

FISCAL SPILLOVERS: THE IMPORTANCE OF MACROECONOMIC AND POLICY CONDITIONS IN TRANSMISSION

Are fiscal spillovers today as large as they were during the global financial crisis? How do they depend on economic and policy conditions? This note informs the debate on the cross-border impact of fiscal policy on economic activity, shedding light on the magnitude and the factors affecting transmission, such as the fiscal instruments used, cyclical positions, monetary policy conditions, and exchange rate regimes. The note assesses spillovers from five major advanced economies (France, Germany, Japan, United Kingdom, United States) on 55 advanced and emerging market economies that represent 85 percent of global output—looking at government spending and tax revenue shocks during expansion and consolidation episodes. We find that fiscal spillovers are economically significant in the presence of slack and/or accommodative monetary policy and considerably smaller otherwise, which suggests that spillovers are large when domestic multipliers are also large. We also find that spillovers from government spending shocks are larger and more persistent than those from tax shocks and that transmission may be stronger among countries with fixed exchange rates. The evidence suggests that although spillovers from fiscal policies in the current environment may not be as large as they were during the crisis, they may still be important under certain economic circumstances.

Introduction

The global financial crisis rekindled the debate on the potential of fiscal policy to affect economic activity in other economies through cross-border spillovers. During the crisis, with substantial and persistent economic slack and monetary policy at the effective lower bound in many countries, fiscal stimulus was widely advocated, not least because the expected positive spillovers would add to the effectiveness of the effort at the multilateral level. More recently, the

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global effects of fiscal policy have been discussed, for example, in connection with changes—either pursued or contemplated—in the macroeconomic policy mix in Japan and the United States. There is also an ongoing debate on whether European countries with excess external surpluses should raise fiscal spending, in part to support growth elsewhere. At the same time, stronger cyclical positions—and a related easing of monetary policy constraints—in many countries raise questions about whether spillovers from fiscal stimulus today would be as large as they were during the global financial crisis.

We examine the magnitude and determinants of cross-border output spillovers from fiscal actions. We analyze the implications of fiscal policy changes in large advanced economies—France, Germany, Japan, the United Kingdom, and the United States—for economic activity in a group of advanced and emerging market economies. The analysis draws general lessons about the main factors behind the transmission of fiscal shocks.

Theory suggests that spillovers depend on the fiscal instruments involved, as well as the cyclical conditions and monetary and exchange rate policy in both shock-emitting (source) and shock-receiving (recipient) economies. First, fiscal shocks associated with expenditure measures are likely to have a direct (and relatively swift) impact on economic activity, while tax measures act indirectly through their impact on saving, consumption, and investment. The strength of these domestic effects—as captured by the domestic multipliers—will, in turn, influence the impact fiscal policy will have on other countries through trade and other channels. Second, spillovers can be stronger if there is a large amount of economic slack—which reduces the extent of crowding out of private sector activity—or if monetary policy is constrained (for example, by the effective lower bound)—since the response of monetary policy to a fiscal shock in both source and recipient countries can dampen its impact. Finally, while a fixed exchange rate between source and recipient may dampen spillovers because relative price adjustment is less pronounced, it may also amplify

them if trade integration is stronger among a group of pegging countries. Which effect dominates is an empirical question.

The empirical literature on fiscal spillovers so far has focused on a limited set of countries and fiscal policy measures. For example, many studies focus on member countries of the Organisation for Economic Co-operation and Development (OECD) only and either just government spending shocks or only fiscal consolidation episodes. Several papers center their analysis on the euro area (Beetsma and Giuliodori 2004; Beetsma and others 2006; Blanchard, Erceg, and Lindé 2017; Hollmayr 2012) and find sizable spillovers within the currency union. Other papers analyze only fiscal consolidations (Goujard 2017; Poghosyan 2017) or focus on a small group of countries or states within a large federal union (Nicar 2015; Nakamura and Steinsson 2014). Finally, work by Auerbach and Gorodnichenko (2013) studies government spending shocks in 30 OECD economies, finding that spillovers are statistically significant only for shocks coming from a few large OECD countries; for the full sample of countries, spillovers are large and statistically significant only during recessions. Most papers use long sample periods—which makes it difficult to control for structural breaks, such as the introduction of the euro or increasing trade integration—and limit themselves to a single shock identification methodology, leaving questions about the robustness of the identification strategy.

We add to the existing literature by expanding the scope of the analysis. Specifically, we consider both government spending and tax revenue shocks during both budget expansion and consolidation episodes, for a larger set of recipient countries than has yet been studied, including advanced economies as well as emerging markets representing 85 percent of world GDP. In addition, we focus on a more recent sample period than in other studies, which is less likely to include structural breaks associated with increases in trade openness and economic integration across countries. This opens the door to examining fiscal spillovers on economic activity under a wide range of conditions and drawing policy lessons on how they depend on the type of fiscal instruments used and economic conditions in both source and recipient economies.

Our empirical approach to estimating spillovers draws on previous work by Auerbach and Gorodnichenko (2013). In our baseline specification, we identify fiscal shocks for the five systemic economies mentioned above following the structural vector

autoregression (SVAR) methodology of Blanchard and Perotti (2002) and focus our analysis on the period covering the first quarter of 2000 through the second quarter of 2016. This shock identification strategy differs from that of Auerbach and Gorodnichenko (2013), but allows us to identify shocks to tax revenues in addition to expenditure shocks, at quarterly frequency. We then combine the information contained in the five source country shocks using trade weights to assess global spillovers onto output. To do this, we use the local-projections method of Jordà (2005), which allows us to estimate our baseline specification and introduce nonlinearities to analyze the role that different factors play in transmission. Our estimates of spillovers reflect all channels of transmission (broadly, trade and financial), though we are unable to disentangle their relative importance explicitly. The baseline approach is subjected to extensive robustness checks using alternative shock identification methods and estimation techniques for the spillover effects.

Our results point to a number of important take-aways. Economic slack and policy constraints can lead to large spillovers from fiscal policy, but spillovers are relatively small during normal times—that is, when economic slack is limited and monetary policy is not constrained. The fiscal policy instrument and policy frameworks also play a role in transmission. More specifically:

- *Fiscal instruments.* Changes in government expenditures have larger and more persistent spillovers than tax revenue measures, particularly over a longer horizon.
- *Cyclical positions.* Spillovers from a fiscal shock are smaller when there is less economic slack in the source or in the recipient economies.
- *Monetary policy constraints.* Policy rates near the effective lower bound amplify spillovers from fiscal policy, as monetary policy will be doing less to offset fiscal shocks. Again, this effect can be at work both in source and in recipient economies.
- *Geographical impact.* Fiscal shocks in the United States have a global impact, with a larger effect in Canada and Latin America. The global impact of shocks from Germany and France is more modest, but they are particularly relevant for Europe.
- *Exchange rate regimes.* Results suggest that spillovers may be amplified for recipient countries whose currencies are pegged with respect to the source country's currency.

The rest of the note is organized as follows. The next section explains the methodology and data used for identification of fiscal shocks. The third section assesses the evidence on fiscal spillovers under the baseline and places our results among comparable studies. The fourth section analyzes the role of critical factors in transmission—cyclical positions and monetary policy constraints. The fifth section assesses the role of exchange rate regimes and is followed by a concluding section. A number of annexes tackle technical issues and perform robustness tests for the results in the baseline.

Identification of Fiscal Shocks

Our identification strategy stresses robustness. This section describes the methodology and data used to identify fiscal shocks in the baseline specification. We rely on the SVAR methodology of Blanchard and Perotti (2002) for the baseline results and explore alternative identification strategies, such as forecast errors and comparable narrative shocks, as robustness checks.¹ We also assess whether our baseline strategy identifies relevant fiscal events by comparing the SVAR shocks with major historical fiscal policy changes documented in the literature, using the narrative method, where available (see, for example, Romer and Romer 2010; DeVries and others 2011; Cloyne 2013; Kataryniuk and Valles 2015).² Finally, we examine the impact of our structural shocks on the domestic economy, allowing for a comparison with the literature on domestic multipliers.

