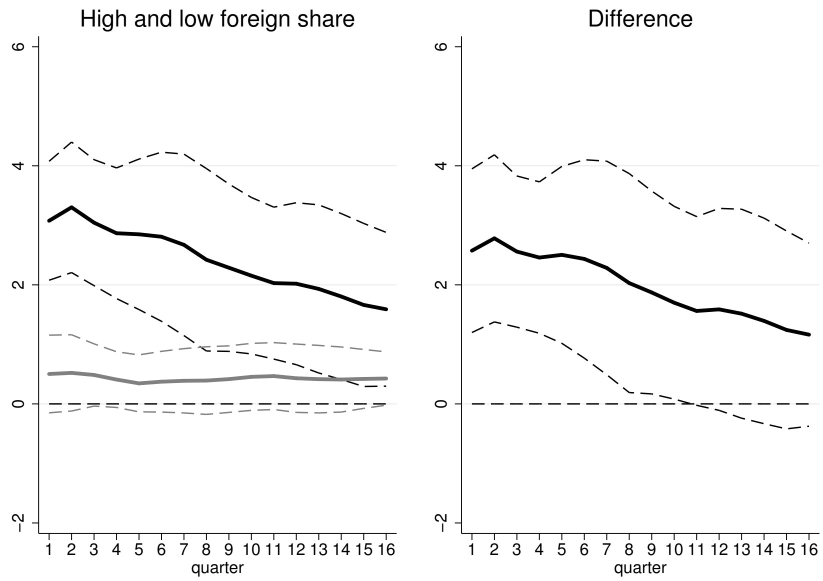
	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	0.34	0.35	0.33	0.26
	(0.44)	(0.43)	(0.35)	(0.31)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	5.80***	6.26***	5.76***	5.54***
	(1.88)	(1.92)	(1.74)	(1.74)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	0.19	0.22	0.25	0.27
	(0.33)	(0.35)	(0.37)	(0.39)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	5.64***	5.48**	5.14**	4.57*
	(2.03)	(2.28)	(2.46)	(2.52)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 4 illustrates the corresponding cumulative multipliers $m_h(X_{t-1})$ for $h \leq 16$ quarters. The first panel plots the cumulative multipliers for both a low foreign share, which corresponds to the 10th percentile of foreign holdings in the sample ($X_{t-1} = 3\%$), and a high foreign share, which corresponds to the 90th percentile of foreign holdings in the sample ($X_{t-1} = 47\%$ of debt held by foreigners). While the cumulative multipliers for a low foreign share are statistically indistinguishable from zero at all horizons, multipliers when the foreign share is high are statistically different from zero at all horizons. The second panel plots the difference between the cumulative multipliers for high and low foreign share. The panel illustrates the results of Table 3 and shows that the regime-dependent multipliers are statistically different from each other.

From an economic standpoint, the effect of the foreign share on the size of the fiscal multiplier

Figure 4: **Foreign share: U.S. output multiplier**



Notes: Cumulative GDP multipliers from a government expenditure shock equal to 1% of GDP with low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

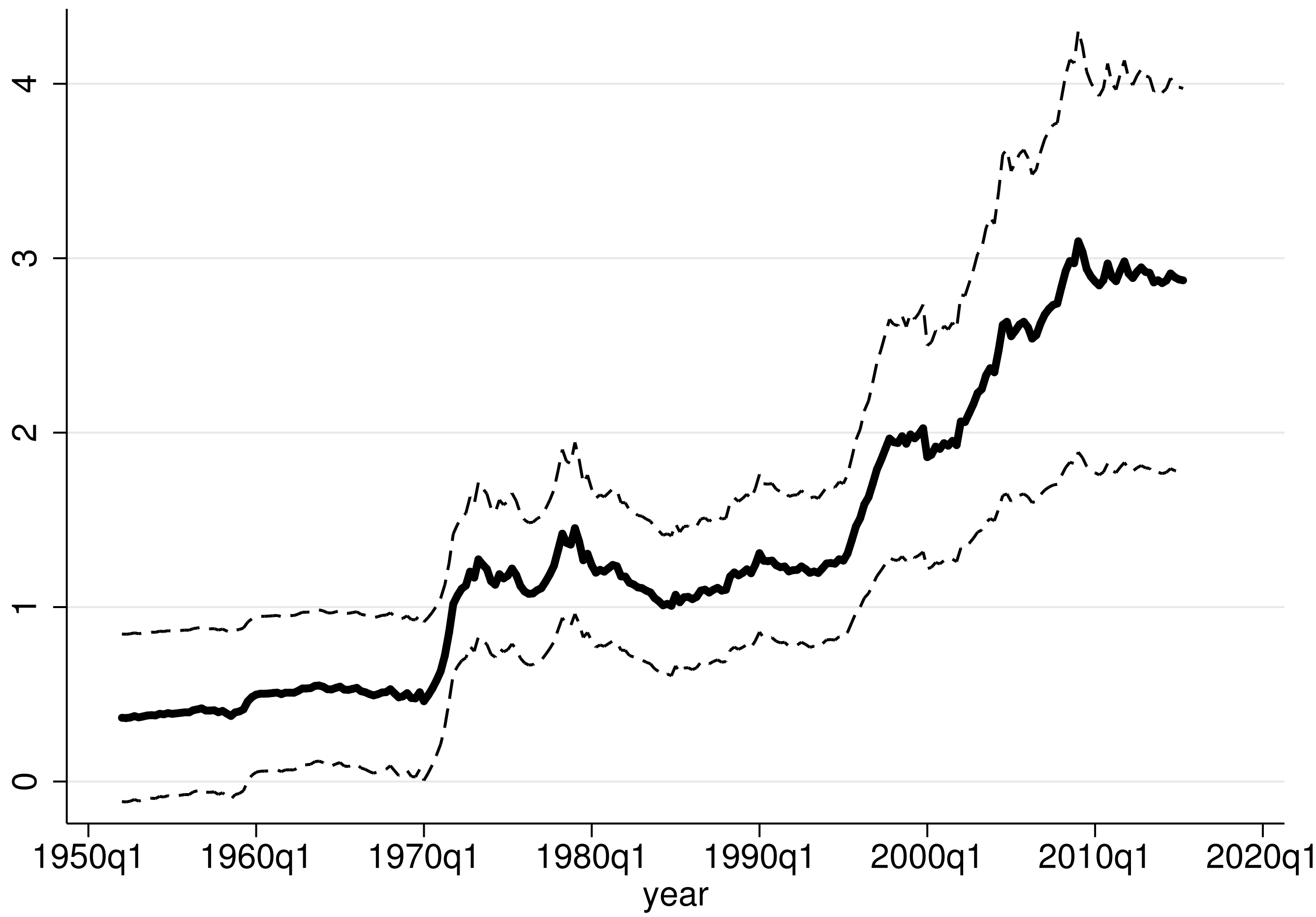
is large. For a low foreign share, the point estimate of the multipliers fall relative to those in our baseline regression. We can say confidently that they are smaller than one but not whether they are positive. For a high foreign share, instead, the point estimate of the multipliers rise relative to those in our baseline regression. Although the standard errors also increase we can say confidently that the multipliers are greater than one for $h \leq 7$ quarters. Coupled with the growth of the foreign share throughout the sample, our estimates imply a significant increase in the fiscal multiplier over time. Figure 5 illustrates this by plotting the implied multiplier over the sample period.

To make sure that our results are not driven by the recent global financial crisis or by the zero lower bound (ZLB) constraint, we repeat our exercise using data only up to the second quarter of 2007 and the third quarter of 2008, respectively.[25,26] Panels (a) and (b) in Figure 6, which replicate Figure 4 for these subsamples, show that our results remain largely unaffected. We present the estimated results in Appendix C.

[25]The binding ZLB has been associated with higher fiscal multipliers (e.g. Mayimoto et al. 2018). In our sample, the ZLB was binding between the fourth quarters of 2008 and 2015.

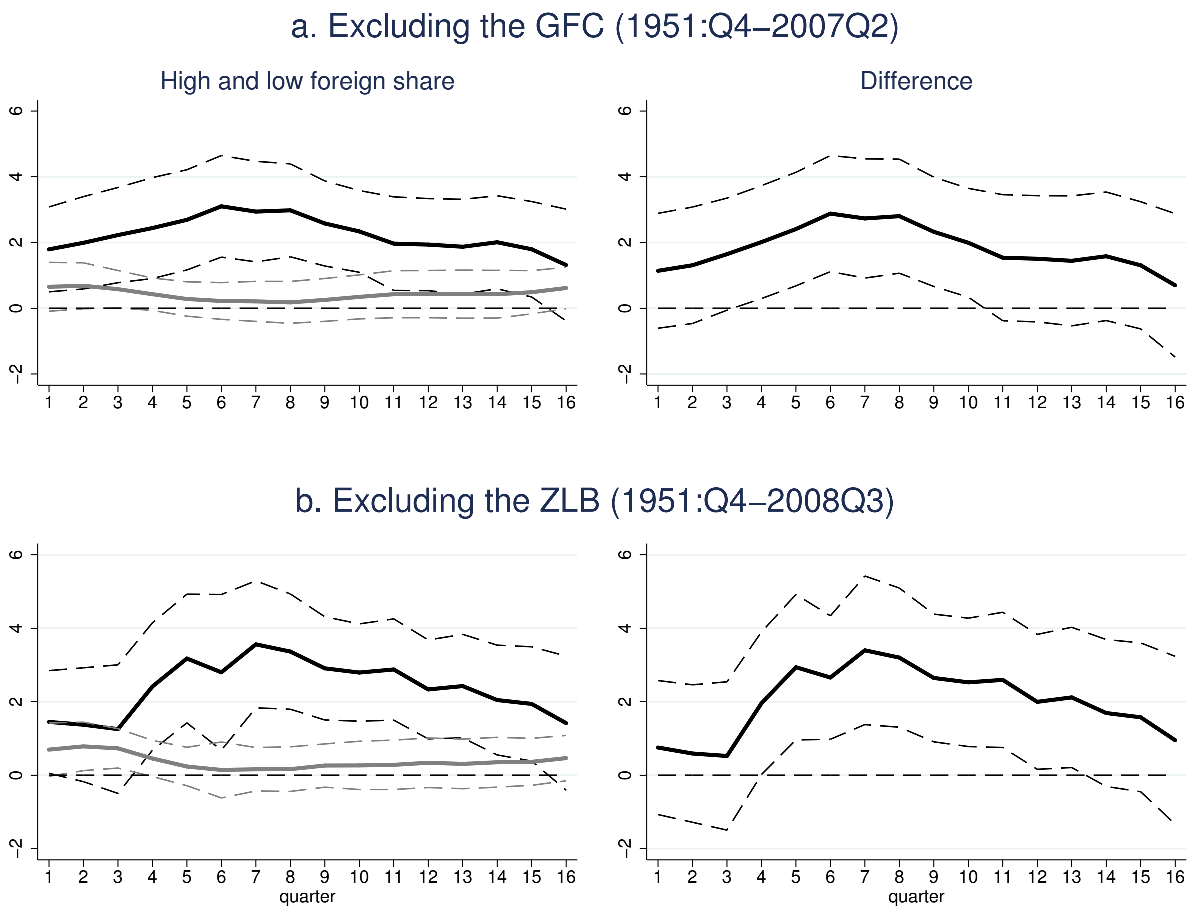
[26]Ramey and Zubairy (2018a) emphasise the need for sufficiently long samples to generate informative estimates of state-dependent multipliers. To ensure our subsample is useful, we conducted the same instrument relevancy tests as for the full sample (see Appendix B). Our pre-crisis subsample passes these tests and is therefore suitable for use.

Figure 5: **Effect on U.S. output of a government expenditure shock after 4 quarters**



Notes: Foreign share-dependent cumulative multiplier after four periods from a government expenditure shock equal to 1% of GDP. The (dashed lines) confidence bands represent significance at the 10% level.

Figure 6: **Foreign share: pre-crisis U.S. output multiplier**

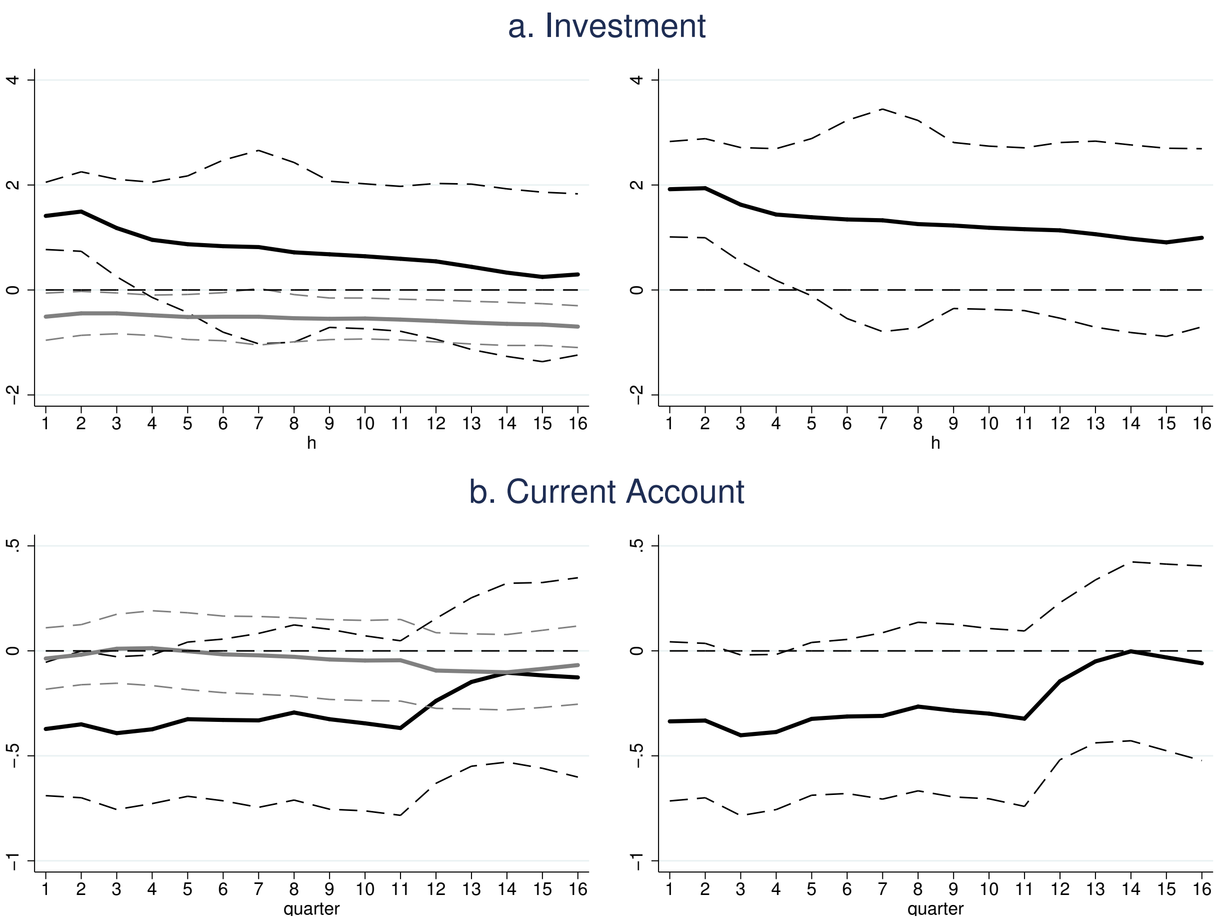


Notes: Pre-crisis period defined as up to and including the second quarter of 2007 (panel a) or up to and including the third quarter of 2008 (panel b). Cumulative multipliers from a government expenditure shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

5.3 Investment and the current account

Our findings show that the foreign share of public debt holdings has a large effect on the size of the fiscal multiplier. But why is this the case? In the simple model of Section 3, the underlying narrative was that fiscal expansions lead to larger capital inflows and higher investment when the foreign share is high. To provide further evidence, we analyze next how investment and the current account react to fiscal shocks. In particular, we run the regression in Equation (19) using investment and the current account as dependent variables. The resulting cumulative multipliers are respectively depicted in panels (a) and (b) of Figure 7, which plot these multipliers under a low and a high foreign share, as well as the difference between the two. We present the estimated results in Appendix C.

