Estimating Fiscal Multipliers: An SVAR Approach

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Stat 451: Causal Inference

How does fiscal policy affect overall output in the US?

Background

Fiscal policy is one of the two main tools for policymakers to affect the economy

- Taxes \Rightarrow Lower Output (Barro and Redlick 2011)
- Spending \Rightarrow Higher Output (Blanchard and Leigh 2013)

The fiscal multiplier is the magnitude of the effect of fiscal policy

Keynesian Multiplier \$1 increase in spending ⇒ >\$1 increase in Output (Barro and Redlick 2011)
Crowding Out \$1 increase in spending ⇒ <\$1 increase in Output (Baum 2012)

Empirical Strategy

Growth vs. Business Cycle Effects



We're interested in understanding Business Cycles

Model a vector of outputs as an autoregressive process

$$Y_t = \sum_{\ell=1}^p B_\ell Y_{t-\ell} + u_t$$

Where:

- Y_t Vector of OutputsB_ρ Coefficient Matrix
- ut Vector of Errors

Vector Autoregression (2/2)



Variance covariance matrix of u_t is symmetric and dense VARs measure correlations, not causation (Nakamura and Steinsson 2018)

Ex: Measured effect of interest rate on GDP could be:

- The interest rate responding to forecasts about GDP
- GDP actually responding to the interest rate

A structural shock is an exogenous shock to one of the variables in the model

Could be caused by

• ...

- International events
- Other series movements

The effect of a structural shock to a variable is the causal effect of changes in that variable

Add a contemporaneous relationship to the VAR

$$A_0Y_t = \sum_{\ell=1}^p A_\ell Y_{t-\ell} + \varepsilon_t$$

Where:

- Y_t Vector of Outputs
- A, Coefficient Matrix
- ε_t Vector of Structural Errors (Var Cov Matrix I_n)

Structural VAR (2/2)



Estimate the order 4 VAR

$$Y_t = \sum_{\ell=1}^p B_\ell Y_{t-\ell} + u_t$$

Where Y_t is the vector of

- GDP (x_t)
- Government Spending (\boldsymbol{g}_t)
- Government Revenue (t_t)

Our Model (2/2)

Structural relationship:

$$u_t^x = a_1 u_t^g + a_2 u_t^t + \varepsilon_t^x$$
$$u_t^g = b_1 u_t^x + b_2 \varepsilon_t^t + \varepsilon_t^g$$
$$u_t^t = c_1 u_t^x + c_2 \varepsilon_t^g + \varepsilon_t^t$$

Assume:

- b₁ = 0, Government response is delayed
- **c**₁ = **1.7**, Lutz and Follette (2010)
- b_2 or $c_2 = 0$, identification restriction



(Blanchard and Perotti 2002)

Data

- Get data on GDP, Government Spending, and Tax Revenues from FRED between 1960 and 2007 Then we:
- Inflation Adjust Divide by GDP deflator Detrend Get business cycle effects

Data (2/2)



Results



Take the maximum increase in GDP following the structural shock

Adjust for relative size of GDP and government spending Estimate multiplier is

1.035 (0.115)

Results are robust to

- Setting $b_2 = 0$ Setting $b_2 = 0$
- Different responsiveness of revenue to GDP
 Changing
- Using a different number of lags VAR Order
- Allowing the effect to change over time

Conclusion

Using an SVAR, we estimated the fiscal multiplier for the US economy Found fiscal spending has approximately a 1-1 effect Limitations:

- Structural assumptions
- Simplistic linear detrending
- Revenue-side effects

Questions?

Parameter	a ₁	a ₂	<i>c</i> ₂				
Estimate	-0.182	-0.150	0.040				
► Back							

Setting $b_2 = 0$



Multiplier: 0.990 (0.115)

Back

Follow Blanchard and Perotti (2002), set $c_1 = 2.08$

Parameter			Mutiplier				
	a ₁	a ₂	<i>c</i> ₂	Value	Std. Er.	Time	
-0	.182	-0.150	0.040	1.126	0.115	2	

Back

Different VAR Orders

Estimate multiplier using VAR with order 1-24 (1 Quarter - 6 Years)



Back

Time Trends

Estimate multiplier within 10 year rolling windows





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