A key advantage of our baseline methodology is that it allows for comprehensive coverage and consistent joint identification of revenue and spending shocks across source countries. As noted in the introduction,

¹Forecast errors are constructed as the difference between actual and projected values of the relevant fiscal variable (spending or taxes). Shocks based on forecast errors are identified as residuals from a regression of the spending- or tax-revenue-based forecast errors on GDP forecast errors and lagged macroeconomic variables.

²The narrative method, pioneered by Romer and Romer (2010), makes use of the narrative record, such as budget documents and speeches, to identify the size, timing, and principal motivation for fiscal actions. Romer and Romer's data set also separates fiscal policy changes into those made for reasons related to prospective economic conditions and discretionary actions (for example, to reduce public debt), thereby allowing for a causal analysis of the impact of fiscal policy on output. A shortcoming of narrative-based shocks is that, for most countries other than the United States, mostly consolidation shocks have been identified so far in the literature, making them not directly comparable to the structural shocks used in our analysis.

one contribution of this note is that it analyzes spillovers from shocks to both government spending and tax revenue—for both consolidation and expansion episodes—across five major shock-emitting countries: France, Germany, Japan, the United Kingdom, and the United States. The SVAR methodology facilitates comprehensive coverage and, most importantly, joint identification guarantees that spending and tax shocks are orthogonal to one another, which is critical for comparing spillovers from these two fiscal variables.³

Methodology and Data

Blanchard and Perotti's (2002) methodology for identification of government spending and tax revenue shocks relies on two identifying assumptions. First, it assumes that *discretionary* fiscal policy (government spending or taxes) does not respond contemporaneously to unexpected changes in output, even though output can respond contemporaneously to fiscal variables. Second, it uses information from outside the model to calibrate the contemporaneous *automatic* response of tax revenues to output (the tax elasticity). The contemporaneous automatic response of government spending to changes in output is assumed to be zero. Together, these assumptions are equivalent to an ordering restriction in the SVAR, in which innovations in output are placed after innovations in the fiscal variables, with additional conditioning information given by the tax elasticity (see Annex 3 for details).

The analysis uses quarterly data, which is instrumental to the first identification assumption. The assumption capitalizes on the fiscal policy decision lags: it takes time for policymakers to assess unexpected changes in cyclical conditions and make spending and/or tax decisions, including passing new measures through the legislature and implementing them. As Blanchard and Perotti (2002) note, the assumption is more likely to hold in the short term, making the use

³As noted in Blanchard and Perotti's original paper, possible implementation lags imply that structurally identified shocks could be subject to a fiscal foresight problem, in which the "shocks" may be anticipated by the private sector as a result of earlier announcement of policy changes (see, for example, Forni and Gambetti 2010; Ramey 2011; Leeper, Richter, and Walker 2012; Leeper, Walker, and Yang 2013; and Ben Zeev and Pappa 2015). However, there is some evidence that fiscal foresight may not present a critical issue, especially for assessing the impact of fiscal actions on relatively slow-moving variables such as activity (Perotti 2014), as opposed to forward-looking variables such as the exchange rate (Forni and Gambetti 2016; Auerbach and Gorodnichenko 2016).

of quarterly-frequency fiscal and output data a key part of the identification strategy. In addition, the use of quarterly data—by increasing the degrees of freedom—also allows us to focus on the post-2000 period and avoid possible structural breaks related to increasing trade openness or economic integration across countries, such as the introduction of the euro.

We construct a database of quarterly government spending, tax revenues, and output for the five source countries. Our definition of government spending is the sum of government consumption and investment excluding transfers. On the revenue side, we use tax revenues where available and total government revenues in cases in which quarterly tax revenue data are absent or patchy (for example, Japan).⁴ The three series—spending, tax revenues, and output—are seasonally adjusted, converted into per capita real terms, and expressed in logarithms before entering the SVAR specification. The starting point of the sample period differs across countries depending on data availability, ranging from the first quarter of 1980 for the United States to the first quarter of 1995 for Japan (see Annex 1 for details).

Fiscal Shocks

The identified structural shocks using quarterly data are relatively small in magnitude (Table 1). As a share of respective source country GDP, the absolute values of the shocks to government spending average between 0.1 and 0.2 percent and those for shocks to tax revenues between 0.2 and 0.3 percent. The range of shocks varies across source countries and across fiscal instruments, but in most cases historical fiscal shocks are small.

The shocks offer a sensible narrative of fiscal policies adopted over the most recent decades. To assess the relevance of the structural shocks with respect to historical policy records, we have reviewed narrative descriptions of fiscal measures and contrasted the SVAR shocks' order of magnitude with narrative-based shocks estimated in the literature. Figure 1 describes two examples, one for tax revenue shocks in the United States and the other for public-spending shocks in Germany.

⁴In cases in which both tax and total revenues are available, shocks identified using the two revenue measures are very highly correlated. Consistent data on specific tax instruments (for example, corporate and personal income tax, consumption tax) are generally not available.

Table 1. Properties of Structural Shocks
(Percent of source GDP)

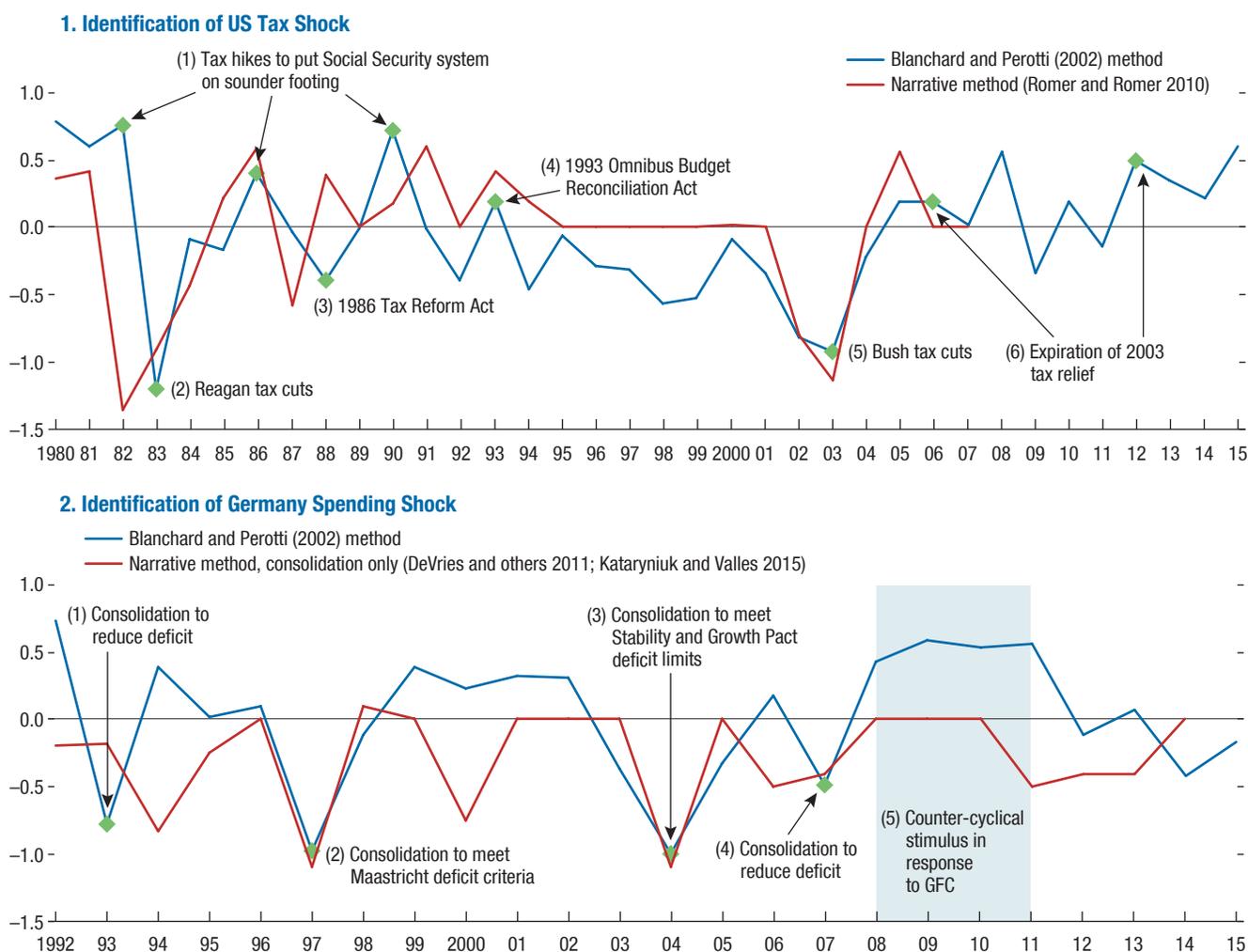
	Mean (Absolute Value)	Standard Deviation	Maximum
Government Spending Shock			
France	0.10	0.11	0.21
Germany	0.14	0.18	0.46
Japan	0.16	0.19	0.56
United Kingdom	0.14	0.17	0.49
United States	0.10	0.14	0.50
Tax Revenue Shock			
France	0.29	0.42	1.49
Germany	0.28	0.35	0.82
Japan	0.21	0.28	1.02
United Kingdom	0.23	0.29	0.70
United States	0.19	0.27	0.55