Figure 7: **Foreign share: U.S. multipliers**



Notes: Cumulative investment (panel a) and current account (panel b) multipliers from a government expenditure shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

Panel (a) in Figure 7 shows that the cumulative multiplier of investment is greater when the foreign share is high. On impact, this multiplier is approximately 1.8 for a high foreign share, but it is -0.4 for a low foreign share. The difference between both is statistically significant for $h \leq 4$ quarters. Panel (b) shows that the cumulative multiplier of the current account is more negative when the foreign share is high. Specifically, the figure shows that this multiplier is indistinguishable from zero when the foreign share is low, but it is significantly negative when the foreign share is high.

These findings are consistent with the narrative laid out in the model of Section 3. Namely, when foreigners are willing to purchase domestic government debt, fiscal expansions are financed by capital inflows and they do not crowd out domestic investment.

5.4 Is it really the foreign share of public debt?

So far we have only considered the foreign share as a possible determinant of the size of the fiscal multiplier. As Figure 1 shows, the foreign share in the US has increased throughout the sample period. But there are other economic variables, such as trade openness, that are believed to influence the fiscal multiplier and that have also increased during this period. How can we know whether it is the foreign share or these other correlated variables that drive our results?

We address this question in two ways. The first is by analyzing the role of the foreign share in a large sample of advanced economies, where there is significant heterogeneity in the evolution of the foreign share: we do so in the next section. The second is by performing a sequence of "horse races" for the US, between the foreign share and alternative variables. Specifically, we amend Equations (17) and (18) to include a competing explanatory variable, denoted by R_{t-1}, so that they are now replaced by:

$$\begin{aligned}\sum_{j=1}^{h} g_{t+j} = \alpha_h + \beta_h^N \cdot \epsilon_t^N + \beta_h^{NX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^V \cdot g_t + \beta_h^{VX} \cdot g_t \cdot X_{t-1} + \\ + \beta_h^{NR} \cdot \epsilon_t^N \cdot R_{t-1} + \beta_h^{VR} \cdot g_t \cdot R_{t-1} + \beta_h^X \cdot X_{t-1} + \beta_h^R \cdot R_{t-1} + \\ + \phi_h \cdot Z_{t-1} + \phi_h^X \cdot Z_{t-1} \cdot X_{t-1} + \phi_h^R \cdot Z_{t-1} \cdot R_{t-1} + \upsilon_{t,h},\end{aligned} \tag{21}$$

$$\begin{aligned}\sum_{j=1}^{h} g_{t+j} \cdot X_{t-1} = \alpha_h^I + \beta_h^{IN} \cdot \epsilon_t^N + \beta_h^{INX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^{IV} \cdot g_t + \beta_h^{IVX} \cdot g_t \cdot X_{t-1} + \\ + \beta_h^{INR} \cdot \epsilon_t^N \cdot R_{t-1} + \beta_h^{IVR} \cdot g_t \cdot R_{t-1} + \beta_h^{IX} \cdot X_{t-1} + \beta_h^{IR} \cdot R_{t-1} + \\ + \phi_h^I \cdot Z_{t-1} + \phi_h^{IX} \cdot Z_{t-1} \cdot X_{t-1} + \phi_h^{IR} \cdot Z_{t-1} \cdot R_{t-1} + \upsilon_{t,h}^I,\end{aligned} \tag{22}$$

and

$$\sum_{j=1}^{h} g_{t+j} \cdot R_{t-1} = \alpha_h^{I'} + \beta_h^{I'N} \cdot \epsilon_t^N + \beta_h^{I'NX} \cdot \epsilon_t^N \cdot X_{t-1} + \beta_h^{I'V} \cdot g_t + \beta_h^{I'VX} \cdot g_t \cdot X_{t-1} + \tag{23}$$

$$+ \beta_h^{I'NR} \cdot \epsilon_t^N \cdot R_{t-1} + \beta_h^{I'VR} \cdot g_t \cdot R_{t-1} + \beta_h^{I'X} \cdot X_{t-1} + \beta_h^{I'R} \cdot R_{t-1} +$$

$$+ \phi_h^{I'G} \cdot Z_{t-1} + \phi_h^{I'GX} \cdot Z_{t-1} \cdot X_{t-1} + \phi_h^{I'R} \cdot Z_{t-1} \cdot R_{t-1} + \upsilon_{t,h}^{I'}.$$

Equation (19), in turn, now becomes

$$\sum_{j=1}^{h} y_{t+j} = \alpha_h^{Y} + \beta_h^{YG} \cdot G_{t,h} + \beta_h^{YGX} \cdot GX_{t,h} + \beta_h^{YGR} \cdot GR_{t,h} + \beta_h^{YX} \cdot X_{t-1} + \beta_h^{YR} \cdot R_{t-1} + \tag{24}$$

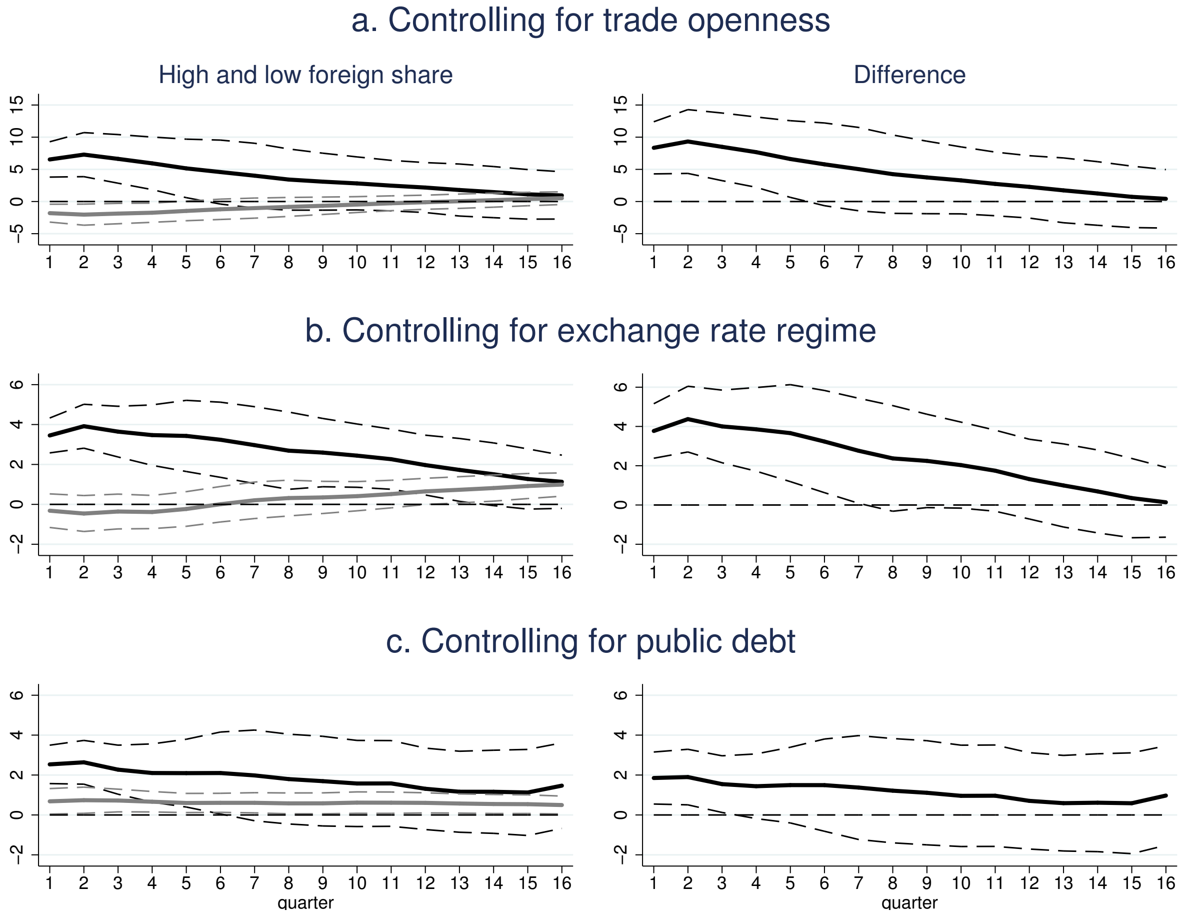
$$+ \phi_h^{Y} \cdot Z_{t-1} + \phi_h^{YX} \cdot Z_{t-1} \cdot X_{t-1} + \phi_h^{YR} \cdot Z_{t-1} \cdot R_{t-1} + \upsilon_{t,h}^{Y}.$$

We consider several such races. The first competing variable is trade openness, which has also increased over time and has been found to significantly influence the fiscal multiplier (e.g. Ilzetzki et al. 2013). Note that the consensus in the literature is that trade openness is associated with a lower fiscal multiplier so that, if anything, including it should strengthen our results. Panel (a) of Figure 8 shows that the inclusion of trade openness does not alter our main findings. Namely, the cumulative fiscal multipliers appear to be closely associated with the foreign share, and the difference between the multipliers at high and low levels of foreign shares remains positive and statistically significant.

A second competing variable is the exchange rate regime, which has also been shown to influence the fiscal multiplier. Like trade openness, however, taking this variable into account should strengthen our results. Indeed, throughout the sample period the US has gravitated towards more flexible exchange rate regimes, which tend to be associated with lower fiscal multipliers (e.g. Ilzetzki et al. 2013). Nonetheless, we explicitly introduce the exchange rate regime through a race against a dummy variable that takes the value one whenever the exchange rate is fully flexible (as defined by Ilzetzki et al. 2019a).[27] As panel (b) of Figure 8 shows, our main result is robust to the inclusion of this variable.

[27] Corsetti et al. (2012) employ a similar approach.

Figure 8: **Foreign share and alternative explanations: U.S. output multiplier**

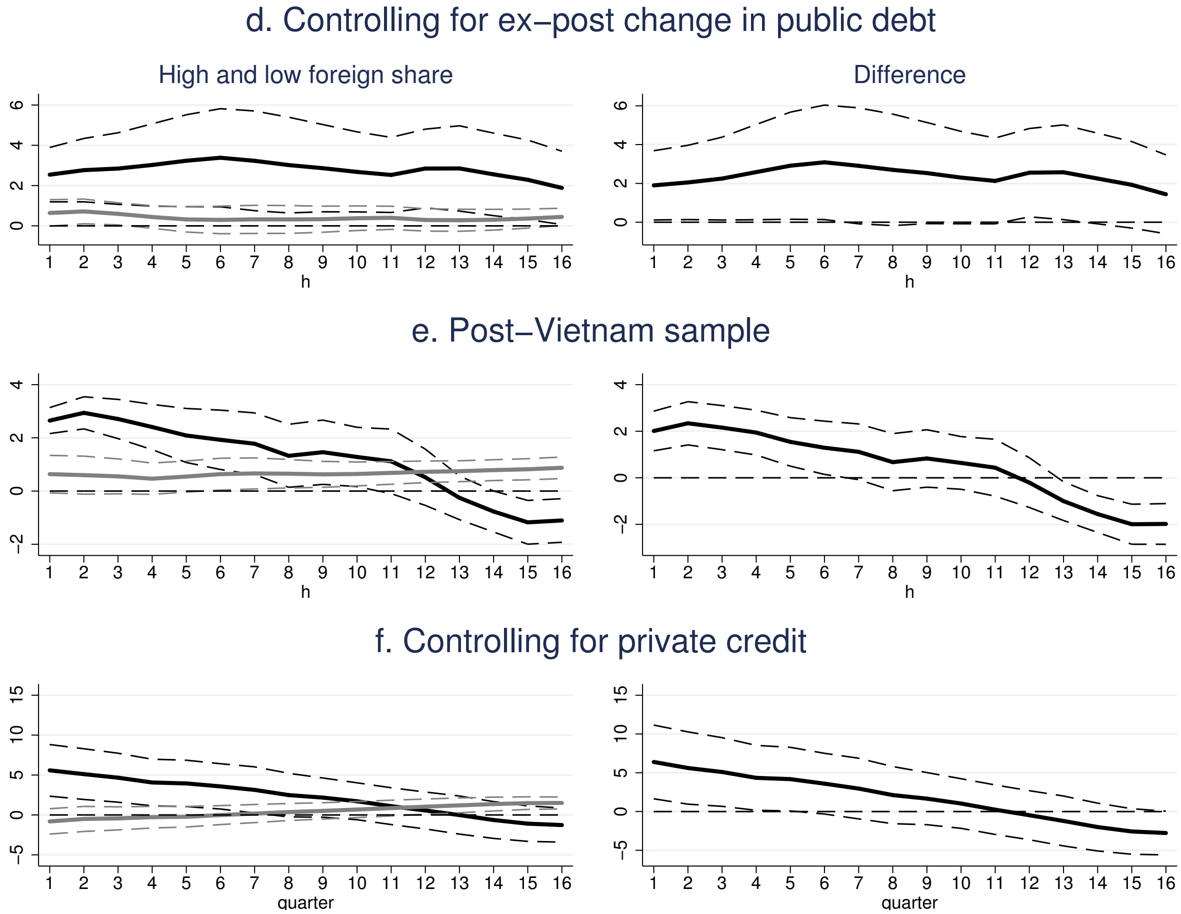


Notes: Cumulative GDP multipliers from a government expenditure shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share when trade openness (panel a), the exchange rate regime (panel b) or public debt (panel c) are included as alternative explanations, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

A third competing variable is government debt, which is also believed to affect the fiscal multiplier (e.g. Ilzetzki et al. 2013). Introducing it as a competing explanatory variable, however, does not substantially affect our main results (panel (c) of Figure 8). There is an additional concern related to debt, however, in that in the early part of the sample fiscal expansions might have been financed largely by raising taxes and not by issuing debt. The Korean and Vietnam wars, for instance, dominate the early part of the sample and were financed with higher taxes. To address this concern, we first run a race against the *ex-post* changes in public debt to capture the financing of fiscal shocks.[28] As panel (d) of Figure 8 shows, our main results remain significant. However,

[28] In particular, for a fiscal shock in period t, we consider the change in public debt between t and $t+4$, normalized by initial GDP.

