

Output Spillovers from Fiscal Policy

Alan Auerbach and Yuriy Gorodnichenko

UC Berkeley

How Strong are Fiscal Spillovers?

- Key issue for country seeking to maintain stability is economic shocks from abroad, including those due to fiscal policy
- Especially important in a currency union, because of close trade linkages and lack of separate monetary policy options
 - A justification for SGP and current initiatives
- But how strong are fiscal spillovers, and what determines their strength?

This Paper

- Extend previous empirical estimates of fiscal spillover effects in several ways
 - Study a large number of OECD countries;
 - Estimate effects of fiscal spillover shocks directly;
 - Remove predictable components of shocks using real-time forecasts of government purchases;
 - Allow effects to vary over the cycle in both source and affected country;
 - Consider effects on several measures, not just GDP.

Methodology

- Follow Auerbach & Gorodnichenko (AG 2012b), using direct projection approach to study effects of government purchases (G) on output (Y) and other variables in OECD countries:

$$(1) \quad \frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} = \alpha_h \frac{GShock_{it}}{Y_{i,t-1}} + \sum_{s=1}^m \beta_{hs} \frac{\Delta Y_{i,t-s}}{Y_{i,t-s-1}} \\ + \sum_{s=1}^m \delta_{hs} \frac{\Delta G_{i,t-s}}{Y_{i,t-s-1}} + \phi_{hi} + \mu_{ht} + error_{iht}$$

with impulse response for H periods from a sequence of estimated $\{\alpha_h\}$, $h = 0, \dots, H$.

Methodology

- Follow Auerbach & Gorodnichenko (AG 2012b), using direct projection approach to study effects of government purchases (G) on output (Y) and other variables in OECD countries:

$$(1) \quad \frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} = \alpha_h \frac{GShock_{it}}{Y_{i,t-1}} + \sum_{s=1}^m \beta_{hs} \frac{\Delta Y_{i,t-s}}{Y_{i,t-s-1}} \\ + \sum_{s=1}^m \delta_{hs} \frac{\Delta G_{i,t-s}}{Y_{i,t-s-1}} + \phi_{hi} + \mu_{ht} + error_{iht}$$

with impulse response for H periods from a sequence of estimated $\{\alpha_h\}$, $h = 0, \dots, H$.

Methodology

- *GShock* is government spending spillover shock from other countries, defined as:

$$(2) \quad GShock_{i,t} = \frac{\sum_{q \neq i} \left(\frac{M_{iq,B}}{G_{q,B}} \right) \times \{e_{q,t} \times G_{q,t-1} \times E_{q,B}\}}{E_{i,B}}$$
$$= M_{iT,B} \sum_{q \neq i} \omega_{iq,B} \times \left\{ \frac{e_{q,t} \times G_{q,t-1}}{G_{q,B}} \right\}$$

where $G_{j,t}$, $e_{j,t}$ and $E_{j,t}$ are government purchases, the percent spending shock, and the dollar exchange rate in country j , year t .

Methodology

- *GShock* is government spending spillover shock from other countries, defined as:

$$(2) \quad GShock_{i,t} = \frac{\sum_{q \neq i} \left(\frac{M_{iq,B}}{G_{q,B}} \right) \times \{e_{q,t} \times G_{q,t-1} \times E_{q,B}\}}{E_{i,B}}$$
$$= M_{iT,B} \sum_{q \neq i} \omega_{iq,B} \times \left\{ \frac{e_{q,t} \times G_{q,t-1}}{G_{q,B}} \right\}$$

$M_{iq,t}$ is imports by country q from country i in year t , $M_{iT,t}$ is total such imports, and

$$\omega_{iq,B} = \left(\frac{M_{iq,B} E_{q,B}}{M_{iT,B} E_{i,B}} \right)$$

Methodology

- *GShock* is government spending spillover shock from other countries, defined as:

$$(2) \quad GShock_{i,t} = \frac{\sum_{q \neq i} \left(\frac{M_{iq,B}}{G_{q,B}} \right) \times \{e_{q,t} \times G_{q,t-1} \times E_{q,B}\}}{E_{i,B}}$$
$$= M_{iT,B} \sum_{q \neq i} \omega_{iq,B} \times \left\{ \frac{e_{q,t} \times G_{q,t-1}}{G_{q,B}} \right\}$$

Intuition: if government spending shocks work through imports, then expect effect to be scaled by M/G .