Source: IMF staff calculations.

- *Tax shocks in the United States.* The narrative shocks identified by Romer and Romer (2010) are the most comparable to the ones identified in this note, in terms of both coverage (both expansion and consolidation episodes) and frequency (quarterly). They are, however, only available until 2007. Figure 1 shows that, as in the narrative approach, the structural shocks capture the tax cuts enacted under the Reagan and Bush administrations as well as the subsequent expiration of the latter. The same is true for tax hikes during the 1980s, which were put in place following the Greenspan Commission's recommendations to shore up the financing of the Social Security system. The order of magnitude identified in the narrative approach is also similar to that identified by the structural shocks.
- *Spending shocks in Germany.* Figure 1 shows several consolidation episodes that are well captured by both our SVAR approach and the narrative database of DeVries and others (2011)—which identifies only consolidation shocks. In particular, consolidations related to the adherence to Maastricht and Stability and Growth Pact deficit criteria in 1997 and 2004, respectively, are identified clearly in both methods and show very similar magnitudes. In addition, countercyclical spending following the global financial crisis is well captured by our structural shocks—but not by the narrative record, since it features only consolidations.

Finally, the structural shocks have a statistically and economically significant impact on the domestic economy. Consistent with traditional Keynesian theory and previous empirical work, estimates of domestic

Figure 1. Tracking US Tax Shock and Germany Spending Shock
(Percent of GDP)



Sources: Romer and Romer 2010; DeVries and others 2011; Kataryniuk and Valles 2015; and IMF staff calculations.
 Note: GFC = global financial crisis.

multipliers from our SVAR shocks tend to be larger for spending instruments (slightly above 1) than for tax instruments (slightly below 1).⁵ There is also some heterogeneity in the size of the domestic tax multipliers across the five source countries, with the multiplier for the United States being relatively larger than that of its

⁵A dollar of government spending contributes directly to aggregate demand, whereas firms and/or households can spend or save a dollar of tax cuts. Thus, the spending multiplier would be larger than the tax multiplier if the marginal propensity to consume is less than 1. Mineshima, Poplawski-Ribeiro, and Weber (2014), based on a survey of 41 studies, document that first-year multipliers for government spending tend to be larger than those for tax revenues in advanced economies.

European peers or Japan, possibly reflecting different tax structures across countries as well as the specific tax instruments being used (see Annex 4 for details).

A plausible expectation is that larger domestic fiscal multipliers will lead to larger cross-border spillovers. Naturally, a larger increase in domestic consumption and investment in the source country following a fiscal shock will give rise to higher import demand, which directly benefits trading partners (the so-called *expenditure-shifting* effect or leakages). The marginal propensity to import in both public and private sectors plays a key role: if most of the increase in spending goes to nontradable sectors, spillovers from expendi-

ture shifting will be small. In principle, however, it is possible for a fiscal shock to have spillover effects even if the domestic impact and/or the marginal propensity to import is relatively small. This can happen, for example, if despite crowding out of domestic private spending, fiscal shocks trigger an increase in import demand associated with an appreciation of the exchange rate in source countries (the so-called *expenditure-switching* effect).⁶

Fiscal Spillovers: Baseline Estimates

Baseline Specification

The local-projections method is used to estimate the response of output in recipient countries to foreign fiscal shocks, similar to the approach of Auerbach and Gorodnichenko (2013).⁷ The specification at time horizon h (for $h = 0, \dots, H$) is given by

$$\frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} = \alpha_b \frac{Shock_{it}}{Y_{i,t-1}} + \sum_{l=1}^L \beta'_{hl} \mathbf{X}_{i,t-l} + \theta_{hi} + \mu_{ht} + \varepsilon_{iht} \quad (1)$$

in which Y_{it} is real GDP in recipient country i at quarter t ; $Shock_{it}$ is the foreign fiscal shock facing country i at time t (to be specified subsequently); \mathbf{X}_{it} is a vector of control variables including lags of the fiscal shock, lags of GDP growth, and lags of external demand—measured as a weighted average of trading-partner growth rates (we choose the number of lags $L = 4$; results are robust to using different lag structures); and θ_{hi} and μ_{ht} capture the country and time fixed effects. As the foreign fiscal shock is expressed in units of recipient country GDP for the panel estimation ($Shock_{it}$ scaled by lagged GDP), the coefficient α_b is analogous to a domestic multiplier of an external shock (Hall 2009; Barro and Redlick 2011). The impulse response for H periods is constructed from a sequence of estimates $\{\alpha_b\}_{b=0}^H$.

⁶In a Mundell-Fleming-Dornbusch framework, a fiscal expansion puts upward pressure on interest rates, appreciates the nominal exchange rate, and increases domestic prices, which results in a real appreciation (see, for example, Fleming 1962; Mundell 1963; and Dornbusch 1976). Note, though, that other frameworks can deliver different exchange rate predictions (see, for example, Obstfeld and Rogoff 1995), in which case the expenditure-switching effect could go in the opposite direction.

⁷This approach was selected, in part, because it is well suited to estimating nonlinear specifications—that is, spillovers under different states of the economy—which is an issue to which we return later in the note.

The recipient sample includes a broad range of countries. As a departure from the existing fiscal spillover literature, which tends to focus on a small set of advanced European or OECD economies, our estimation sample includes 55 recipient economies representing almost 85 percent of global output (on a purchasing power parity basis). The model is estimated using quarterly data for the period covering the first quarter of 2000 through the third quarter of 2016. (See Annex 2 for details on data and list of countries.)