Figure 8: **Foreign share and alternative explanations: U.S. output multiplier, continued**



Notes: Cumulative GDP multipliers from a government expenditure shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share when the ex-post (one-year ahead) change in public debt (panel a), a post-Vietnam War sample (panel b) or private credit (panel c) are included as alternative explanations, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

as we have already argued, such ex post variables are endogenous. Thus, we also run our baseline regression for the post-1973 subsample, which excludes the Korean and Vietnam wars. Panel (e) of Figure 8 shows that our results are strongly significant in this subsample.

Another competing variable is private debt, which has increased throughout the sample and appears to be associated with larger fiscal multipliers (e.g. Bernardini and Peersman 2018). To account for this, we run a race against domestic nonfinancial private debt to GDP. As panel (f) of Figure 8 shows, doing so does not affect our results.

Finally, there are two additional variables that seem relevant but have received less attention in the literature. The first is financial openness, which has also increased in the US throughout the sample period. Financial openness should be relevant for crowding-out because it could enable domestic residents to finance their purchases of public debt by borrowing abroad. In this case, the crowding-out effect could be weak even if the foreign share is low. The second variable is government solvency or credibility, which might affect both the foreign share (as in Corsetti et al. 2013) and the effectiveness of fiscal expansions.

These two hypotheses are hard to test for the case of the US. The most common measure of financial openness, the ratio of foreign assets and liabilities to GDP, only goes back to the 70s. As for government credibility, there are no real periods of fiscal stress in our US sample. Thus, we postpone the discussion of both hypotheses to the next section, where we analyze the evolution of the fiscal multiplier for a panel of advanced economies.

6 Multipliers around the World

In this section we extend the analysis to a panel of advanced economies. This allows us to assess the generality of the results reported for the US, which admittedly plays a special role in the international financial system. In addition, given the cross-country heterogeneity both in the foreign share of public debt and in other macroeconomic variables, this evidence is useful to further disentangle among potential drivers of fiscal multipliers.

We follow Guajardo et al. (2014a) and Jorda and Taylor (2016) and use the change in the cyclically-adjusted primary deficit as the fiscal variable. Like them, we also adopt the narrative approach and instrument the primary deficit with announcements of fiscal consolidations. In other respects, the empirical methodology follows Ramey and Zubairy (2018a) as in the previous sections.

We start by describing the data on the foreign share of public debt holdings and fiscal shocks. We then explain how we extend the methodology of the previous sections to a panel context. Finally, we discuss the empirical results.

6.1 Data

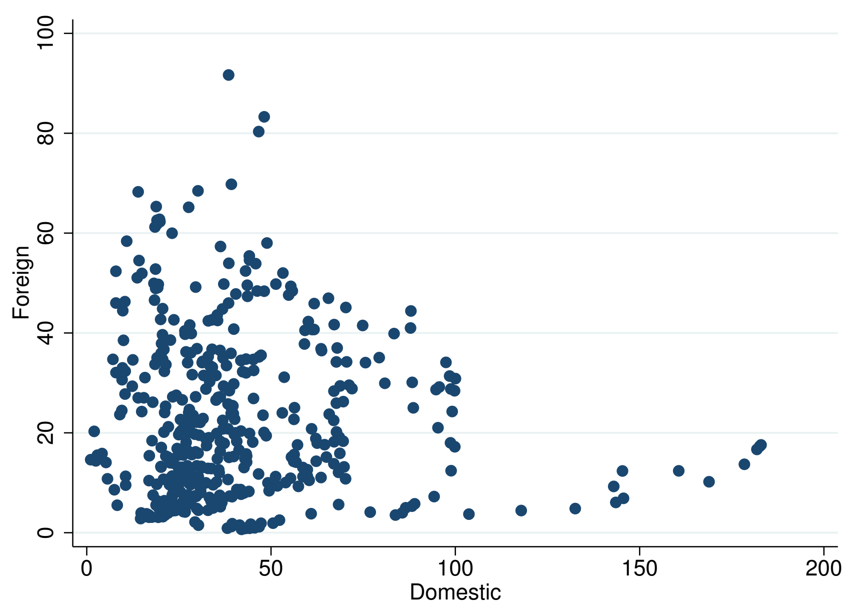
We construct a novel dataset of public debt holdings for a large set of advanced economies, which we view as an additional contribution of the paper. For shocks to fiscal balances, we use the data on fiscal consolidations by Guajardo et al. (2014b) and the extension by Katariniuk and Valles (2018b). For a detailed description of the sources used to construct the dataset, see Appendix D.

6.1.1 Foreign share of public debt

The data covers 17 countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the United Kingdom and the United States. The data is annual, with a starting year that ranges from the late 1970s to the early 1990s depending on the country. The sample ends in 2014.

Since we are interested in fiscal policy at the consolidated government level, our data is for General Government Debt. The underlying data was collected from public sources, such as the Balance of Payments (Financial Accounts, International Investment Positions) and Monetary Surveys, and provided to us directly by Central Banks, Ministries of Finance and Statistical Offices.[29] To reduce potential distortions associated with valuation effects, we measure debt at face value.[30]

Figure 9: **Foreign and domestic debt holdings for a panel of OECD economies**



Notes: Foreign and domestic holdings of public debt, as a percentage of GDP.

Figure 9 shows the raw data by plotting domestic and foreign holdings of public debt, normalized by GDP. In the figure, each observation corresponds to a given country in a given year. The figure illustrates that there is a large variation both in the levels of debt and in their allocation between domestic and foreign holders.

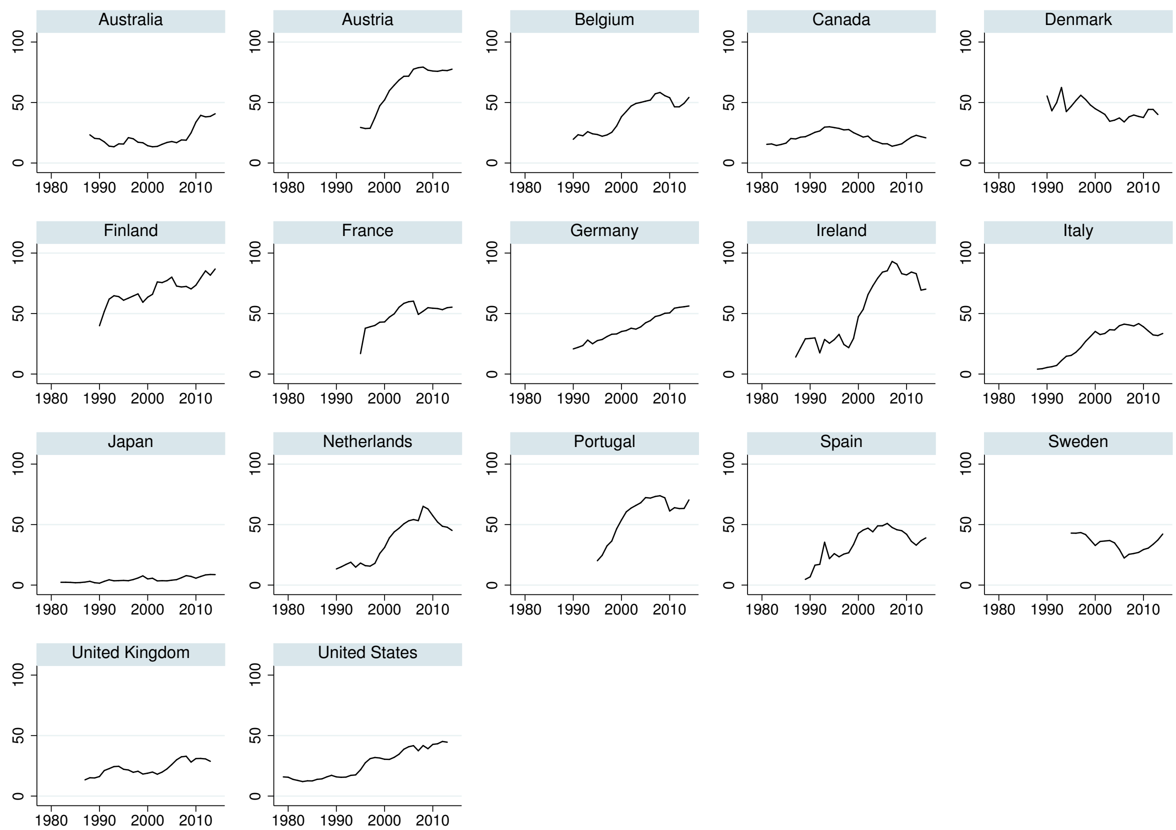
Figure 10 shows the evolution of the foreign share for all countries in the sample. The foreign

[29] Our dataset significantly expands the time coverage relative to Arslanalp and Tsuda (2012). They provide quarterly data for 24 advanced economies, but only starting in 2004.

[30] See Brutti and Saure (2015) for a discussion of potential biases due to price effects.

share has increased over time in most countries, but this increase has not been uniform over time. For example, foreign shares in the euro periphery declined after the onset of the sovereign debt crisis in 2009.[31] In addition, there is substantial heterogeneity in the level of foreign shares across countries. At one extreme, Japan has a foreign share close to 0% throughout the sample. At the other extreme, several countries in the euro area, such as Austria and Finland, have at some point reached foreign shares above 75%.

Figure 10: **Foreign share of public debt holdings over time**



Notes: Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt.

6.1.2 Fiscal shocks

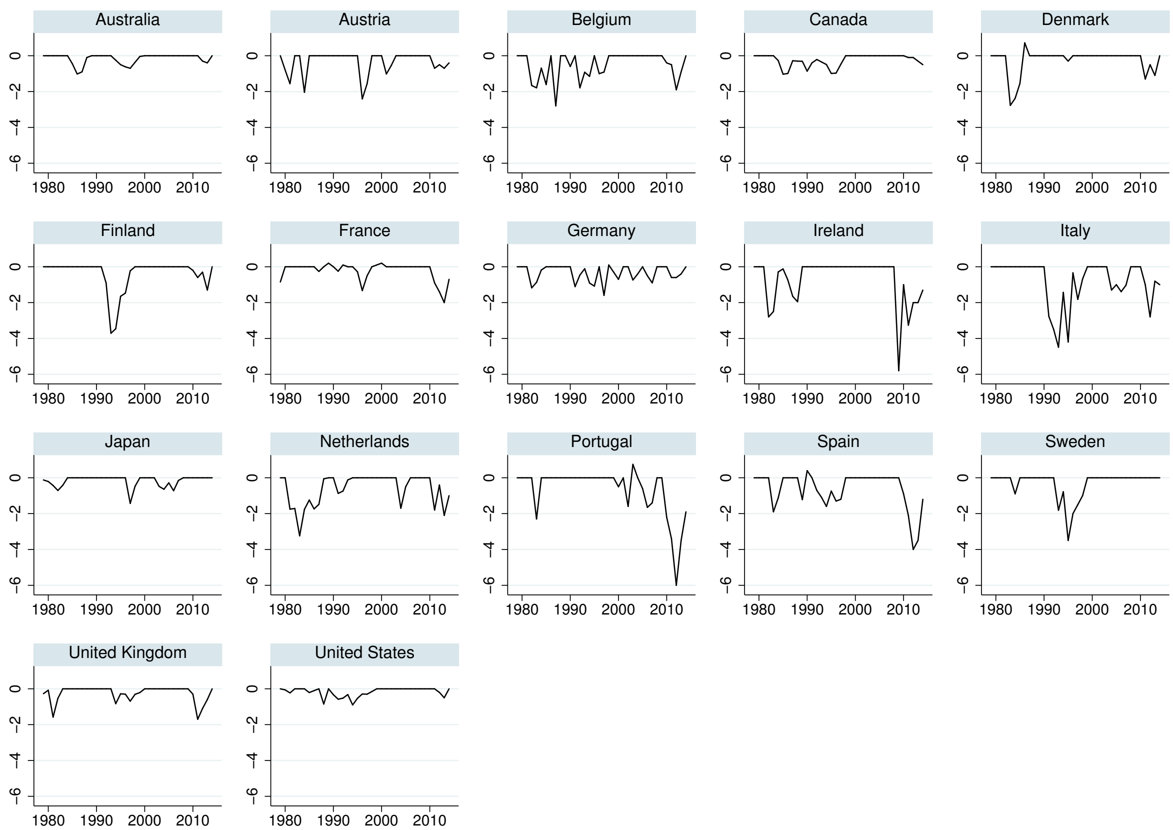
To instrument shocks to fiscal balances, we use the data of Guajardo et al. (2014b) and the extension by Katariniuk and Valles (2018b). These series are constructed by analyzing contemporaneous policy documents to identify discretionary fiscal consolidations, i.e., changes in tax rates

[31]For a detailed account of the dynamics of foreign share of public debt during the European debt crisis see Broner et al. (2014).

and government spending that are not motivated by current or prospective economic conditions. The magnitude of the shocks reflect the expected future budgetary impact of the consolidations.

This approach identifies 230 fiscal consolidations for our sample between 1978 and 2014, depicted in Figure 11 below. The average budgetary impact of these consolidations is -1.1% of GDP, ranging from -6.0% of GDP (Portugal, 2012) to 0.8% of GDP (Portugal, 2003). Negative observations correspond to reductions in the fiscal deficit, while positive ones correspond to expirations of temporary consolidations.[32]

Figure 11: **International panel: Identified narrative fiscal shocks**



Notes: The shocks are from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP.

