GOVERNMENT SPENDING MULTIPLIERS IN GOOD TIMES AND IN BAD: EVIDENCE FROM U.S. HISTORICAL DATA

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MOTIVATION

Key policy questions

- What is the size of the government spending multiplier?
  - Previous work: multiplier $\approx 1$ (wide “confidence” bands)
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Challenges of estimating state-dependent multipliers

- A handful of recessions in the post-WWII data & relatively little variation in \( G \)
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  - RZ: News shocks (extend Ramey (QJE 2011)) about military gov’t spending
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- **Nonlinear models: sensitive estimates + how to model feedback/dynamics?**
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Why are the RZ results different from the results in Auerbach-Gorodnichenko and others?

- Measurement
- Specification
- Estimation
- Identification
**RZ APPROACH**

\[ Y_t = \alpha_0 \text{shock}_t + \text{error}_t \]
\[ Y_{t+1} = \alpha_1 \text{shock}_t + \text{error}_{t+1} \]
\[ Y_{t+2} = \alpha_2 \text{shock}_t + \text{error}_{t+2} \]
\[ \ldots \]
\[ Y_{t+h} = \alpha_h \text{shock}_t + \text{error}_{t+h} \]

\[
\text{IRF}^Y = \{\alpha_h\}_{h=0}^{H}
\]
**RZ APPROACH**

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Instrumental variable interpretation: Regress \( Y_{t+h} \) on \( G_{t+h} \) and use \( shock_t \) as an IV.
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The logic extends to state-dependent multipliers

\[ Y_{t+h} = M_h^R G_{t+h} \times I(\text{recession}_t) + M_h^E G_{t+h} \times I(\text{expansion}_t) + \text{error}_t \]

\( \text{shock}_t \times I(\text{recession}_t) \) and \( \text{shock}_t \times I(\text{expansion}_t) \) as IVs.
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Single equation approach

\[ Y_{t+h} = M_h^R G_{t+h} \times I(\text{recession}_t) + \text{error}_t \quad \text{IV: } \text{shock}_t \times I(\text{recession}_t) \]
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Note: controls are included. F-stat in the figure is capped at 45.
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**FIRST STAGE FIT: RECESSION**

Horizon $h = 8$

b = 0.77 (0.11)

b = 0.45 (0.39)
FIRST STAGE FIT: RECESSION

Horizon $h = 8$

Question: which shocks should one use to design/assess the fiscal stimulus in 2009?
Ramey-Zubairy:

- \( Y_{t+h} - Y_{t-1} = M_h(G_{t+h} - G_{t-1}) + controls + error_t \)
- use military spending shocks as the instrument
RAMEY-ZUBAIRY VS. BLANCHARD-PEROTTI

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- Alternative IV (Auerbach-Gorodnichenko):
  - \((G_t - F_{t-1}G_t) \perp controls\)
  - \(F_{t-1}G_t \equiv \) a professional forecast as of time \( t - 1 \) of government spending at time \( t \)
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Strength of 1\(^{st}\) stage: RZ vs. BP

- BP (AG) instrument is nearly impossible to beat over short horizons.
- RZ can perform better over longer horizons b/c it measures present values.
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- Data quality is likely to vary
  - Linear interpolation
    ⇒ Attenuate differences between recession/expansion
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• Structural changes
  o Changes in the volatility of government spending
% CHANGE IN REAL PER CAPITA GOVERNMENT SPENDING

st.dev. dlog(G p.c.), 5 year moving window

dlog(government spending p.c.)

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    ⇒ avoid using variables in levels, use differences or/and growth rates

**RZ:** \[
\frac{Y_{t+h} - Y_{t-1}}{Y_{t-1}} = M_h \frac{G_{t+h} - G_{t-1}}{Y_{t-1}} + \sum_k \psi_k \ln Y_{t-k} + \sum_q \gamma_q \ln G_{t-q} + \sum_s \phi_s t^s + \text{error}
\]

Alt.: \[
\frac{Y_{t+h} - Y_{t-1}}{Y_{t-1}} = M_h \frac{G_{t+h} - G_{t-1}}{Y_{t-1}} + \sum_k \psi_k \Delta \ln Y_{t-k} + \sum_q \gamma_q \Delta \ln G_{t-q} + \sum_s \phi_s t^s + \text{error}
\]
NORMALIZATION

Typical approach:  \[ \Delta \log Y_t = b \times \Delta \log G_t + \text{error} \Rightarrow \text{multiplier} \ M = b \times \left( \frac{Y_t}{G_t} \right) \]
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Alternative approach: \[ \frac{Y_t - Y_{t-1}}{Y_{t-1}} = b \times \frac{G_t - G_{t-1}}{Y_{t-1}} + error \Rightarrow \text{multiplier } M = b \]
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Potential concerns

- \( \frac{Y_t - Y_{t-1}}{Y_{t-1}} \) and \( \frac{G_t - G_{t-1}}{Y_{t-1}} \) are correlated because \( Y_{t-1} \) shows up in the denominator
- \( \frac{G_t}{Y_t} \) varies systematically over the business cycle
Notes: post 1960 data; potential GDP is from the CBO.
MULTIPLIERS: RAMEY-ZUBAIRY

Spec: baseline, IV implementation
Spec: IV implementation, include more lags, normalize by potential GDP, controls include variables in growth rates rather than levels.

These estimates are similar to the Auerbach-Gorodnichenko results.
Equality of Multipliers over the Business Cycle

![Graph showing the p-value for the comparison of Recession and Expansion over the horizon h. The graph compares Blanchard-Perotti and Ramey-Zubairy approaches.](image)
CONCLUDING REMARKS

We need more variation/data to identify G shocks and estimate their effects

- Cross-state variation (e.g., Nakamura and Steinsson 2014)
- Natural experiments (e.g., Joshua Hausman 2013)
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- Prices, wages, interest rates
- Employment, capacity utilization
- Export, import, exchange rates
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“The problem with QE is it works in practice but it doesn’t work in theory.” – Bernanke