The fiscal shock combines country-specific shocks from the five source economies, weighting their relative importance using trade links with recipient countries. Specifically, the fiscal shock facing recipient economy i in time t is given by

$$Shock_{it} = \sum_{j=1}^5 \frac{M_{ijt-1} s_{jt} E_{j,t-1}}{M_{j,t-1} E_{i,t-1}}, \quad (2)$$

in which j denotes source country, M_{ijt} is country j 's goods imports from country i at time t , M_{jt} is total goods imports by country j , s_{jt} is the identified fiscal shock in country j (in its own currency in real terms), and E_{jt} is country j 's US dollar real exchange rate. Thus, the second term in the summation equals the real monetary value of the fiscal shock emanating from country j converted into units of recipient country i 's currency. This is then scaled by the trade exposure between country i and country j (the first term), which captures the relative importance of recipient country i as a supplier of the source country's imports.⁸ The rationale is that, all else equal, recipient countries with tighter trade linkages to the source would be expected to receive larger shocks in the form of larger changes in export demand.⁹ Finally, the weighted shocks

⁸Bilateral trade data are available for trade in *goods* only.

⁹Implicit in this weighting scheme is the assumption that the marginal propensity to import is the same for all source countries and for both spending and tax shocks. An alternative scheme that attempts to account explicitly for the differences in marginal propensity to import across source countries and types of shocks would be to have an additional scaling factor, M_{jt}/G_{jt} for government spending shocks and M_{jt}/T_{jt} for tax revenue shocks, in which G_{jt} and T_{jt} denote total government spending and tax revenues in country j , respectively. However, these ratios would serve only as very rough proxies for the marginal propensity to import of the public and private sector in any given country. At the same time, such a specification would introduce arbitrary asymmetries into the size of spending relative to tax shocks being transmitted abroad, confounding the comparison of spillover effects from different fiscal instruments. Thus, given that results are robust to alternative weighting schemes (more on this later in the note), we keep the simple scheme in equation (2) for ease of interpretation of the relative magnitude of spillovers from spending and tax shocks.

Table 2. Top 10 Trading Partners, by Share of Total Imports, of Source Economies (Percent)

Asia		Europe		Americas					
France		Germany		Japan		United Kingdom		United States	
1	Germany 18.9	1	Netherlands 12.6	1	China 18.8	1	Germany 13.5	1	Canada 16.8
2	Belgium 10.7	2	France 8.5	2	United States 11.7	2	United States 8.4	2	China 13.8
3	Italy 8.4	3	Belgium 6.9	3	Australia 5.7	3	Netherlands 7.3	3	Mexico 11.8
4	Netherlands 7.5	4	Italy 6.0	4	Korea 4.4	4	France 6.9	4	Japan 7.5
5	Spain 7.0	5	China 5.2	5	Indonesia 4.3	5	China 5.6	5	Germany 5.0
6	United Kingdom 5.7	6	United Kingdom 5.0	6	Malaysia 3.4	6	Belgium 5.0	6	United Kingdom 2.9
7	United States 4.9	7	United States 4.9	7	Germany 3.2	7	Norway 4.8	7	Korea 2.6
8	China 3.4	8	Austria 4.4	8	Thailand 3.1	8	Italy 4.2	8	France 2.0
9	Switzerland 2.7	9	Switzerland 4.0	9	Russia 1.6	9	Ireland 3.5	9	Italy 1.8
10	Russia 1.6	10	Czech Republic 3.7	10	Canada 1.6	10	Spain 3.1	10	Malaysia 1.5

Source: IMF staff calculations.

Note: Table shows top 10 partners based on trading partner's average share in respective source country's total imports for 2000–15.

are added up across the five source countries.¹⁰ The combined shocks are relatively small in magnitude, with spending (tax) shocks averaging about 0.06 (0.1) percent of recipient country GDP. We also construct a shock to the overall fiscal balance—henceforth referred to as the *overall fiscal shock*—from shocks to government spending and tax revenues (spending minus tax), such that a positive shock implies a reduction in the source country's fiscal balance.

The working assumption behind the construction of the shock is that fiscal policy is transmitted primarily through trade. For each recipient, the trade weight plays the key role of scaling shocks coming from different source economies based on the strength of trade linkages.¹¹ Combining shocks from all source economies allows us to use critical information from the variability of shocks coming from the major trading centers, as trading patterns indicate that any recipient country potentially receives shocks from more than one source country at any point in time (Table 2). In addition, among the source economies in this study, the United States tends to trade with a wide range of countries, whereas the others are more regionally focused (for example, Germany's most important trading partners are concentrated in Europe). This implies that, based on our trade-driven weighting scheme, US fiscal policy is expected to have a more global impact, while fiscal shocks from other source

economies will likely have a more regional impact. Of course, whether this is indeed the case is ultimately an empirical question.

For ease of interpretation of the economic magnitude, results are presented with shocks normalized to an average 1 percent of GDP across *source* countries. Our baseline specification expresses the fiscal shocks in terms of recipient country GDP (see equation (1)), which is necessary to combine shocks from different sources. Although standard in the literature on fiscal spillovers, this transformation can make interpreting the magnitude of spillovers challenging. To facilitate the interpretation of economic magnitude, we consider how much recipient countries' GDP changes when source countries change their overall fiscal stance, spending, or taxes by 1 percent of their own GDP. This requires rescaling our panel results using relative GDP levels and trade links as follows:

$$Spill_{i,j} = S_j \frac{M_{i,j}}{M_j} \frac{Y_j}{Y_i} \alpha, \quad (3)$$

in which S_j is the source country shock as a percent of its own GDP (for this exercise, we consider a 1 percent of GDP shock). Then, this shock is weighted as in our baseline model, using the recipient country's share of the source country's total imports $\frac{M_{i,j}}{M_j}$. To apply the spillover coefficient (α) to this weighted shock, we need to express it in units of recipient country GDP, that is, to multiply by the ratio $\frac{Y_j}{Y_i}$, which captures the relative size of source and recipient country GDP—both measured in US dollars.¹²

¹²Results shown in terms of source-country-GDP shocks would be unchanged under plausible alternative weighting schemes, as any

¹⁰Estimated fiscal shocks are uncorrelated across countries.

¹¹This does not preclude spillovers through other channels, since our estimates capture the overall response of recipient country GDP. However, the use of a trade-driven weighting scheme may result in some bias of the estimates in situations in which other channels are not proportional to trade—for example, if a recipient country's financial exposure to a source country differs markedly from its trade exposure, although these cases are likely limited.

Baseline Results

We find significant spillovers from fiscal shocks in the major economies, with spending measures having a larger and more persistent effect than tax measures (Figure 2). The estimates indicate that, on average, an overall fiscal shock equal to an average 1 percent of source countries' GDP would increase recipient output by about 0.04 percent on impact, reaching 0.1 percent at the peak—around the third quarter after the shock—before starting to dissipate. Regarding the specific fiscal instrument, an increase in foreign fiscal spending of similar size is estimated to increase output by about 0.05 percent on impact, with spillovers stabilizing at about 0.2 percent over a two-year horizon—the impact is highly statistically significant.¹³ The output response to a foreign tax hike of equal size is more muted and short lived, with output declining by 0.03 percent on impact and reaching a trough of about 0.05 percent by the end of the first year before starting to reverse. The average first-year impact of the tax shock is statistically significant, although it is generally less precisely estimated compared to the spending shock.¹⁴ These results highlight the importance of the fiscal instruments at the source in determining the magnitude and persistence of cross-border spillovers and are broadly consistent with our estimates of domestic spending multipliers being generally larger than domestic tax multipliers. They are also intuitive, since spillovers from a spending shock are directly triggered by the public sector's decision to consume and/or invest, whereas spillovers from a tax shock hinge on the saving, consumption, and investment decisions of many private agents in the source economy.