[32]We adopt this sign convention to make the results more comparable to those of the previous sections. Temporary consolidations may be problematic if their expiration is anticipated. As we discuss in Section 6.4, however, there are few such measures and excluding them does not change our results.

6.2 Empirical Methodology

The empirical specification for the panel of advanced economies is similar to the one for the US so we will not write it down explicitly. There are a few differences: (i) we run panel regressions with country and time fixed effects instead of time series regressions; (ii) the data is annual instead of quarterly; (iii) as a result, and following Guajardo et al. (2014a) and Jorda and Taylor (2016), we use the contemporaneous instrument instead of lagging it by one period; (iv) the fiscal variable is the change in the cyclically-adjusted primary deficit instead of government expenditure; and (v) the instrument is the narrative measure of fiscal consolidations instead of announcement of defense spending and VAR residuals.[33] As in the case of the US, we relegate all first-stage results to Appendix E.

6.3 Results

The baseline results are reported in Table 4 and Figure 12. They both show the coefficients β_h^Y for $h \leq 4$ years. In the figure we also plot the confidence bands reflecting significance at the 10-percent level. The estimated cumulative multipliers are around 0.5 and statistically significant for horizons of up to 3 years. This is similar to the multipliers for government spending shocks in our baseline results for the US.[34]

Table 4: **International panel baseline model: output multiplier**

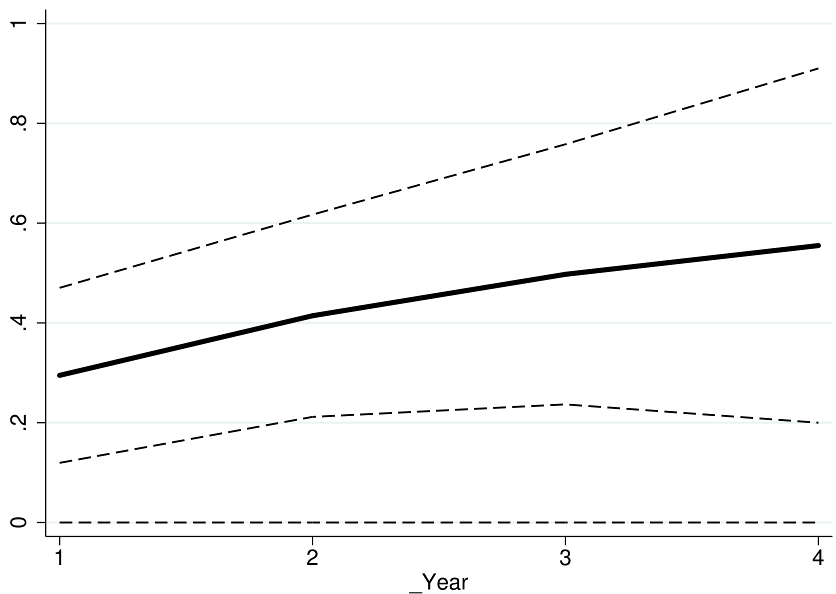
	Year t+1	Year t+2	Year t+3	Year t+4
Fiscal shock$_t$	0.29*	0.41**	0.50*	0.56
	(0.18)	(0.20)	(0.26)	(0.36)
Other controls	Yes	Yes	Yes	Yes
Observations	576	558	540	523

Notes: The fiscal shock is change in the cyclically-adjusted primary deficit instrumented by the narrative shocks from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[33] The changes in the cyclically-adjusted primary deficit in Ireland in 2010 and 2011 are extreme outliers. The reported changes are, respectively, +15.6% and -18.1% of GDP, which are over eight standard deviations away from the average change in deficit. To prevent our results from being driven by these two observations, we exclude them from all regressions. Our main results are robust to both the inclusion of these outliers and the exclusion of Ireland entirely.

[34] Note that these results cannot be directly compared to those in Guajardo et al. (2014a) and Jorda and Taylor (2016), since their methodology provides dynamic output responses as opposed to multipliers.

Figure 12: **International panel baseline model: output multiplier**



Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP. The (dashed lines) confidence bands represent significance at the 10% level.

The results on the role of the foreign share are reported in Table 5 and Figure 13 for $h \leq 4$ years. The main finding is that the interaction coefficient β_h^{YGX} is statistically significant at the 5% level for $2 \leq h \leq 4$ years.[35]

Figure 13 illustrates the corresponding cumulative multipliers $m_h(X_{t-1})$. Now that the cumulative multipliers depend on the foreign share of public debt holdings, the figure contains two panels. The first panel plots the cumulative multipliers for a low foreign share, which corresponds to the 10th percentile of foreign holdings in the sample ($X_{t-1} = 6\%$), and for a high foreign share, which corresponds to the 90th percentile of foreign holdings in the sample ($X_{t-1} = 66\%$ of debt held by foreigners). As in the case of the US, the cumulative multipliers when the foreign share is low are statistically indistinguishable from zero at all horizons. Instead, cumulative multipliers when the foreign share is high are statistically different from zero at all horizons and the point estimates are approximately equal to or higher than one. The second panel plots the difference between the cumulative multipliers for high and low foreign share. The panel illustrates the results of Table 5 and shows that the regime-dependent multipliers are statistically different from each other.

[35] In Tables 4 and 5, errors are not clustered. There is an ongoing debate on whether clustering is necessary in setups like ours. Cameron and Miller (2015) provide a general defense of the use of clustering while Abadie et al. (2017) question it in the presence of fixed effects. In the online appendix, we show that clustering does not affect the significance of our results.

Table 5: **International panel foreign share: output multiplier**

	Year t+1	Year t+2	Year t+3	Year t+4
Fiscal shock$_t$	-0.67	-0.35	-0.25	-0.61
	(0.55)	(0.46)	(0.40)	(0.67)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	2.72	1.87**	2.54**	4.64**
	(1.81)	(0.92)	(1.20)	(2.12)
Other controls	Yes	Yes	Yes	Yes
Observations	405	387	369	352

Notes: The fiscal shock is the change in the cyclically-adjusted primary deficit instrumented by the narrative narrative shocks from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Foreign share is our measure of foreign holdings of public debt as a percentage of total public debt. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As in the US results, the effect of the foreign share on the size of the fiscal multiplier is large. For a low foreign share, we can say fairly confidently that the fiscal multipliers are smaller than one and might even be zero. For a high foreign share, instead, the point estimates are significant and above one, although given the high standard errors we cannot reject that they are one. As examples, these results suggest that in a country with a low foreign share like Japan ($X_t = 8\%$) the multiplier is essentially zero while in a country with a high foreign share like Ireland ($X_t = 64\%$) the multiplier is likely above one.

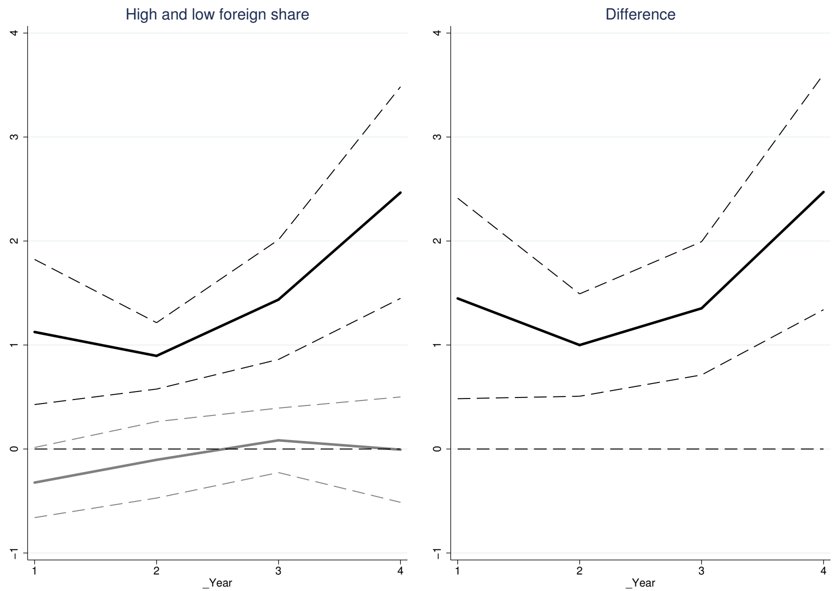
6.4 Robustness and additional results

We perform several robustness tests. First, we analyze whether our results are driven by the European crisis and/or some of the countries that have carried out the largest fiscal consolidations. To do so we run the regression with data only up to 2007. We also run it excluding Ireland, Spain and Portugal. In both cases our results are unaffected, as shown in Appendix F.

Second, a few consolidations included temporary measures that, at their time of expiration, were reflected in positive values of fiscal shocks. These shocks could have been anticipated, potentially leading to effects different from those of unanticipated shocks. Thus, we run the regressions excluding both the adoption and the expiration of these temporary measures.[36] Our results are

[36] The excluded consolidations are Denmark (1985), France (1982, 1992, 1999, 2000), Germany (1998), Portugal (2003) and Spain (1990).

Figure 13: **International panel foreign share: output multiplier**



Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

unaffected, as shown in Appendix F.

Third, although Guajardo et al. (2014b) and Katariniuk and Valles (2018b) exclude consolidations that explicitly reflect current and prospective economic conditions, the remaining ones might not be completely exogenous. Jorda and Taylor (2016) argue that this is likely the case and propose an augmented inverse probability weighting scheme to address this potential problem. We run the regressions following this alternative methodology and, as shown in Appendix F, our results are not affected.[37]

We perform two additional "horse races" that are not feasible for the US sample: financial openness and government credibility.

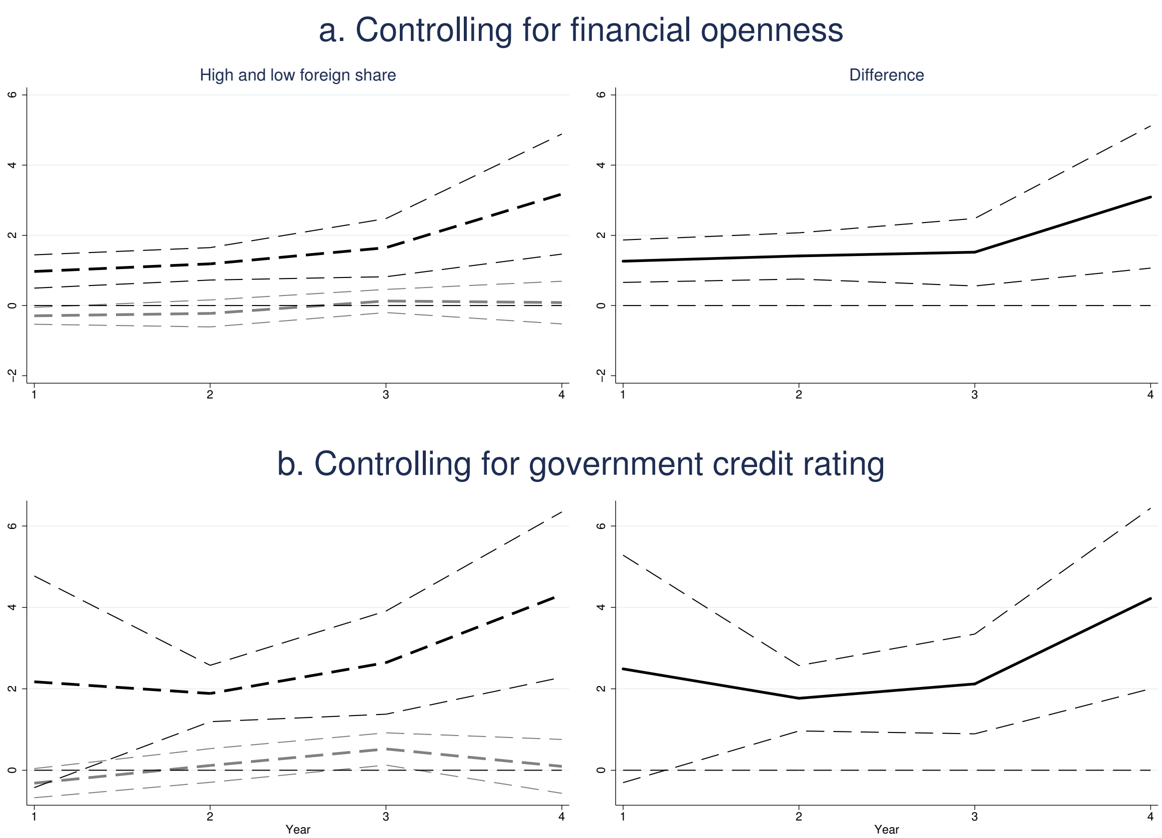
The most common measure of financial openness is the ratio of foreign assets and liabilities to GDP, as compiled by Lane and Milesi-Ferretti (2018b). Running a race against this variable does not significantly affect our results. In particular, the interaction of the fiscal shock with the foreign share remains positive and – within a two-year horizon – significant, while its interaction with financial openness is not statistically significant. Panel (a) of Figure 14 illustrates the results

[37]We find that economic conditions do help predict fiscal consolidations, but the foreign share of public debt does not.

of this race.

Another concern is that the foreign share of public debt may be correlated with the government's credibility or solvency, which could be the ultimate driver of high fiscal multipliers (see Corsetti et al. 2013). This is hard to address for the case of the US, which did not experience episodes of significant fiscal stress in the sample period. To deal with this concern, we perform a race with sovereign credit ratings in the panel. As panel (b) of Figure 14 shows, our main result remains.

Figure 14: **International panel foreign share and alternative explanations: output multiplier**



Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share when financial openness (panel a) and sovereign credit ratings (panel b) are included as alternative explanations, and the difference between the two multipliers. The (outer dashed lines) confidence bands represent significance at the 10% level.

7 Concluding remarks

This paper explores a natural connection between fiscal multipliers and governments' access to foreign resources when selling their debt. In particular, it shows that fiscal multipliers are increasing in the share of public debt in the hands of foreigners. This result holds both for the United States during the post-war period, and for a panel of advanced economies over the last few decades. In both cases, the estimated multipliers are larger than one in periods and countries with a high foreign share of public debt, and smaller than one in periods and countries with a low foreign share.