Methodology

- We purge *GShock* of anticipated changes by regressing OECD forecast errors on lags of macro variables for country q to construct $e_{q,t}$.

Cyclical Multiplier Variation

- Following AG (2012a,b), we allow impact of shocks to vary over cycle, replacing (1) with:

$$\begin{aligned}
 (4) \quad \frac{Y_{i,t+h} - Y_{i,t-1}}{Y_{i,t-1}} &= \alpha_{R,h} F(z_{i,t-1}) \frac{GShock_{i,t}}{Y_{i,t-1}} + \alpha_{E,h} \left(1 - F(z_{i,t-1})\right) \frac{GShock_{i,t}}{Y_{i,t-1}} \\
 &+ \sum_{s=1}^m \beta_{R,hs} F(z_{i,t-1}) \frac{\Delta Y_{i,t-s}}{Y_{i,t-s-1}} + \sum_{s=1}^m \beta_{E,hs} \left(1 - F(z_{i,t-1})\right) \frac{\Delta Y_{i,t-s}}{Y_{i,t-s-1}} \\
 &+ \sum_{s=1}^m \delta_{R,hs} F(z_{i,t-1}) \frac{\Delta G_{i,t-s}}{Y_{i,t-s-1}} + \sum_{s=1}^m \delta_{E,hs} \left(1 - F(z_{i,t-1})\right) \frac{\Delta G_{i,t-s}}{Y_{i,t-s-1}} \\
 &+ \phi_{hi} + \mu_{ht} + error_{iht}
 \end{aligned}$$

where z is an indicator of the state of the cycle

and $F(z_{i,t}) = \frac{\exp(-\gamma z_{i,t})}{[1 + \exp(-\gamma z_{i,t})]}$, with $\gamma = 1.5$.

Cyclical Multiplier Variation

- For z , use normalized, HP filtered ($\lambda = 10,000$) average of six-period (three-year) GDP growth, although other cyclical indicators yield similar results.

Data

- OECD data through 2011.
- Semiannual and starting in 1985, to accommodate availability of forecast data.
- Consider reduced samples (large countries only, stop before 2008) to check robustness.