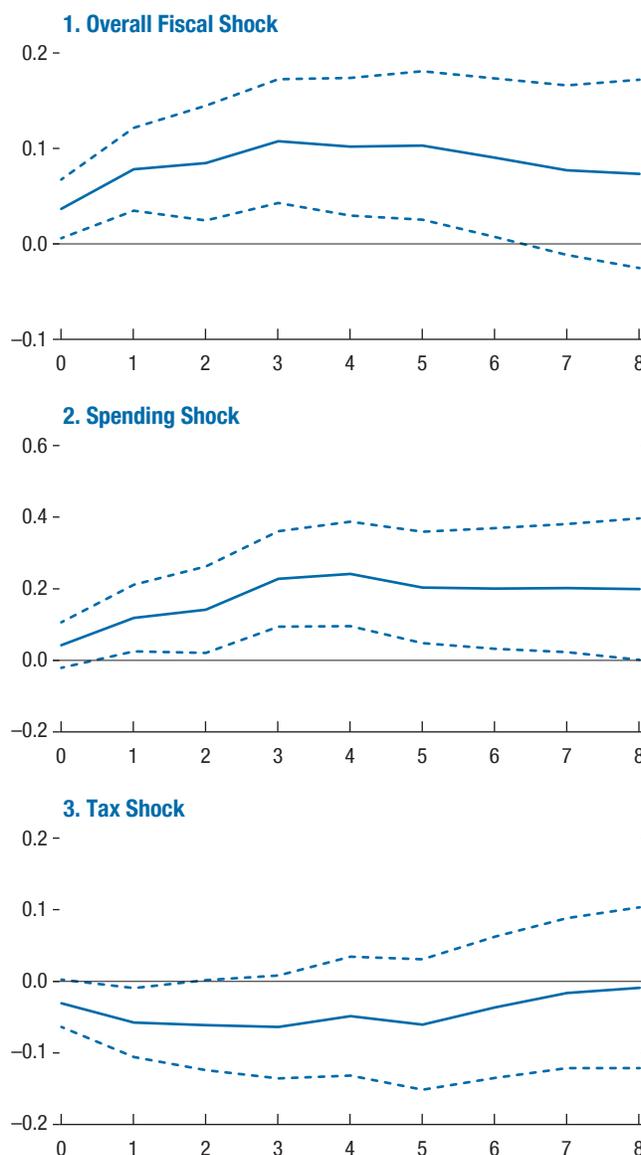
Our estimates are robust to alternative specifications and shock identification strategies. The baseline results are robust to inclusion of additional control variables (for example, short-term interest rate,

alternative weighting schemes would also require us to recalculate the spillover coefficient estimated in equation (1), resulting in an equal-and-offsetting adjustment of this coefficient, since any transformation applied to the *source* shock would be constant across all *recipient* countries.

¹³We use the term “spillovers” to refer to a recipient GDP's response to the *initial* fiscal shock at the source, that is, a point estimate of the impulse-response function. Our approach does not estimate “multipliers” or “cumulative multipliers,” as the aggregation of shocks across source countries makes this infeasible.

¹⁴The standard errors are clustered at the country level. The fiscal shock is generated outside of the local-projections model presented in equation (1), implying that confidence bands may be wider than presented in Figure 2 if uncertainty around the estimated shocks is also taken into account.

Figure 2. Dynamic Responses of Recipient Countries' Output Level to Fiscal Shocks
(Percent)



Source: IMF staff calculations.

Note: Numbers along the horizontal axes represent quarters; $t = 0$ is the quarter of respective shocks. Solid lines denote point estimates, and dashed lines denote 90 percent confidence bands. Shocks are normalized to an average 1 percent of GDP across the source countries.

output gap, unemployment rate, and fiscal position in recipient countries).¹⁵ In addition, to account for possible cross-sectional correlation among our panel

¹⁵As long as any omitted variable not considered in this list is uncorrelated with the fiscal shock in the source country, then its omission will not affect our spillover estimates.

of recipient countries, we conduct a robustness check by applying the Driscoll and Kraay (1998) correction to our standard errors; resulting confidence bands are nearly identical to those in the baseline. We also obtain similar spillover estimates—albeit slightly larger in magnitude—using a panel vector autoregression (VAR) estimation methodology that explicitly allows for endogenous responses of exchange rates and interest rates to fiscal shocks, which can also affect the dynamics of output. In addition, estimates using comparable fiscal shocks obtained from alternative identification strategies—namely, forecast errors and the narrative approach—also yield spillover estimates that are similar in size and dynamics, providing reassurance that our results are not driven by the SVAR methodology for identifying fiscal shocks (details on robustness tests are discussed in Annex 5).¹⁶

Our estimates of fiscal spillovers are also broadly in line with earlier estimates. Focusing on the one-year average impact, our estimates indicate that a 1 percent of GDP overall fiscal shock in an average major advanced economy would raise output in the recipient country by about 0.08 percent; the impact would be 0.15 percent and -0.05 percent for a spending and a tax hike of the same magnitude, respectively. Although differences in country and time samples as well as shock identification make a direct comparison challenging (for example, our sample includes several years of significant economic slack), these are of the same order of magnitude as those found in previous work. For example, Beetsma and others (2006) find that a 1 percent of German (French) GDP shock to government spending results in a European GDP response of about 0.14 (0.08) percent after two years; for a tax shock, spillovers are about -0.05 (-0.03) percent. Compared with studies that express shocks in units of recipient country GDP (Auerbach and Gorodnichenko 2013; Goujard 2017), estimates are also broadly similar (see details in Annex 6).

Estimates of spillovers differ across regions, with those from the United States having a more global impact than those from other countries. Table 3 shows approximate calculations of potential spillover effects by region, using the baseline spillover coefficient estimate, trade links, and relative size between a particular

¹⁶We use the narrative-based tax shocks for the United States as identified by Romer and Romer (2010) to conduct the robustness test, since these are the most comparable narrative shocks to our structural shocks (quarterly frequency, covering both expansion and consolidation episodes).

source country and the average country in different geographical regions.¹⁷ These should be interpreted as illustrative of the relative regional impact of fiscal shocks from different source countries, rather than precise estimates of the magnitude of spillovers. The calculations suggest that fiscal shocks in the United States will likely have larger spillovers than shocks in other countries, owing to the larger size and broader trade links of the US economy. For example, a 1 percent of US GDP government spending shock would increase the average recipient country GDP by about 0.33 percent over the first year, compared to a 0.15 percent impact from a 1 percent of German GDP spending shock.¹⁸ In addition, spillovers vary across regions, reflecting trade patterns. As expected, US shocks have a relatively global reach, with larger impact in Canada, Latin America, and Asia, where trade linkages with the US economy are tighter. By contrast, the impact of European shocks is mainly concentrated in Europe and that of Japanese shocks in Asia, given those source economies' more regional trading focus.

The Role of Cyclical Positions and Monetary Policy Constraints

The business cycle and monetary policy conditions can affect the magnitude of spillovers. In general, a larger impact of fiscal shocks in a source economy is expected to give rise to more significant spillovers. Hence, factors expected to affect the domestic impact of fiscal shocks—relevant for source countries—and/or their cross-border transmission should affect spillovers.

The literature on domestic fiscal multipliers points to the state-dependency of the results. Theoretical models indicate that the impact of fiscal shocks can be strong in the presence of significant economic slack, due to reduced crowding out of private sector activity (Michaillat 2014) or an increase in the share of liquidity-constrained households (Canzoneri and others 2016). In addition, when monetary policy is

¹⁷For simplicity, only spending and tax shocks are presented. These simple calculations are intended to allow for comparison to other studies in the literature and may be misleading for some countries in our sample—an example of this are spillovers from Japan to Asia, which may be overstated by these calculations, since Japan is a relatively closed economy and as such accounts for a relatively small share of Asia's overall exports.

¹⁸Note that 1 percent (the unit we pick for illustrative purposes) represents an abnormally large shock in historical terms. To put this in context, the largest US government spending shock in our sample is 0.5 percent, with the average (absolute) value at only 0.1 percent.