These findings have important implications for how we think about fiscal policy in open economies. They challenge the conventional Mundell-Fleming view by suggesting that openness may increase fiscal multipliers. Openness makes it possible to finance fiscal expansions with foreign resources, reducing their crowding-out effects on domestic investment. These results also enrich our understanding of the channels of fiscal spillovers. There is a common perception that fiscal expansions have positive spillovers through trade linkages, because they raise demand for foreign goods. Our findings suggest that fiscal expansions can also have negative spillovers through financial linkages, because they detract from resources available for foreign investment, i.e., their crowding-out effects are partly exported abroad.[38]

Data Availability Statement

The data and replication files underlying this article are available in the Zenodo repository, at https://dx.doi.org/10.5281/zenodo.4984555

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[38] For a recent model of such spillovers, see Broner et al. (2021).

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A Data definition and sources: United States

We expand the quarterly dataset compiled by Ramey and Zubairy (2018b) to include our measure of the foreign share, as well as private investment, current account, exports, imports, private credit and exchange rate classifications. Our sample runs from 1951:Q4 to 2015:Q1. Below we provide a brief overview of the original data sources and their definitions. See the Data Availability Statement in our replication package for more details.

Government spending is government consumption expenditure and gross investment from the BEA (NIPA Table 1.1.5 line 22), divided by the GDP deflator (NIPA Table 1.1.9, line 1); **defense news shocks** comes from Ramey and Zubairy (2018b); **BP shocks** used for the plot in Figure 2 comes from Ramey (2016b); **Nominal Output** is nominal GDP from the BEA (NIPA Table 1.1.5 line 1); **Real Output** is real GDP from the BEA (NIPA Table 1.1.6 line 1); **Potential output** is computed as the HP-filtered real GDP; **Estimated shocks** are the Blanchard-Perotti shocks captured by including government spending as a regressor while controlling for lagged GDP and government spending; **Public debt** is the U.S. federal government's treasury securities liabilities (FRED series: FGTSUSQ027S); **Foreign share** is computed as the rest of the world's treasury securities assets (FRED series: ROWTSEQ027S) as a proportion of the U.S. public debt; **Private investment** is from the BEA (NIPA Table 1.1.5 line 7), divided by the GDP deflator; **Current account** is the balance on current account from the BEA (NIPA Table 4.1 line 31), divided by the GDP deflator; **Exports** is exports of goods and services from the BEA (NIPA Table 1.1.5 line 16), divided by the GDP deflator; **Imports** is imports of goods and services from the BEA (NIPA Table 1.1.5 line 19), divided by the GDP deflator; **Private credit** is total credit to the private non-financial sector (FRED series: QUSPAM770A); **Exchange rate classifications** are from Ilzetzki et al. (2019b).

B Instrument relevance: United States

We use instrumental variable regressions to examine how foreign holdings of public debt affect the size of U.S. fiscal multipliers. We report here the first-stage regression results, related to the (second-stage) regression results discussed in Section 5. The results in Tables B.1 and B.2 correspond to the estimation of the instruments on U.S. government expenditure and U.S. government expenditure interacted with our measure of foreign share respectively. Ramey and Zubairy (2018a) demonstrate that a combination of the defense news shock and a shock derived from the Blanchard and Perotti (2002) VAR specification delivers the most relevant instruments for the analysis of U.S. government spending multipliers. They find that this holds for both the linear and state-dependent cases. We therefore use both fiscal shocks to instrument government spending. In the tables, "news shock" represents ϵ_t^N and the "BP shock" is g_t (having controlled for lagged GDP and government spending in the regression). When interacted with the foreign share variable they represent the $\epsilon_t^N \cdot X_{t-1}$ and $g_t \cdot X_{t-1}$ terms from the first-stage regressions in Section 4. The first-stage results show that the interaction of the fiscal shocks and foreign share are statistically significant in both regressions.

Table B1: **U.S. government spending instruments**

	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8
News shock$_t$	-0.00	0.05	0.13**	0.25**	0.44***	0.66***	0.89***	1.11***
	(0.02)	(0.03)	(0.06)	(0.10)	(0.16)	(0.23)	(0.29)	(0.35)
News shock$_t \cdot$ Foreign share$_{t-1}$	-0.01	-0.22	-0.50	-1.00*	-1.79**	-2.65**	-3.49**	-4.29**
	(0.07)	(0.17)	(0.33)	(0.54)	(0.83)	(1.17)	(1.49)	(1.76)
BP shock$_t$	1.95***	2.99***	4.03***	5.12***	6.08***	7.15***	8.08***	8.97***
	(0.08)	(0.21)	(0.33)	(0.50)	(0.75)	(1.04)	(1.39)	(1.75)
BP shock$_t \cdot$ Foreign share$_{t-1}$	0.67	0.65	1.03	2.29	4.26	5.59	7.39	9.92
	(0.52)	(1.09)	(1.84)	(2.93)	(4.49)	(6.13)	(8.05)	(10.05)
Observations	254	254	253	252	251	250	249	248

Notes: The (defense) news shocks are from Ramey and Zubairy (2018b). The BP shocks are the Blanchard-Perotti shocks. Both shocks are normalized by potential GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

However, the instrumental variable approach is invalid if the instruments are irrelevant or have only weak relevance. Tests of underidentification assess whether instruments are relevant, while tests of weak identification examine whether instruments are weak. Although there are many methods to conduct these tests, they are not all appropriate for our analysis. Our use of more than

Table B2: **Interacted U.S. government spending instruments**

	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8
News shock$_t$	-0.01*	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
News shock$_t\cdot$ Foreign share$_{t-1}$	0.03**	0.06*	0.11*	0.14*	0.13	0.16	0.20	0.25
	(0.01)	(0.03)	(0.06)	(0.08)	(0.09)	(0.12)	(0.15)	(0.17)
BP shock$_t$	-0.00	0.01	0.01	-0.00	-0.00	0.00	0.01	-0.01
	(0.01)	(0.02)	(0.03)	(0.04)	(0.05)	(0.07)	(0.09)	(0.11)
BP shock$_t\cdot$ Foreign share$_{t-1}$	2.06***	2.97***	3.95***	5.21***	6.39***	7.59***	8.76***	10.22***
	(0.08)	(0.17)	(0.28)	(0.39)	(0.50)	(0.70)	(0.89)	(1.10)
Observations	254	254	253	252	251	250	249	248

Notes: The dependent variable is U.S. government spending interacted with our measure of foreign share. The (defense) news shocks are from Ramey and Zubairy (2018b). The BP shocks are the Blanchard-Perotti shocks. Both shocks are normalized by potential GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

one endogenous variable rules out the Staiger and Stock (1997) test of weak identification, as well as the Olea and Pflueger (2013) test used by Ramey and Zubairy (2018a). Stock and Yogo (2005) provide critical values for multiple endogenous regressors and multiple instruments, but assume conditional homoskedastic error terms.

Instead, we use the test statistics from Kleibergen and Paap (2006) and Sanderson and Windmeijer (2016). The Kleibergen-Paap rk Wald statistic allows for tests of weak identification when there are more than one endogenous variable and the errors are heteroskedastic and serially correlated. This is the test statistic reported in Table B.3. This test, however, is only formally justified in the context of underidentified, and not weak, instruments. Sanderson and Windmeijer (2016) provides tests of weak and underidentification for each endogenous regressor seperately.[39] The results for the Sanderson and Windmeijer (2016) weak and underidentfication tests are in Tables B.4 and B.5 respectively. Sanderson and Windmeijer (2016) note that the Stock and Yogo (2005) critical values can be used for their conditional F-statistics. For our case of two endogenous regressors and four instruments, the critical values for the Stock and Yogo (2005) weak ID test are:

- 5% maximal IV relative bias: 11.04

[39]For the weak identification test, the critical values are only available for the i.i.d. case.

- 10% maximal IV relative bias: 7.56
- 20% maximal IV relative bias: 5.57
- 30% maximal IV relative bias: 4.73
- 10% maximal IV size : 16.87
- 15% maximal IV size: 9.93
- 20% maximal IV size: 7.54
- 25% maximal IV size: 6.28

Taken together, the results in Tables B.3, B.4 and B.5 show that the defense-news and Blanchard-Perotti shocks are jointly relevant instruments for government spending and therefore suitable for use in the empirical analysis.

Table B3: **Weak identification test: Kleibergen-Paap rk Wald statistic**

h	U.S. government spending F-statistic	Interacted U.S. government spending F-statistic
1	624.0	369.9
2	235.1	81.8
3	149.5	61.7
4	127.1	48.6
5	108.6	45.3
6	90.2	37.6
7	77.5	32.8
8	66.6	28.9
9	57.9	25.9
10	49.3	23.1
11	43.4	21.5
12	37.7	19.8
13	34.7	14.4
14	33.1	10.5
15	31.2	7.6
16	28.9	6.6

Notes: The third column is U.S. government spending interacted with our measure of foreign share. We use both the defense news and the Blanchard-Perotti shocks as instruments.

Table B4: **Sanderson and Windmeijer (2016) weak identification test statistics**

h	U.S. government spending F-statistic	Interacted U.S. government spending F-statistic	U.S. government spending p-value	Interacted U.S. government spending p-value
1	483.5	428.7	0.000	0.000
2	118.0	363.6	0.000	0.000
3	87.1	287.7	0.000	0.000
4	69.9	255.9	0.000	0.000
5	63.7	192.2	0.000	0.000
6	53.7	134.4	0.000	0.000
7	46.9	103.4	0.000	0.000
8	42.0	75.0	0.000	0.000
9	37.8	67.0	0.000	0.000
10	33.9	61.8	0.000	0.000
11	31.0	50.8	0.000	0.000
12	27.3	22.6	0.000	0.000
13	26.7	18.7	0.000	0.000
14	26.0	14.4	0.000	0.000
15	25.3	10.7	0.000	0.000
16	24.3	8.9	0.000	0.000

Notes: The second and fourth columns are U.S. government spending interacted with our measure of foreign share. We use both the defense news and the Blanchard-Perotti shocks as instruments. The p-values are from the first-stage regressions and assume i.i.d. errors.

Table B5: **Sanderson and Windmeijer (2016) underidentification chi-squared statistics**

h	U.S. government chi-squared statistic	Interacted U.S. government spending chi-squared statistic	U.S. government spending p-value	Interacted U.S. government spending p-value
1	1666.9	1478.2	0.000	0.000
2	406.7	1253.6	0.000	0.000
3	300.4	992.5	0.000	0.000
4	241.3	883.5	0.000	0.000
5	219.9	663.9	0.000	0.000
6	185.5	464.4	0.000	0.000
7	162.1	357.7	0.000	0.000
8	145.4	259.5	0.000	0.000
9	131.0	231.8	0.000	0.000
10	117.4	214.1	0.000	0.000
11	107.6	176.3	0.000	0.000
12	94.6	78.4	0.000	0.000
13	92.6	64.9	0.000	0.000
14	90.2	50.0	0.000	0.000
15	88.1	37.1	0.000	0.000
16	84.7	31.0	0.000	0.000

Notes: The second and fourth columns are U.S. government spending interacted with our measure of foreign share. We use both the defense news and the Blanchard-Perotti shocks as instruments. The p-values are from the first-stage regressions and assume i.i.d. errors.

C Regression results: United States

In this section, we provide the regression results underlying all the impulse responses for the US analysis contained in the paper.

Table C1: Effect on Output: Foreign Share in Pre-Crisis Sample (Q2 2007)

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	0.55	0.57	0.43	0.25
	(0.53)	(0.50)	(0.41)	(0.36)
Fiscal shock$_t$ · Foreign share$_{t-1}$	3.81	4.37	5.50	6.73*
	(3.55)	(3.60)	(3.46)	(3.49)
Other controls	Yes	Yes	Yes	Yes
Observations	221	220	219	218
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	0.06	-0.04	-0.04	-0.07
	(0.38)	(0.40)	(0.44)	(0.45)
Fiscal shock$_t$ · Foreign share$_{t-1}$	8.05**	9.63***	9.13**	9.37***
	(3.51)	(3.59)	(3.68)	(3.53)
Other controls	Yes	Yes	Yes	Yes
Observations	217	216	215	214

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2: Effect on Output: Foreign Share in Pre-ZLB Sample (Q3 2008)

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	0.64	0.74	0.69*	0.30
	(0.51)	(0.46)	(0.39)	(0.36)
Fiscal shock$_t$ · Foreign Share$_{t-1}$	2.26	1.77	1.57	5.87*
	(3.33)	(3.41)	(3.68)	(3.54)
Other controls	Yes	Yes	Yes	Yes
Observations	226	225	224	223
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	-0.00	-0.12	-0.11	-0.09
	(0.38)	(0.42)	(0.43)	(0.44)
Fiscal shock$_t$ · Foreign Share$_{t-1}$	8.83**	10.69***	10.21***	9.61***
	(3.61)	(3.84)	(3.69)	(3.46)
Other controls	Yes	Yes	Yes	Yes
Observations	222	221	220	219

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C3: Effect on Investment: Foreign Share

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	-0.63**	-0.57**	-0.55**	-0.57**
	(0.30)	(0.28)	(0.26)	(0.26)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	4.32***	4.37***	3.66**	3.24*
	(1.24)	(1.29)	(1.49)	(1.72)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	-0.60**	-0.59*	-0.59	-0.62*
	(0.30)	(0.33)	(0.38)	(0.33)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	3.12	3.03	2.99	2.83
	(2.05)	(2.59)	(2.90)	(2.70)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C4: Effect on Current Account: Foreign Share

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	-0.02	0.00	0.04	0.04
	(0.10)	(0.09)	(0.11)	(0.11)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	-0.76	-0.75	-0.91*	-0.87*
	(0.52)	(0.50)	(0.52)	(0.51)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252

	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	0.02	0.00	-0.00	-0.01
	(0.12)	(0.11)	(0.12)	(0.12)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	-0.73	-0.70	-0.70	-0.60
	(0.50)	(0.50)	(0.54)	(0.55)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C5: Effect on Output: Foreign Share and Trade openness

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	2.55***	2.77***	2.45***	2.08**
	(0.96)	(1.01)	(0.91)	(0.89)
Fiscal shock$_t$ · Foreign share$_{t-1}$	18.80***	21.01***	19.15***	17.28**
	(5.55)	(6.79)	(7.19)	(7.48)
Fiscal shock$_t$ · Trade openness$_{t-1}$	-28.67***	-31.64***	-28.52**	-25.27**
	(10.34)	(12.02)	(11.62)	(11.37)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	1.54	1.24	1.01	0.81
	(0.96)	(1.08)	(1.12)	(1.11)
Fiscal shock$_t$ · Foreign share$_{t-1}$	14.88*	13.03	11.35	9.58
	(8.16)	(8.80)	(8.87)	(8.34)
Fiscal shock$_t$ · Trade openness$_{t-1}$	-20.02*	-16.47	-13.76	-11.22
	(11.96)	(12.84)	(12.97)	(12.34)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Trade openness is the sum of imports and exports divided by GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C6: Effect on Output: Foreign Share and Exchange Rate regime