Figure 1. Time Series of Fiscal Shocks

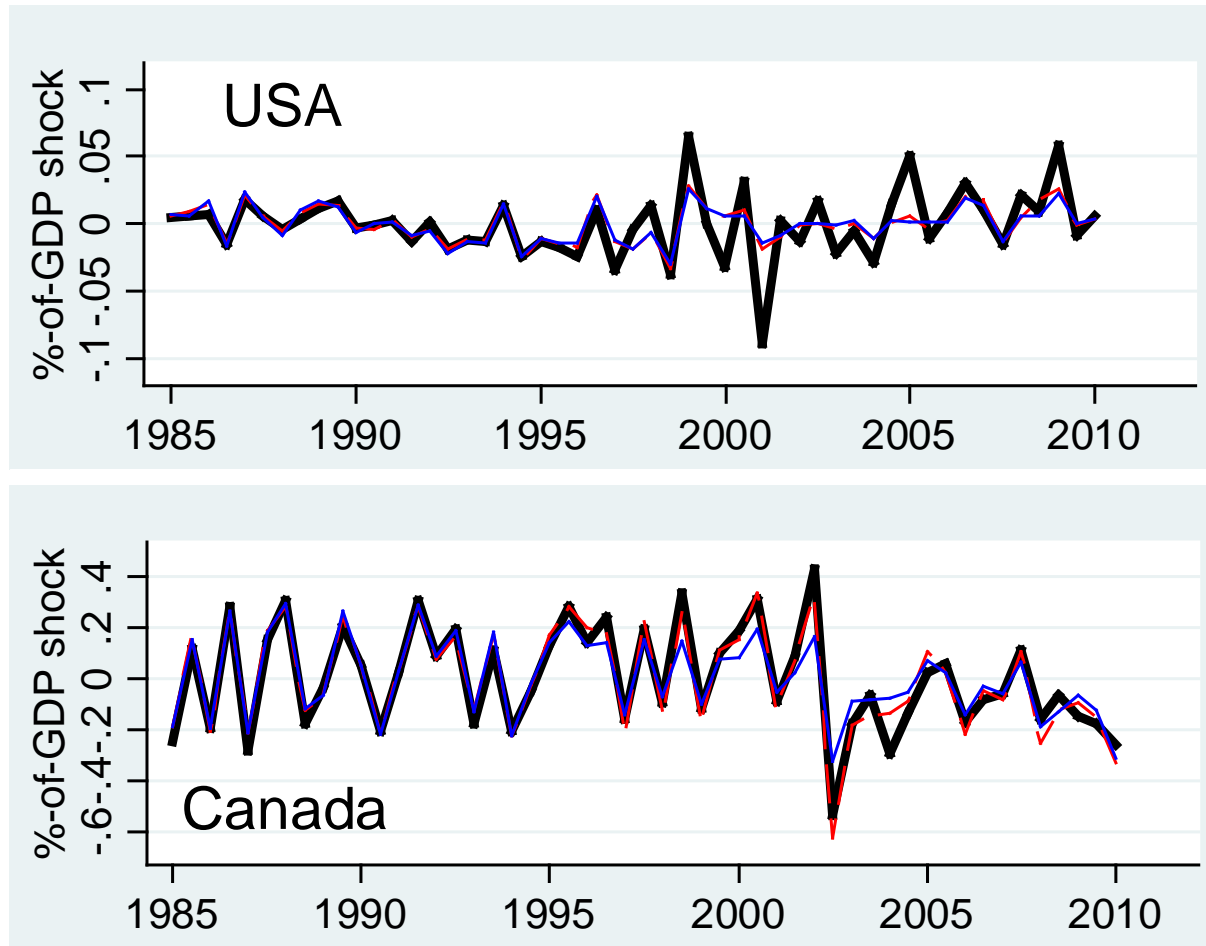


Figure 1. Time Series of Fiscal Shocks

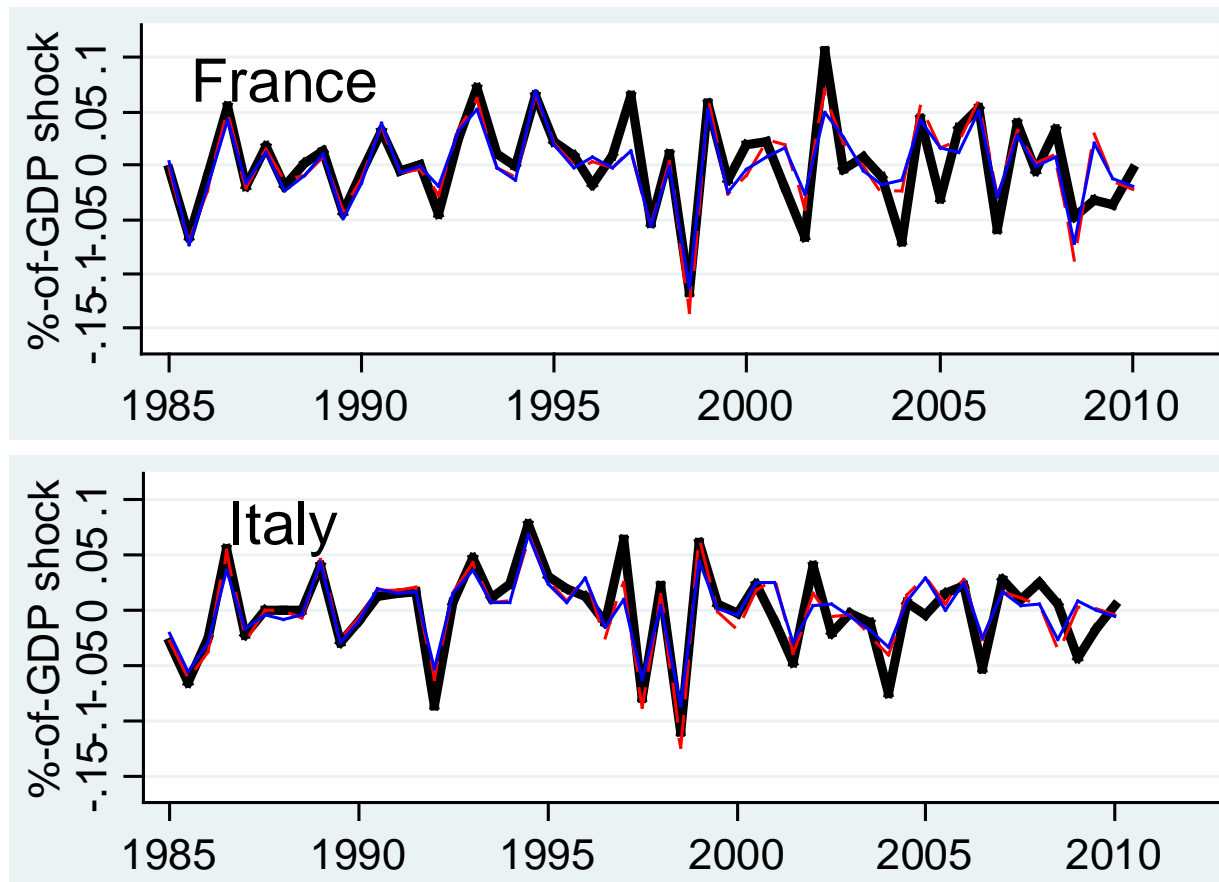


Table 2. Average Multipliers over 3 Years

Shock series	Linear	State-dependent multipliers	
		Output growth rate	
		Expansion	Recession
	(1)	(2)	(3)
Base	1.60 (1.00)	-1.10 (1.59)	4.63* (2.54)
Only old/large OECD economies in construction of spillover shocks	1.96* (1.16)	-2.56 (2.13)	6.72*** (2.72)
Constrain the sample to pre-2008	2.05** (1.00)	-0.93 (1.63)	5.36** (2.73)

Notes: Driscoll and Kraay (1998) standard errors are in parentheses
 ***, **, * denote significance at 0.01, 0.05, and 0.10 levels

Table 2. Average Multipliers over 3 Years

Shock series	Linear	State-dependent multipliers	
		Output growth rate	
		Expansion	Recession
	(1)	(2)	(3)
Base	1.60 (1.00)	-1.10 (1.59)	4.63* (2.54)
Only old/large OECD economies in construction of spillover shocks	1.96* (1.16)	-2.56 (2.13)	6.72*** (2.72)
Constrain the sample to pre-2008	2.05** (1.00)	-0.93 (1.63)	5.36** (2.73)

Notes: Driscoll and Kraay (1998) standard errors are in parentheses