Table 3. Average One-Year Regional Impact of Fiscal Shocks
(Percent)

	Canada + LAC5	Europe	Asia	Average
Government Spending Shock				
France	0.01	0.14	0.02	0.08
Germany	0.02	0.26	0.04	0.15
Japan	0.10	0.04	0.35	0.10
United Kingdom	0.02	0.14	0.04	0.09
United States	0.84	0.20	0.47	0.33
Tax Revenue Shock				
France	0.00	-0.05	-0.01	-0.03
Germany	-0.01	-0.09	-0.01	-0.05
Japan	-0.03	-0.01	-0.12	-0.04
United Kingdom	-0.01	-0.05	-0.01	-0.03
United States	-0.30	-0.07	-0.17	-0.12

Source: IMF staff calculations.

Note: Table shows regional responses to a 1 percent of GDP shock in the source country. LAC5 includes Brazil, Chile, Colombia, Mexico, and Peru. The impact is calculated by scaling the estimated spillover coefficient by a country-specific scaling factor, which is a function of the trade exposure (recipient country's share in source country's imports) and source country GDP relative to recipient country GDP.

constrained by the effective lower bound—such as when the economy is in a liquidity trap—the lack of monetary policy response to higher expected inflation following a fiscal shock causes real interest rates to decline, thereby crowding in domestic demand and increasing the multiplier.¹⁹ Several empirical studies have found larger government spending multipliers when the economy is in recession and/or when monetary policy is operating at the effective lower bound.²⁰

Spillovers from fiscal shocks can differ depending on the state of the economy as well, in both source and recipient countries. When the source country has substantial slack or policy rates are near the effective lower bound, the larger domestic impact of a fiscal shock

¹⁹See, for example, Christiano, Eichenbaum, and Rebelo 2011; Eggertsson 2011; Woodford 2011; and Blanchard, Erceg, and Lindé 2017. This can be true for expansionary fiscal shocks as well as contractionary shocks. For example, if central banks aim for a more accommodative stance than feasible, a fiscal expansion may be fully accommodated, thereby increasing domestic multipliers and spillover effects. This rationale applies with a (rather unlikely) caveat. Should the actual and shadow policy rates in the source economy be at zero at times in which the economy is closing the output gap, nothing would prevent a policymaker from hiking rates to counteract fiscal expansions, preventing an amplification of the fiscal shock.

²⁰See, for example, Almunia and others 2010; Gordon and Krenn 2010; Auerbach and Gorodnichenko 2011; Auerbach and Gorodnichenko 2012; DeLong and Summers 2012; Blanchard and Leigh 2014; and Dell'Erba, Koloskova, and Poplawski-Ribiero 2014. On the other hand, there are studies that find little to no state-dependent effects in the United States (for example, Ramey and Zubairy, forthcoming, and Owyang, Ramey, and Zubairy 2013).

implies greater demand for imports and thus may produce larger spillovers through expenditure shifting. In addition, when they are facing an external shock, recipient economies will be affected more if (1) they are unable or unwilling to counteract it with countercyclical monetary policy, (2) slack reduces the extent of crowding out from higher export demand to the rest of the economy, or (3) the share of liquidity-constrained households in the economy is substantially higher during periods of slack.²¹ Consistent with these predictions, our results show that spillovers are small during normal times and much larger when either the source or recipient economy has slack or monetary policy is close to the effective lower bound. We note, however, that the estimates for slack and effective lower bound should be interpreted with caution, as it is difficult to disentangle these two states empirically, given that they often occur in tandem in our sample.²²

Recipient Countries

We first examine how spillovers vary with the state of the recipient economy. We estimate a nonlinear version of the baseline specification, in which we partition the shock as well as the control variables according to the “state” variable of interest (that is, output gap or short-term interest rate); this allows us to consider spillovers from fiscal shocks under different economic states. Thus, following Auerbach and Gorodnichenko (2013), we adapt the baseline specification from equation (1) in the following way:

$$\begin{aligned} \frac{Y_{i,t+b} - Y_{i,t-1}}{Y_{i,t-1}} = & \alpha_{1b} I_{i,t-1} \frac{Shock_{it}}{Y_{i,t-1}} + \alpha_{2b} (1 - I_{i,t-1}) \frac{Shock_{it}}{Y_{i,t-1}} \\ & + \sum_{l=1}^4 \beta'_{1bl} I_{i,t-1} \mathbf{X}_{i,t-l} \\ & + \sum_{l=1}^4 \beta'_{2bl} (1 - I_{i,t-1}) \mathbf{X}_{i,t-l} \\ & + \theta_{bi} + \mu_{bt} + \varepsilon_{ibt} \end{aligned} \quad (4)$$

in which $I_{i,t}$ takes the value of either 1 or 0, indicating the state in recipient country i in period t . We consider two different states for a recipient country's cyclical

²¹Credit market imperfections could also play a role in increasing multipliers when a country is in a liquidity trap (see Carrillo and Poilly 2013).

²²For example, in our post-2000 sample, about 26 percent of country-quarter observations fall under the definition of “effective lower bound,” three-quarters of which coincide with economic slack; similarly, about 55 percent of observations fall under the definition of “slack,” 35 percent of which coincide with the effective lower bound.

position (slack/no slack) and two different states for the ability of its monetary policy to respond to shocks (near the effective lower bound/normal times). In both cases, spillovers under the two different states can then be examined by comparing the estimated α_{1b} and α_{2b} parameters.

In the presence of economic slack, spillovers tend to be larger than in normal times. Table 4 provides estimates for economic slack corresponding to a negative output gap in the recipient, which show that spillovers are larger under this condition for an overall fiscal shock as well as separately for government spending and tax revenue shocks in the source. Specifically, over the first year, the spillover effects under slack are 0.11, 0.2 and -0.08 percent for an overall fiscal shock, a government spending shock, and a tax shock, respectively.²³ By contrast, during periods of no economic slack in the recipient, the corresponding spillover estimates are 0.06, 0.08, and -0.04 percent, respectively.²⁴

Spillovers are even larger when interest rates are close to the effective lower bound. Conducting the same regime-dependent analysis as for a country's cyclical position (equation (4)), we evaluate spillovers under two different monetary policy regimes: $I_{i,t} = 1$, when a country's short-term interest rate is below the 25th percentile value of the cross-country distribution, and $I_{i,t} = 0$, otherwise.²⁵ Table 4 suggests that the response of recipients' output to fiscal shocks is markedly stronger and more persistent in the case of exceptionally low interest rates in the recipient economy; for example, the spillover estimate from a 1 percent of source country GDP overall fiscal shock is 0.19 percent when the effective lower bound is binding—more than four times larger than when interest rates are not near the effective lower bound. The differential effects are also observed for spending and tax instruments separately.

²³Results are robust to using alternative definitions of slack, including using the unemployment gap or smooth-transition probability as in Auerbach and Gorodnichenko 2013.

²⁴Our findings are consistent with the evidence for a sample of OECD countries in other studies in the literature (Auerbach and Gorodnichenko 2013; Goujard 2017). See Annex 6.

²⁵We use different distributions for advanced economies and emerging markets. The 25th percentile value for the cross-country distribution is about 0.57 percent for advanced economies and 3.0 percent for emerging markets. Results are robust to using alternative definitions of effective lower bound, such as using absolute thresholds (common to all countries) for the short-term interest rates.

Table 4. Nonlinear Results: State in Recipient Economy (Percent)

	Overall Fiscal Shock	Spending Shock	Tax Shock
Baseline	0.08***	0.15**	-0.05*
Economic Slack	0.11***	0.20***	-0.08**
No Economic Slack	0.06**	0.08	-0.04
<i>Difference Statistically Significant? (p-value)</i>	0.27	0.18	0.43
Interest Rate Near Effective Lower Bound	0.19***	0.3***	-0.15**
Interest Rate Not Near Effective Lower Bound	0.04	0.07	-0.02
<i>Difference Statistically Significant? (p-value)</i>	0.01	0.02	0.07

Source: IMF staff calculations.