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	0.62	0.69**	0.68**	0.55
	(0.40)	(0.35)	(0.31)	(0.36)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	8.49***	9.85***	9.02***	8.68***
	(1.90)	(2.29)	(2.53)	(2.92)
Fiscal shock$_t$ $\cdot$ Exchange rate$_{t-1}$	-1.17**	-1.42**	-1.29**	-1.17**
	(0.57)	(0.59)	(0.56)	(0.58)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	0.41	0.44	0.53	0.63
	(0.46)	(0.54)	(0.58)	(0.57)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	8.24**	7.28**	6.22*	5.34
	(3.38)	(3.56)	(3.66)	(3.68)
Fiscal shock$_t$ $\cdot$ Exchange rate$_{t-1}$	-0.87	-0.64	-0.49	-0.46
	(0.65)	(0.71)	(0.75)	(0.73)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Exchange rate is a dummy for a freefloating rate, as defined by Ilzetzki et al. (2019a). Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C7: Effect on Output: Foreign Share and Public Debt-to-GDP

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock_t	0.33	0.34	0.49	0.96
	(0.87)	(0.91)	(0.84)	(0.81)
Fiscal $\text{shock}_t \cdot$ Foreign share_{t-1}	4.17^{**}	4.28^{**}	3.48^{*}	3.24
	(1.78)	(1.91)	(1.94)	(2.22)
Fiscal $\text{shock}_t \cdot$ Public debt_{t-1}	0.62	0.73	0.35	-1.02
	(2.27)	(2.19)	(1.95)	(1.88)
Other controls	Yes	Yes	Yes	Yes
Observations	254	254	253	252
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock_t	1.35^{*}	2.04^{***}	2.54^{***}	2.69^{***}
	(0.78)	(0.75)	(0.75)	(0.77)
Fiscal $\text{shock}_t \cdot$ Foreign share_{t-1}	3.37	3.37	3.09	2.74
	(2.60)	(3.16)	(3.56)	(3.58)
Fiscal $\text{shock}_t \cdot$ Public debt_{t-1}	-2.21	-3.97^{*}	-5.26^{**}	-5.71^{**}
	(2.01)	(2.09)	(2.23)	(2.33)
Other controls	Yes	Yes	Yes	Yes
Observations	251	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Public debt is in percentage of GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C8: Effect on Output: Foreign Share and Ex-Post Change in Public Debt-to-GDP

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	0.31	0.34	0.35	0.30
	(0.39)	(0.39)	(0.33)	(0.31)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	4.28*	4.62*	5.06*	5.82*
	(2.44)	(2.62)	(2.92)	(3.36)
Fiscal shock$_t$ $\cdot$ Ex-post change in public debt$_t$	10.25	11.84	5.24	-0.93
	(12.14)	(15.38)	(16.57)	(18.49)
Other controls	Yes	Yes	Yes	Yes
Observations	250	250	250	250
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	0.25	0.29	0.34	0.37
	(0.34)	(0.38)	(0.40)	(0.41)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	6.56*	6.95*	6.55	6.08
	(3.78)	(4.04)	(4.09)	(3.93)
Fiscal shock$_t$ $\cdot$ Ex-post change in public debt$_{t-1}$	-5.17	-9.14	-9.50	-10.67
	(19.35)	(18.90)	(17.92)	(16.97)
Other controls	Yes	Yes	Yes	Yes
Observations	250	250	249	248

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Ex-post (one-year ahead) change in public debt is in percentage of GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C9: Effect on Output: Foreign Share in Post-Vietnam Sample (Q1 1973 - Q1 2015)

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	-0.30	-0.49	-0.45	-0.44
	(0.64)	(0.66)	(0.60)	(0.54)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	6.20***	7.21***	6.64***	5.98***
	(1.59)	(1.74)	(1.77)	(1.80)
Other controls	Yes	Yes	Yes	Yes
Observations	166	166	165	164
	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock$_t$	-0.17	0.03	0.14	0.34
	(0.53)	(0.56)	(0.56)	(0.54)
Fiscal shock$_t$ $\cdot$ Foreign share$_{t-1}$	4.75**	3.97*	3.44	2.07
	(1.95)	(2.14)	(2.24)	(2.30)
Other controls	Yes	Yes	Yes	Yes
Observations	163	162	161	160

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C10: Effect on Output: Foreign Share and Private Debt-to-GDP

	Quarter t+1	Quarter t+2	Quarter t+3	Quarter t+4
Fiscal shock$_t$	3.23	2.44	2.35	1.83
	(2.15)	(2.06)	(1.86)	(1.63)
Fiscal shock$_t$ · Foreign share$_{t-1}$	14.41**	12.65**	11.49*	9.79*
	(6.51)	(6.38)	(6.06)	(5.73)
Fiscal shock$_t$ · Private debt-to-GDP$_{t-1}$	-0.04	-0.03	-0.03	-0.02
	(0.03)	(0.03)	(0.03)	(0.02)
Other controls	Yes	Yes	Yes	Yes
Observations	253	253	252	251

	Quarter t+5	Quarter t+6	Quarter t+7	Quarter t+8
Fiscal shock $_t$	1.58	1.28	0.89	0.45
	(1.53)	(1.48)	(1.56)	(1.57)
Fiscal shock$_t$ · Foreign share$_{t-1}$	9.42*	8.10	6.68	4.78
	(5.62)	(5.36)	(5.36)	(5.04)
Fiscal shock$_t$ · Private debt-to-GDP$_{t-1}$	-0.02	-0.01	-0.01	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)
Other controls	Yes	Yes	Yes	Yes
Observations	250	249	248	247

Notes: The fiscal shock is government expenditure instrumented by the defense news shocks from Ramey and Zubairy (2018b) and the Blanchard-Perotti shock. Both shocks are normalized by potential GDP. Foreign share is our measure of foreign holdings of public debt, as a percentage of total public debt. Private debt is total credit to the private non-financial sector, as a percentage of GDP. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

D Data definition and sources: International Panel

D.1 Macroeconomic data

To maximise consistency across countries, we collect as many macroeconomic variables as possible from the OECD's Economic Outlook No. 95, from November 2015. Due to the availability of the fiscal shock data, our maximum sample period runs from 1978 to 2014.

All countries **Population** is the total population (OECD series: POP); **Narrative fiscal shocks** are from Guajardo et al. (2014b) and Kataryniuk and Valles (2018b); **Government spending** is the volume of final government expenditure (OECD series: CGV); **Nominal Output** is nominal GDP (OECD series: NGDP); **Real Output** is nominal output divided by the **GDP deflator** (OECD series: PGDP); **Potential output** is computed as the HP-filtered real GDP; **Budget deficit** is the value of the cyclically-adjusted primary balance (OECD series: NLGXA); **Private investment** is the volume of private total fixed capital formation (OECD series: IPV); **Net exports** is the value of exports of goods and services (OECD series: NX) minus the value of imports of goods and services (OECD series: NM); **Total financial assets** are from Lane and Milesi-Ferretti (2018); **Total financial liabilities** are from Lane and Milesi-Ferretti (2018); **Sovereign credit ratings** are the average of the ratings from Fitch, Moody's and S&P; **Bank crises** is a dummy constructed from Laeven and Valencia (2020b)'s systemic bank crises database; textbfExchange rate classifications are from Ilzetzki et al. (2019b).

Our data on public debt, foreign holdings of public debt, the current account and exchange rate with the US dollar are from a variety of sources and are discussed next.

D.2 Public debt

Where possible, we use total general government debt. We extend the series back by gathering data directly from domestic and international sources.

Australia: Non-consolidated general government debt. Millions of national currency. Final quarter taken as the annual value.
<u>1988-2014:</u> Financial Account by Institutional Sector, Flow of Funds. Haver code: AUNFLGGD@ANZ.

Austria: Sum of government debt held by residents and non-residents. Millions of national currency. European Central Bank Statistical Data Warehouse.

1995-2014: Variable codes:

GFS.A.N.AT.W2.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T (residents);

GFS.A.N.AT.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T (non-residents).

Belgium: Consolidated gross debt of General Government. Millions of national currency.
1990-2014: National Bank of Belgium. Haver code: BEAFD@BENELUX.

Canada: Gross debt of the general government. Millions of national currency.
1981-2014: International Monetary Fund, World Economic Outlook Database.
Haver code: A156GDS@IMFWEO.

Denmark: 1990-1991: Sum of short- and long-term general government debt. Millions of national currency. European Central Bank Statistical Data Warehouse. Variable codes:

GST.A.DK.N.B0X13.MJS.B1300.SA.N_T (short-term debt);

GST.A.DK.N.B0X13.MJM.B1300.SA.N (long-term debt).

1992-2014: Gross debt of the general government. International Monetary Fund, World Economic Outlook Database. Haver code: A128GDS@IMFWEO.

Finland: Gross debt of the (consolidated) general government. Millions of national currency.
1990-2014: Statistics Finland.

France: Sum of government debt held by residents and non-residents, consolidating for within general government holdings. Millions of national currency.

1995-2014: European Central Bank Statistical Data Warehouse. Variable codes:

GFS.A.N.FR.W2.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T (residents);

GFS.A.N.FR.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T (non-residents);

GFS.A.N.FR.W2.S13.S13.CI.L.LE.GD.T._Z.XDC._T.F.V.N._T (intra general government).

Germany: Consolidated General Government liabilities. Millions of national currency.
1990-20014: European Central Bank Statistical Data Warehouse.
Variable code: GST.A.DE.N.B0000.MAL.B1300.SA.E.

Data for year 1990 was extracted from the Bruegel dataset on sovereign holdings.

Ireland: Holdings of long-term government bonds by sectors. Millions of national currency.
1987-2014: Central Bank of Ireland, Securities Statistics. Sum of resident sectors holdings and Nonresident sector holdings.

Italy: Consolidated General Government Debt. Millions of national currency.
1980-2014: Banca d'Italia. Sum of government debt held by resident and non-resident sectors. Datastream variable codes: ITNPD6@ITALY (debt held by Banca d'Italia); ITNPD8@ITALY (debt held by Other Resident MFIs); ITNPD8@ITALY (debt held by Other Resident Financial Institutions); ITNPD12@ITALY (debt held by Other Residents); ITNPD14@ITALY (debt held by Nonresidents).

Japan: Sum of government domestic law bonds, foreign law bonds and T-bills. Billions of national currency.
1982-2014: Bank of Japan Database, Public Finance. Data code: PF'PFGD11 (government bonds, domestic law); PF'PFGD12 (government bonds, foreign law); PF'PFGD@01 (government T-bills).

Netherlands: Gross General Government Debt. Millions of national currency.
1990-2014: European Central Bank Statistical Data Warehouse.
Variable codes: GST.A.NL.N.B0000.MAL.B1300.SA.E

Portugal: Gross General Government Debt. Millions of national currency.
1995-2014: European Central Bank Statistical Data Warehouse.
Variable codes: GST.A.PT.N.B0000.MAL.B1300.SA.E

Spain: General Government securities. Millions of national currency.
1989-2014: Statistical Bulletin of Bank of Spain. Financial Accounts: Securities holdings by institutional sectors. Sum of all domestic sectors (code: BE_3_13.4) and Rest of the World (code: BE_3_13.29), minus intra-government holdings (code: BE_3_13.19).

Sweden: Gross General Government Debt. Millions of national currency.

1995-2014: European Central Bank Statistical Data Warehouse. Sum of liabilities vis-a-vis resident and Nonresident sectors. Variable codes:
GFS.A.N.SE.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T (Domestic excl. General government);
GFS.A.N.SE.W2.S13.S1.C.L.LE.GD.T_Z.XDC._T.F.V.N._T (Rest of the World);
GFS.A.N.SE.W2.S13.S13.CI.L.LE.GD.T._Z.XDC._T.F.V.N._T (Intra-General government).

United Kingdom: Long-term bonds of the Central Government. Millions of national currency. Fourth quarter taken as the annual value. Office of National Statistics.
1987-2013: Variable code: AF.3321: CP NSA

United States: Federal Government, Treasury securities liabilities. Millions of national currency.
1978-2014: Federal Reserve Bank of St. Louis FRED database. FRED series: FGTSUSQ027S. Fourth quarter taken as the annual value.

D.3 Foreign share

This is the foreign holdings of total public debt, as described above. We extend the series back by gathering data directly from domestic and international sources.

Australia: Liabilities of the public sector (general government) held by the rest of the world. Millions of national currency.
1988-2014: Australian Bureau of Statistics, Balance of Payments and International Investment Position, Foreign Debt Levels, Table 30. Series ID: A3374931F.

Austria: General Government debt held by non-residents. Millions of national currency.
1995-2014: European Central Bank Statistical Data Warehouse.
Variable code: GFS.A.N.AT.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T.

Belgium: Consolidated gross debt of the general government, held by the rest of the world. Millions of national currency.
1990-1994: Bruegel dataset on sovereign bond holdings. Based on data from the European Central

Bank Statistical Data Warehouse.

1995-2014: Government debt held by non-residents. European Central Bank Statistical Data Warehouse. Variable code: GFS.A.N.BE.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T

Canada: Portfolio investment in government bonds by foreigners. Millions of national currency.

1981-2014: Statistics Canada, International Investment Position, Table 376-0143.

Denmark: Liabilities of the public sector (general government) held by the rest of the world. Millions of national currency. Statistics Denmark, International Investment Position.

1980-1997: annual data. 1999-2014: Final quarter taken as the annual value. 1998: Linear interpolation between the 1997 and 1999 values.

Finland: Consolidated General Government held by the rest of the world. Millions of national currency.

1990-1994: Bruegel dataset on sovereign bond holdings. Based on data from the European Central Bank Statistical Data Warehouse.

1995-2014: General Government debt held by non-residents. Millions of national currency. Statistics Finland, annual financial accounts. Sum of bonds (AF32) and loans (AF4).

France: Government debt held by non-residents. Millions of national currency.

1995-2014: European Central Bank Statistical Data Warehouse.

Variable code: GFS.A.N.FR.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T.

Germany: General Government Financial stocks at nominal value held by the rest of the world. Millions of national currency.

1990-1994: Bruegel dataset on sovereign bond holdings. Based on data from the European Central Bank Statistical Data Warehouse.

1995-2014: European Central Bank Statistical Data Warehouse.