 ***, **, * denote significance at 0.01, 0.05, and 0.10 levels

Table 4. Average Multipliers by Exchange Rate Regime

Shock series	Fixed		Float	
	Expansion	Recession	Expansion	Recession
	(3)	(4)	(5)	(6)
Base	0.80 (1.92)	2.06 (2.61)	-1.38 (2.40)	4.29 (2.75)
Only old/large OECD economies	-1.15 (1.96)	4.53 (2.85)	-1.27 (2.56)	5.89* (3.22)
Constrain the sample to pre-2008	-0.69 (1.98)	4.16 (2.90)	-1.23 (2.16)	5.86* (3.39)

Table 5. Average Multipliers by Business Cycle Regime

Recipient country regime: Shocks series	Expansion in source country		Recession in source country	
	Expansion	Recession	Expansion	Recession
	(3)	(4)	(5)	(6)
Base	0.54 (4.51)	0.38 (4.83)	-2.21 (6.90)	5.34 (3.69)
Only old/large OECD economies	-0.65 (4.36)	6.92 (4.87)	-5.21 (5.80)	5.21 (4.29)
Constrain the sample to pre-2008	-2.49 (3.84)	-0.80 (4.29)	3.46 (5.53)	8.05** (3.92)

Conclusions

- Fiscal spillovers have a large impact among OECD countries.
- Effects are much larger when affected country is in recession.
- Largest impact when both source and recipient country are in recession.
- Results indicate clear benefits from policy coordination, especially in global recession.