Note: Table shows the average one-year response of recipient GDP to a shock of 1 percent of GDP across the source countries.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Source Countries

We next study how the state of the economy in source countries affects spillovers. To do this, we partition the shocks into two parts according to the state variable of interest—the cyclical position or the ability of monetary policy to respond to shocks, both defined as in the specification for recipient economies—as follows:

$$Shock_{it}^j: I_{i,t-1} Shock_{it}^j + (1 - I_{i,t-1}) Shock_{it}^j, \quad (5)$$

in which $I_{i,t}$ indicates the relevant state in the shock-emitting country. The assumption underpinning this approach is that although shocks in the source country and its domestic response might be regime dependent, their propagation to recipient countries is not.

Spillovers are larger when there is economic slack and/or interest rates are at the effective lower bound in source countries. Table 5 shows that spillovers from both spending and tax shocks are considerably larger when the source country has economic slack. In fact, the response of recipient output to a fiscal shock when the source economy has no slack is very small, pointing to a dampening effect from counter-cyclical policy measures. It also suggests that while spillovers are small during normal business cycle and monetary policy conditions, they are much larger when interest rates are at the effective lower bound. Moreover, the same regime-dependent result that we documented for recipient countries holds here as well: the role of monetary policy constraints in

Table 5. Nonlinear Results: State in Source Economy
(Percent)

	Overall Fiscal Shock	Spending Shock	Tax Shock
Baseline	0.08***	0.15**	-0.05*
Economic Slack	0.09***	0.17***	-0.06**
No Economic Slack	0.02**	0.07	-0.02
<i>Difference Statistically Significant? (p-value)</i>	<i>0.35</i>	<i>0.54</i>	<i>0.58</i>
Interest Rate Near Effective Lower Bound	0.13***	0.25***	-0.10***
Interest Rate Not Near Effective Lower Bound	0.04	0.06	-0.01
<i>Difference Statistically Significant? (p-value)</i>	<i>0.12</i>	<i>0.15</i>	<i>0.20</i>

Source: IMF staff calculations.

Note: Table shows the average one-year response of recipient GDP to a shock of 1 percent of GDP across the source countries.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

boosting spillovers is more pronounced than the role of economic slack alone. Our finding is similar in spirit to the analysis of the euro area in Blanchard, Erceg, and Lindé 2017, in which a fiscal expansion in the core euro area has larger spillovers to other euro area countries under the effective lower bound, as higher inflation in the core reduces real interest rates, thereby stimulating demand in both the core and the rest of the euro area.

Finally, to compare with baseline results, we also present state-dependent spillover estimations by individual source country. Table 6 splits the figures in Table 3 for the average country by different states of the economy using the values of α from our state-dependent analysis and shows contrasting responses to shocks in normal times compared to when there is slack or interest rates are at the effective lower bound. For simplicity, “normal times” estimates are averages of estimates under no slack and those under no effective lower bound, and slack (effective lower bound) estimates are averages of estimates for slack (effective lower bound) in source and those for slack (effective lower bound) in recipient. The calculations indicate that there is a large range of spillover estimates depending on cyclical and/or policy conditions. For example, a 1 percent of US GDP government spending shock would increase the average recipient country GDP by only 0.15 percent in normal times over the first year, but about 0.4 percent if there is slack and 0.61 percent if interest rates are at the effective lower bound. A 1 percent

Table 6. Spillovers under Different Cyclical and Policy Conditions
(Percent)

	Normal Times	Slack	Near Effective Lower Bound
Government Spending Shock			
France	0.04	0.09	0.14
Germany	0.07	0.18	0.27
Japan	0.05	0.13	0.19
United Kingdom	0.04	0.11	0.17
United States	0.15	0.40	0.61
Tax Revenue Shock			
France	-0.01	-0.04	-0.06
Germany	-0.02	-0.07	-0.12
Japan	-0.02	-0.05	-0.08
United Kingdom	-0.02	-0.04	-0.07
United States	-0.05	-0.16	-0.27

Source: IMF staff calculations.

Note: Table shows average one-year impact on average country in sample from a shock of 1 percent of GDP across the source countries. Normal Times refer to an average of no slack and no effective lower bound in both source and recipient countries. Slack (Near Effective Lower Bound) estimates are averages for conditions in source and recipient economies.

of German GDP spending shock would do so by 0.07 percent in normal times, 0.18 percent during a period of slack, and 0.27 percent with monetary policy constraints.

Role of Exchange Rate Regimes

The exchange rate regime can affect the transmission of fiscal shocks. Fiscal shocks will have a direct impact on trade—expenditure shifting—increasing (decreasing) exports in recipient countries in the presence of fiscal expansions (consolidations) at the source. They may also—in a Mundell-Fleming-Dornbusch framework—lead to a change in interest rate spreads, triggering an appreciation (depreciation) of the source country’s currency during fiscal expansions (consolidations), particularly if the change in fiscal stance is expected to be persistent and debt financed.²⁶ This increases incentives

²⁶ The empirical analysis of the exchange rate response to fiscal shocks is beyond the scope of this note. Although the empirical literature has generally found mixed results, some recent work has found evidence of exchange rate appreciation following a fiscal expansion when the anticipation of the fiscal shock is properly taken into account. The exchange rate is a forward-looking variable that reacts on announcements about future spending, that is, before spending takes place. Two recent studies (Auerbach and Gorodnichenko 2016; Forni and Gambetti 2016) isolate the announcement component of fiscal shocks and show that the exchange rate appreciates following news about future fiscal expansions. Popescu and Shibata (2017) extend Forni and Gambetti’s (2016) work to a cross-country per-

for consumers to shift consumption toward relatively cheaper goods—expenditure switching—amplifying spillovers. The exchange rate regime can affect both elements of transmission.

The impact of exchange rate regimes on transmission is an empirical question; pegs can strengthen expenditure shifting between source and recipients, but lack of exchange flexibility can dampen expenditure switching. Several studies have documented a positive association between pegs and trade (for example, Rose and van Wincoop 2001; Klein and Shambaugh 2006; and Qureshi and Tsangarides 2010). They emphasize that fixed exchange rate regimes can reduce exchange rate volatility, thereby providing certainty that is helpful in forming trade relationships, which can increase spillovers from fiscal shocks.²⁷ On the other hand, lack of nominal exchange rate flexibility within currency pegs will likely curb exchange rate adjustments, reducing expenditure switching and, hence, spillovers.²⁸ Currency mismatches in balance sheets of households and corporations in recipient economies can also affect the size of spillovers, for example, by making depreciations contractionary in recipients.²⁹

This section assesses the role of exchange rate regimes by looking at pegs with respect to the US dollar. The United States is a suitable country on which to conduct this exercise given its global currency and systemic trade importance. In particular, countries typically do not peg to the British pound or the Japanese yen. In the case of the euro, Germany and France’s importance is mostly within Europe, where the majority of countries have a fixed regime, not allowing for enough variation in the data to identify the effect under a flexible regime.

To assess the role of exchange rate regimes in spillovers, the empirical approach is modified to allow different spillovers to countries with fixed and flexible exchange rate regimes with respect to the US dollar. The split is based on two alternative schemes: (1) Reinhart and Rogoff’s (2004) de facto time-varying exchange rate regime classification, updated by Ilzetzi, Reinhart, and Rogoff (2017a,

2017b) (“Reinhart-Rogoff” classification); and (2) the IMF’s *Annual Report on Exchange Arrangements and Exchange Restrictions* (“IMF” classification);³⁰ in both cases fixed regimes include de facto pegs and crawling pegs. Using this bilateral exchange rate arrangement, we split the shock from the United States to recipient i into two parts:

$$Shock_{it}^{US}: Fix_{i,t-1}^{US} Shock_{it}^{US} + (1 - Fix_{i,t-1}^{US}) Shock_{it}^{US}, \quad (6)$$

in which $Fix_{it}^{US} = 1$ if country i and the United States share a fixed regime in period t . Spillovers are then estimated using the local-projections method. More details are provided in Annex 2.