Variable code: GST.A.DE.N.B2000.MAL.B1300.SA.E.

Ireland: Holdings of long-term government bonds by non-residents. Millions of national currency.

1978-2014: Central Bank of Ireland, Securities Statistics.

Italy: General Government Debt held by Nonresidents. Millions of national currency.
1988-2014: Banca d'Italia. Datastream code: ITNPD14@ITALY.

Japan: Sum of foreign holdings of government T-bills, central government securities, local government securities and public corporation securities. Billions of national currency.
1982-2014: Bank of Japan Database, Flow of Funds. Data code: FF'FOF_93FFYS500A310 (government T-bills); FF'FOF_93FFYS500A311 (central government securities); FF'FOF_93FFYS500A312 (local government securities); FF'FOF_93FFYS500A313 (public corporation securities).

Netherlands: Consolidated gross debt of the general government, held by Rest of the world. Millions of national currency.
1990-1994: Bruegel dataset on sovereign bond holdings. Based on data from the European Central Bank Statistical Data Warehouse.
1995-2014: European Central Bank Statistical Data Warehouse.
Variable code: GFS.A.N.NL.W1.S13.S1.C.L.LE.GD.T._Z.XDC_R_B1GQ._T.F.V.N._T.

Portugal: Consolidated gross debt of the general government, held by Rest of the world. Millions of national currency.
1995-2014: European Central Bank Statistical Data Warehouse.
Variable code: GFS.A.N.PT.W1.S13.S1.C.L.LE.GD.T._Z.XDC_R_B1GQ._T.F.V.N._T.

Spain: General Government securities held by Rest of the world. Millions of national currency.
1989-2014: Statistical Bulletin of Bank of Spain. Financial Accounts: Securities holdings by institutional sectors.Variable code: BE_3_13.29.

Sweden: Government debt held by non-residents. Millions of national currency.
1995-2014: European Central Bank Statistical Data Warehouse.
Variable code: GFS.A.N.SE.W1.S13.S1.C.L.LE.GD.T._Z.XDC._T.F.V.N._T.

United Kingdom: Long-term bonds of the central government, held by the rest of the world. Millions of national currency.
1987-2013: Office of National Statistics.

United States: Federal government's treasury securities liabilities, held by the rest of the world. Millions of national currency.
1978-2014: Federal Reserve Bank of St. Louis FRED database. FRED series: ROWTSEQ027S.

D.4 Current account

Where possible, we collect data in national currency. We extend the series back by gathering data directly from domestic and international sources, and using data in US dollars and from the BMP5 and BMP6 methodologies where necessary.

Australia: Australian Bureau of Statistics.
1978-2014: Current account balance, millions of national currency. Haver code: AUABC@ANZ

Austria: Oesterrichische Nationalbank.
1992-1994: Current account balance, millions of national currency. BMP5, Haver code: ATOBC@ALPMED
1980-2014: Current account balance, millions of national currency. BMP6, Haver code: ATNBC@ALPMED

Belgium: National Bank of Belgium.
1995-1999: Current account balance, millions of national currency. BMP5, Haver code: BEOBC@BENELUX
1980-2014: Current account balance, millions of national currency. BMP6, Haver code: BE-QBC@BENELUX

Canada: International Monetary Fund.
1978-2014: Current account balance, millions of US dollars. Haver code: C156B6CU@IFS

Denmark: International Monetary Fund.
1978-2014: Current account balance, millions of US dollars. Haver code: C128B6CU@IFS

Finland: Statistics Finland.

1980-2014: Current account balance, millions of national currency. Haver code: FINBC@NORDIC

France: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C132B6CU@IFS

Germany: Deutsche Bundesbank.

1978-2014: Current account balance, millions of national currency. Haver code: DENBCW@GERMANY

Ireland: Central Statistics Office.

1981-2014: Current account balance, millions of national currency. Haver code: IENBC@IRELAND

Italy: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C136B6CU@IFS

Japan: Bank of Japan.

1985-2014: Current account balance, hundreds of millions of national currency. Haver code: N158BC@G10

Netherlands: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C138B6CU@IFS

Portugal: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C182B6CU@IFS

Spain: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C184B6CU@IFS

Sweden: International Monetary Fund.

1978-2014: Current account balance, millions of US dollars. Haver code: C144B6CU@IFS

United Kingdom: Office of National Statistics.

1978-2014: Current account balance, millions of national currency. Haver code: HBOPQ@UK

United States: Bureau of Economic Analysis.
1978-2014: Current account balance, millions of national currency. Haver code: BSBC@USECON

D.5 Exchange rates

For Canada, Denmark, France, Italy, the Netherlands, Portugal, Spain and Sweden, the longest time series we could find for the current account were in U.S. dollars. We convert to national currency values using the exchange rate with the US dollar provided by the Federal Reserve Board (FRB). We use the average annual exchange rate from the FRB G.5 release. Data for the euro area countries only begins in 1980. Before this, we use the individual national currencies to US dollar exchange rate and divide it by the individual national currency to euro exchange rate. For completeness, we provide the exchange series for all our sample, but only use it for the eight countries mentioned above.

Australia: Federal Reserve Board, Foreign Exchange Rates.
1978-2014: Australian Dollar / US Dollar foreign exchange rate. Haver code: A193@FXRATES

Austria: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Austrian Schilling / US Dollar foreign exchange rate (Haver code: FXAST@USECON) divided by Austrian Schilling / Euro foreign exchange rate (Haver code: X122EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A124@FXRATES

Belgium: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Belgian Franc / US Dollar foreign exchange rate (Haver code: FXBLG@USECON) divided by Belgium-Luxembourg Franc / Euro foreign exchange rate (Haver code: X126EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A122@FXRATES

Canada: Federal Reserve Board, Foreign Exchange Rates.
1978-2014: Canadian Dollar / US Dollar foreign exchange rate. Haver code: A156@FXRATES

Denmark: Federal Reserve Board, Foreign Exchange Rates.

1978-2014: Danish Krone / US Dollar foreign exchange rate. Haver code: A128@FXRATES

Finland: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Finnish Markka / US Dollar foreign exchange rate (Haver code: FXFIN@USECON) divided by Finnish Markka / Euro foreign exchange rate (Haver code: X172EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A172@FXRATES

France: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: French Franc / US Dollar foreign exchange rate (Haver code: FXFR@USECON) divided by French Franc / Euro foreign exchange rate (Haver code: X132EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A132@FXRATES

Germany: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: German Deutschmark / US Dollar foreign exchange rate (Haver code: FXGER@USECON) divided by German Deutschmark / Euro foreign exchange rate (Haver code: X134EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A134@FXRATES

Ireland: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Irish Pound / US Dollar foreign exchange rate (Haver code: FXIRL@USECON) divided by Irish Pound / Euro foreign exchange rate (Haver code: X178EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A178@FXRATES

Italy: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Italian Lira / US Dollar foreign exchange rate (Haver code: FXITL@USECON) divided by Italian Lira / Euro foreign exchange rate (Haver code: X136EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A136@FXRATES

Japan: Federal Reserve Board, Foreign Exchange Rates.
1978-2014: Japanese Yen / US Dollar foreign exchange rate. Haver code: A158@FXRATES

Netherlands: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Dutch Guilder / US Dollar foreign exchange rate (Haver code: FXNET@USECON)

divided by Dutch Guilder / Euro foreign exchange rate (Haver code: X138EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A138@FXRATES

Portugal: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Portuguese Escudo / US Dollar foreign exchange rate (Haver code: FXPOR@USECON) divided by Portuguese Escudo / Euro foreign exchange rate (Haver code: X182EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A182@FXRATES

Spain: Federal Reserve Board, Foreign Exchange Rates.
1978-1979: Spanish Peseta / US Dollar foreign exchange rate (Haver code: FXSPA@USECON) divided by Spanish Peseta / Euro foreign exchange rate (Haver code: X184EXR@EUDATA)
1980-2014: Synthetic Euro / US Dollar foreign exchange rate. Haver code: A184@FXRATES

Sweden: Federal Reserve Board, Foreign Exchange Rates.
1978-2014: Swedish Krona / US Dollar foreign exchange rate. Haver code: A144@FXRATES

United Kingdom: Federal Reserve Board, Foreign Exchange Rates.
1978-2014: British Pound / US Dollar foreign exchange rate. Haver code: A112@FXRATES

E Instrument relevance: International Panel

As for the U.S., we use instrumental variable regressions to examine how foreign holdings of public debt affect the size of fiscal multipliers in our panel of advanced economies. We report here the first-stage regression results, related to the (second-stage) regression results discussed in Section 6. The results in Tables E.1 and E.2 correspond to the estimation of the instruments on the change in the cyclically-adjusted primary balance and the change in the cyclically-adjusted primary balance interacted with our measure of foreign share respectively. We use the narrative fiscal shock produced by Guajardo et al. (2014b) and subsequently updated by Kataryniuk and Valles (2018b) to instrument the change in the cyclically-adjusted primary balance. The first-stage results show that the interaction of the fiscal shocks and foreign share are statistically significant in both regressions.

To assess the relevance of our instruments, we follow our approach for the U.S. and use the test statistics from Sanderson and Windmeijer (2016). The results for the weak and underidentification tests are in Tables E.3 and E.4 respectively. Sanderson and Windmeijer (2016) note that the Stock and Yogo (2005) critical values can be used for their conditional F-statistics.

Table E1: **Panel. First stage - fiscal variable**

	Year t+1	Year t+2	Year t+3	Year t+4
Narrative shock$_t$	0.73***	0.50	1.29***	1.18**
	(0.17)	(0.39)	(0.41)	(0.49)
Narrative shock$_t \cdot$ Foreign share$_{t-1}$	-0.44	1.03	-0.51	-0.45
	(0.31)	(0.81)	(0.96)	(1.03)
Observations	405	387	369	352

Notes: The dependent (fiscal) variable is the change in the cyclically-adjusted primary balance. The shocks are from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E2: **Panel. First stage - fiscal variable interacted**

	Year t+1	Year t+2	Year t+3	Year t+4
Narrative shock$_t$	0.11	-0.17	-0.06	-0.05
	(0.08)	(0.11)	(0.15)	(0.14)
Narrative shock$_t \cdot$ Foreign share$_{t-1}$	0.16	1.57***	1.31**	1.24**
	(0.23)	(0.36)	(0.56)	(0.49)
Observations	405	387	369	352

Notes: The dependent (fiscal) variable is the fiscal variable is the change in the cyclically-adjusted primary balance interacted with our measure of foreign share. The shocks are from Guajardo et al. (2014b),updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For our case of two endogenous regressors and two instruments, the critical values for the Stock and Yogo (2005) weak ID test are:

- 10% maximal IV size: 7.03
- 15% maximal IV size: 4.48
- 20% maximal IV size: 3.95
- 25% maximal IV size: 3.63

Table E3: **International panel: Sanderson-Windmeijer (2016) weak identification test statistics**

h	Fiscal variable chi-squared statistic	Interacted fiscal variable chi-squared statistic	Fiscal variable p-value	Interacted fiscal variable p-value
1	12.6	4.5	0.000	0.034
2	6.4	13.3	0.012	0.000
3	20.5	19.8	0.000	0.000
4	13.1	18.8	0.000	0.000

Notes: The dependent (fiscal) variable is the change in the cyclically-adjusted primary balance. The second and fourth columns are the fiscal variable interacted with our measure of foreign share. The shocks are from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The p-values are from the first-stage regressions and assume i.i.d. errors.

Taken together, the results in Tables E.3 and E.4 show that our instruments are relevant. We therefore believe they are suitable for use in the empirical analysis.

Table E4: **International panel: Sanderson-Windmeijer (2016) underidentification test statistics**

h	Fiscal variable F-statistic	Interacted fiscal variable F-statistic	Fiscal variable p-value	Interacted fiscal variable p-value
1	11.3	4.0	0.001	0.046
2	5.7	11.8	0.018	0.001
3	18.2	17.6	0.000	0.000
4	11.6	16.6	0.001	0.000

Notes: The dependent (fiscal) variable is the change in the cyclically-adjusted primary balance. The second and fourth columns are the fiscal variable interacted with our measure of foreign share. The shocks are from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The p-values are from the first-stage regressions and assume i.i.d. errors.

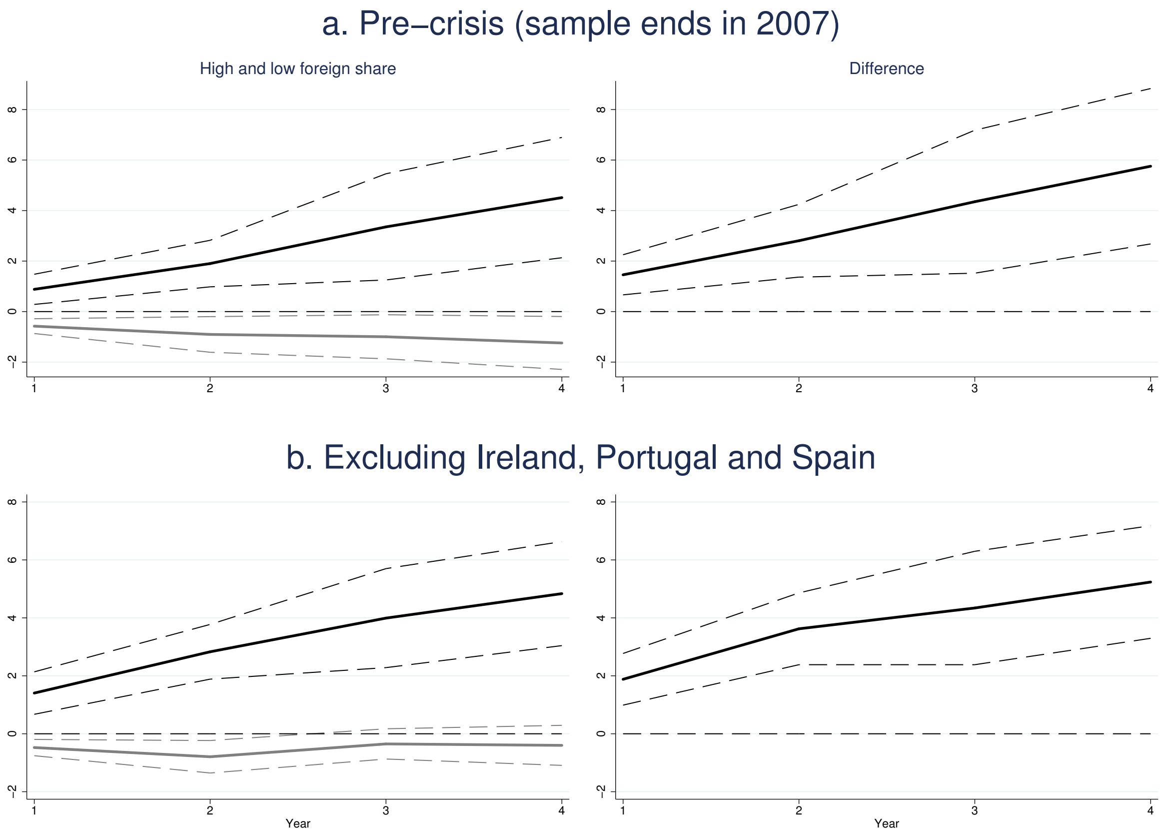
F Additional analysis: International Panel

In this section, we provide the impulse responses for the international panel analysis mentioned in the paper. In Figure F.1, we demonstrate that our result holds in the pre-crisis sample (panel a) and excluding the three countries that received official-sector financial assistance (panel b). In Figure F.2, we provide evidence our results are robust to the exclusion of narratively-identified fiscal consolidations that are subsequently reversed (panel a) or consolidations that are largely based on expenditure measures (panel b).

Although Guajardo et al. (2014a) try to include only consolidations that do not respond to current or prospective economic conditions, Jorda and Taylor (2016) document that the resulting fiscal consolidation shocks are not completely independent from fundamentals. To address this concern, we follow their methodology: namely, we re-run our local projections using an augmented inverse probability weighting scheme (AIPW), which was shown by Jorda and Taylor (2016) to effectively reduce the endogeneity of the narrative fiscal shocks.

This technique uses propensity-scores to reduce the weight in the local projections of those observations which, given fundamentals, are more likely to experience a fiscal consolidation. In the first stage, we estimate propensity scores in the sample, which corresponds to the probability that a consolidation event occurs. We implement this using a probit model of the decision to perform a fiscal consolidation, that allow us to compute the required weights. Interestingly, the first step also allows us to study whether the timing of a fiscal consolidation is dependent on the foreign share. In this way, this exercise also helps addressing concerns regarding endogeneity. The results for the first step are presented in Table F.1. The results show that consolidations are effectively driven by fundamentals: real output growth, the cyclical component of the log of output

Figure F1: **International panel foreign share: output multiplier robustness**

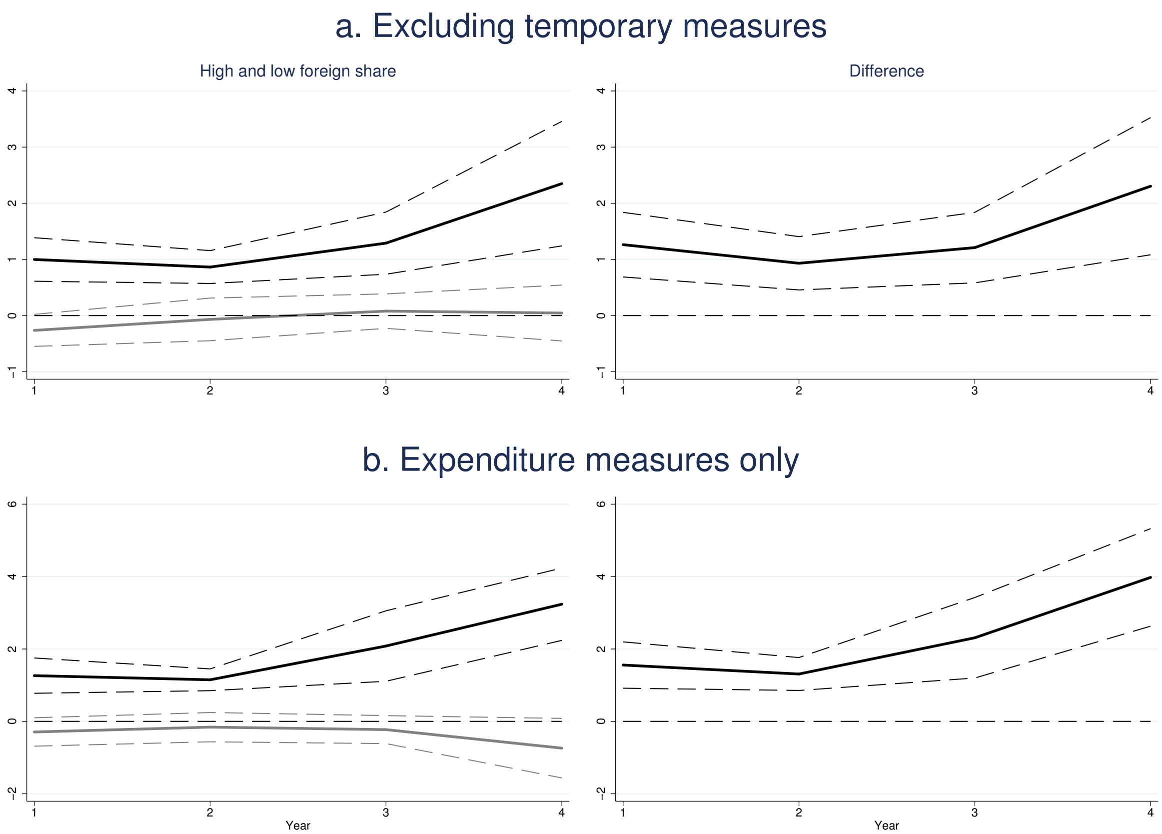


Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. Changes in the cyclically adjusted primary deficit are instrumented using the narrative measure on fiscal consolidation episodes by Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The (outer dashed lines) confidence bands represent significance at the 10% level.

(estimated using a HP filter), the current account deficit and bank distress all increase the likelihood of observing a fiscal consolidation. Instead, the foreign share is, on average, not a major driver of fiscal consolidations. Further confirmation is given by the AUC statistics reported in Table F.1.[40] The AUC statistics show a good predictive ability (AUC=0.85).

[40] AUC stands for area under the curve. The curve usually refers to the Receiver Operating Characteristic (ROC) curve. Under the null that the covariates have no classification ability, AUC=0.5, while perfect classification ability corresponds to AUC=1.

Figure F2: **International panel foreign share: output multiplier robustness II**



Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray line) and high (90th percentile of foreign holdings in the sample, solid black line) foreign share, and the difference between the two multipliers. Changes in the cyclically adjusted primary deficit are instrumented using the narrative measure on fiscal consolidation episodes by Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The (outer dashed lines) confidence bands represent significance at the 10% level.

Table F1: **AIPW: First-stage regression**

	Treatment (t+1)	Treatment (t+1)	Treatment (t+1)
Public debt-to-GDP$_t$	0.00*	0.00**	0.00**
	(0.00)	(0.00)	(0.00)
Cyclical component of output$_t$	1.76	1.67	1.72
	(1.08)	(1.11)	(1.16)
Real output growth$_t$	-4.65***	-4.69**	-4.82***
	(1.36)	(1.39)	(1.44)
Fiscal consolidation dummy$_t$	0.55***	0.52***	0.52***
	(0.04)	(0.04)	(0.04)
Current account-to-GDP$_t$		-1.35***	-1.41***
		(0.51)	(0.51)
Change in CAPB$_t$		-1.71	-1.75
		(1.28)	(1.30)
Bank crisis$_t$		0.06	0.06
		(0.06)	(0.06)
Fixed exchange rate regime$_t$		0.02	0.03
		(0.04)	(0.05)
Foreign holdings of public debt$_t$			-0.02
			(0.13)
Observations	432	420	414
Classification test: AUC	0.85	0.86	0.86
	(0.02)	(0.02)	(0.02)

Notes: Column (1) shows the probit model employed by Jorda & Taylor (2016). Columns (2) and (3) show the saturated regression, omitting the foreign share in the former. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The AIPW-corrected impulse responses are presented in Figure F.3. The results are very similar and show, again, a strong relation between the size of the foreign share and the size of the output multiplier.

Finally, we provide the regression results for the two races we were unable to conduct with the US sample: financial openness (Table F2) and sovereign credit rating (Table F3). We measure financial openness as the share of total financial assets and liabilities to GDP. We source the financial data from Lane and Milesi-Ferretti (2018). Our sovereign credit rating is an average of the rating provided by the three main agencies: Fitch, Moody's and Standard & Poors. The scale runs between 19 (for highest rating) and 1 (in default). Our results are robust to the inclusion of these two alternative explanations.

Table F2: **International panel foreign share and financial openness: Output multiplier**

	Year t+1	Year t+2	Year t+3	Year t+4
Fiscal shock$_t$	-0.67*	-0.57	-0.19	-0.56
	(0.40)	(0.51)	(0.45)	(0.90)
Fiscal shock$_t$ · Foreign share$_{t-1}$	2.37**	2.65**	2.85	5.80
	(1.13)	(1.24)	(1.80)	(3.80)
Fiscal shock$_t$ · Financial openness$_{t-1}$	0.03	-0.00	-0.02	-0.05
	(0.05)	(0.05)	(0.05)	(0.08)
Other controls	Yes	Yes	Yes	Yes
Observations	405	387	369	352

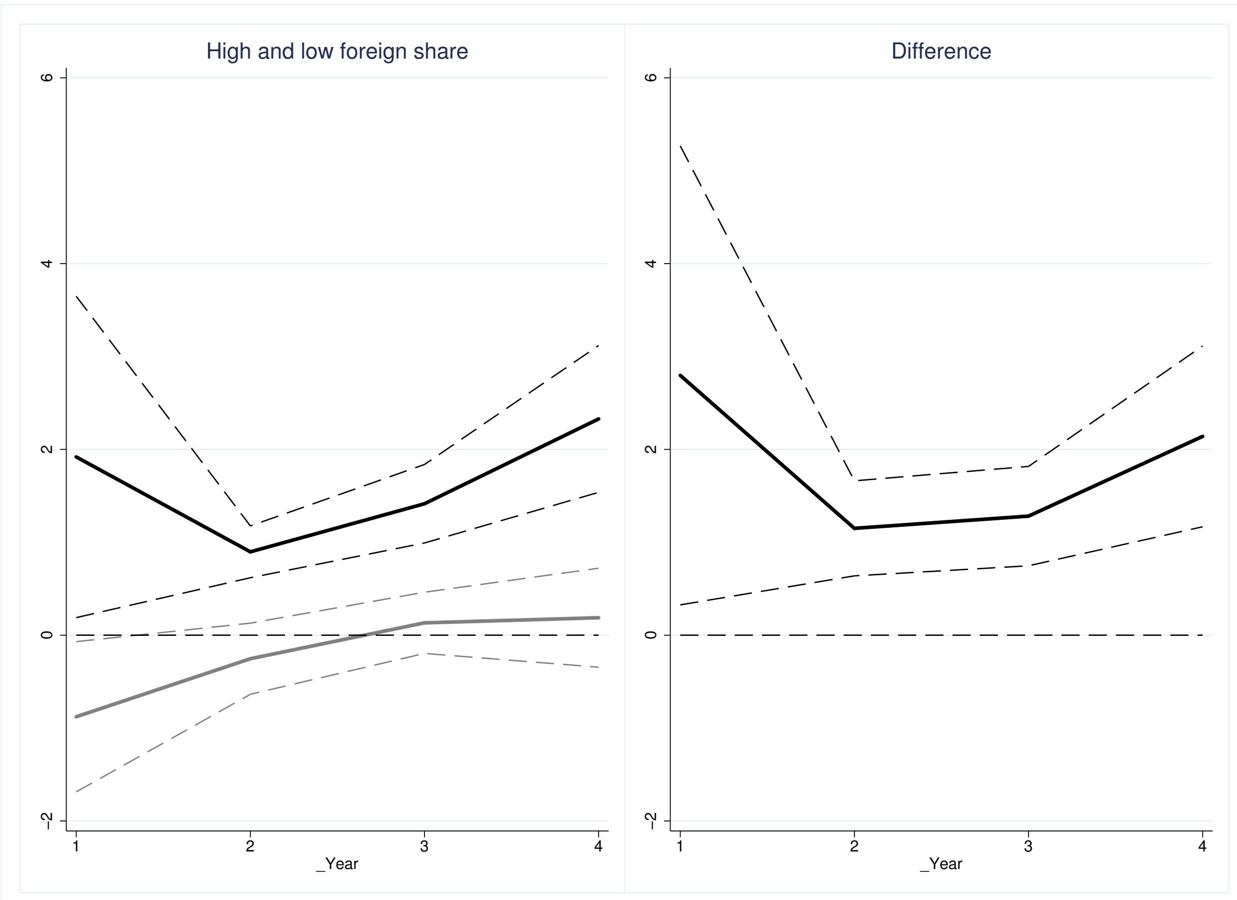
Notes: The fiscal shock is the change in the cyclically-adjusted primary deficit instrumented by the narrative shocks from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Foreign share is our measure of foreign holdings of public debt as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table F3: **International panel foreign share and credit rating: Output multiplier**

	Year t+1	Year t+2	Year t+3	Year t+4
Fiscal shock$_t$	-3.47	-5.11***	-7.10**	-7.39
	(4.21)	(1.86)	(3.10)	(5.34)
Fiscal shock$_t$ · Foreign share$_{t-1}$	4.67	3.32**	3.98*	7.91*
	(5.24)	(1.51)	(2.30)	(4.16)
Fiscal shock$_t$ · Credit rating$_{t-1}$	0.13	0.25***	0.37**	0.34
	(0.18)	(0.09)	(0.16)	(0.27)
Other controls	Yes	Yes	Yes	Yes
Observations	405	387	369	352

Notes: The fiscal shock is the change in the cyclically-adjusted primary deficit instrumented by the narrative shocks from Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). The magnitudes of the shocks reflect the expected future budgetary impact of the consolidations, as a percentage of GDP. Foreign share is our measure of foreign holdings of public debt as a percentage of total public debt. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure F3: **International panel foreign share: output multiplier AIPW**



Notes: Cumulative GDP multipliers from a fiscal shock equal to 1% of GDP for low (10th percentile of foreign holdings in the sample, solid gray lines) and high (90th percentile of foreign holdings in the sample, solid black lines) foreign share, and the difference between the two multipliers. Changes in the cyclically adjusted primary deficit are instrumented using the narrative measure on fiscal consolidation episodes by Guajardo et al. (2014b), updated by Kataryniuk and Valles (2018b). Following Jorda and Taylor (2016), we run the local projection using an augmented inverse probability weighting scheme (APIW). The (outer dashed lines) confidence bands represent significance at the 10% level.