The evidence points to larger spillovers from government spending shocks under fixed exchange rate regimes. Figure 3 shows persistent spillovers from US spending shocks to recipients whose currency is pegged to the US dollar (solid green line) and smaller and shorter-lived spillovers to countries with flexible exchange rates. This is the case regardless of which exchange rate regime classification is used. The difference in the output responses between fixed and flexible regimes is statistically significant on impact under both classifications and also during the second year under the Reinhart-Rogoff classification. We find no difference in spillovers from an overall fiscal shock or a tax revenue shock under different exchange rate regimes.

Larger spillovers under fixed exchange rate regimes seem to suggest relatively weak expenditure-switching effects in transmission. This weakness could reflect that US monetary policy was constrained by the effective lower bound for a large part of the sample, limiting interest rate and exchange rate movements. At the same time, direct trade channels may be larger under pegs as a result of stronger trade integration. Further work is required to disentangle these effects. The case of a currency union—such as the euro area—is particularly interesting, as in such a case, a common monetary policy dampens expenditure switching, while long-standing economic and institutional integration and the use of a common currency strengthen trade and hence expenditure-shifting effects (Rose and van Wincoop 2001; Berger and Nitsch 2008).

spective to study the impact of US government spending shocks on external positions.

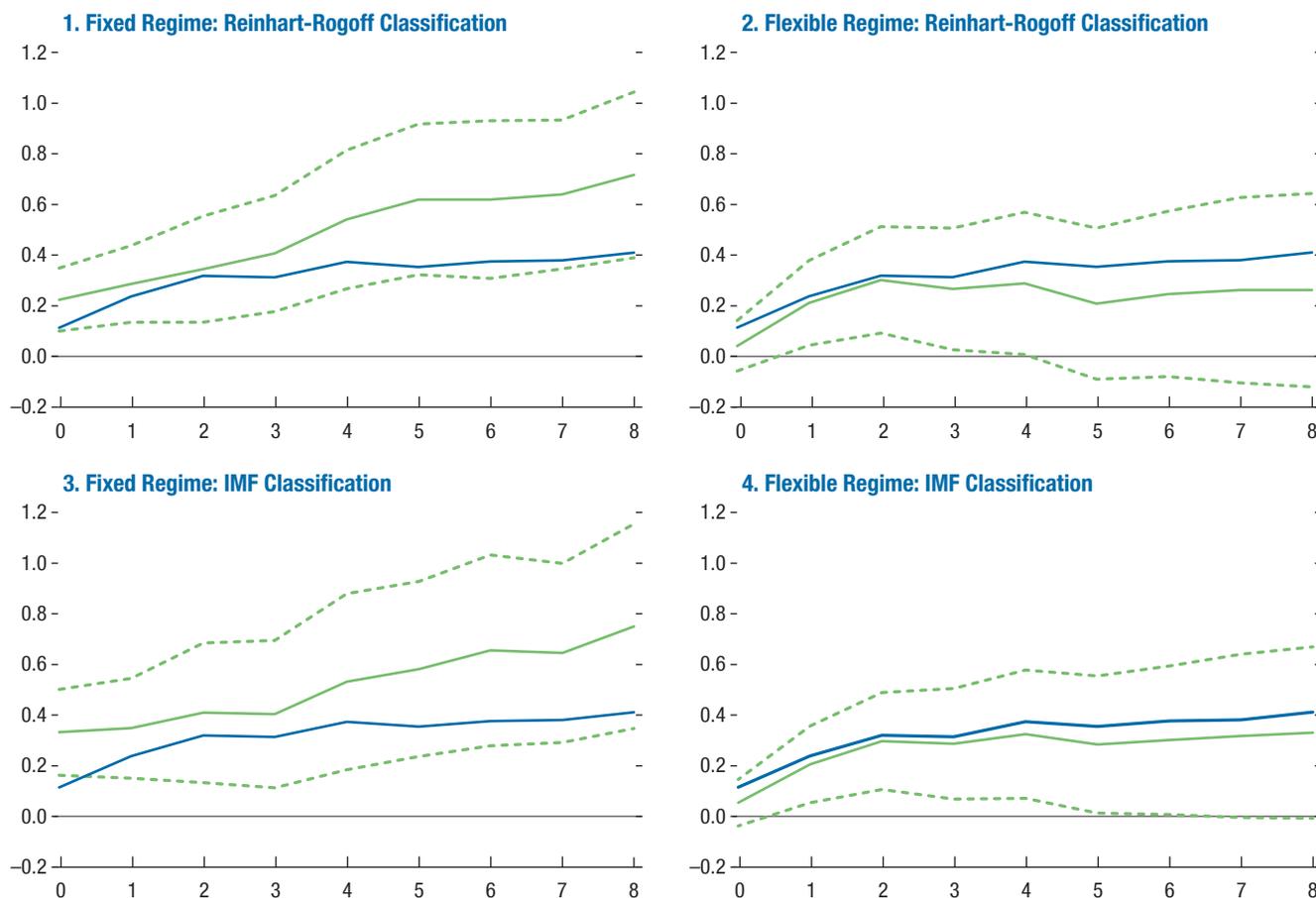
²⁷Qureshi and Tsangarides (2010) point to comparable effects in conventional and hard pegs (currency unions).

²⁸This mechanism is especially relevant in the short term, because real exchange rates will adjust over the medium term, mitigating the differences in spillovers between the two regimes.

²⁹For a discussion on contractionary devaluations, see Diaz Alejandro 1966 and Edwards 1987.

³⁰In 2015, for example, the Reinhart-Rogoff classification yields seven recipient countries with “fixed” exchange rates, while the IMF classification yields two “fixed” countries. However, the number of fixed-rate countries varies over time (and there tend to be more of these in earlier years).

Figure 3. Dynamic Responses of Recipient Countries' Output to US Spending Shock under Different Exchange Rate Regimes (Percent)



Source: IMF staff calculations.

Note: The figure depicts the impact on output level. Numbers on horizontal axes represent quarters; $t = 0$ is the quarter of respective shocks. Solid green lines denote point estimates conditional on exchange rate regime; dashed green lines denote 90 percent confidence bands; and solid blue lines represent unconditional estimates. Shocks are normalized to an average 1 percent of GDP across the source countries (note that this will represent a shock of less than 1 percent of US GDP).

Conclusions

This note informs the debate regarding cross-border spillovers from fiscal policy on economic activity. It sheds light on their magnitude and the factors affecting their transmission, such as the fiscal instruments used, cyclical positions, monetary policy conditions, and exchange rate regimes. We assess spillovers from five economies—France, Germany, Japan, the United Kingdom, and the United States—on 55 advanced and emerging market economies that represent 85 percent of global GDP—a larger sample than any other study in the literature. Using information on bilateral trade links to inform the patterns of global and regional spillovers from the source economies, we draw general

lessons about the transmission of fiscal shocks. We consider both government spending and tax revenue shocks during both expansion and consolidation episodes, extending the range of conditions considered in the literature.

The analysis in this note offers lessons on the magnitude and transmission of fiscal shocks. In general, they indicate that the magnitude of spillovers from fiscal shocks depends critically on conditions that also affect their domestic impact. The findings can be summarized as follows:

- *The fiscal instrument matters.* There is evidence of larger and more persistent spillovers from changes in government spending, relative to those from changes