

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

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EFG Research Meeting
12 July 2014

OUR METHODOLOGICAL CONTRIBUTION

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1. **Richer Data:** Construct new historical U.S. data encompassing periods with dramatic fluctuations in unemployment and government spending and interest rates near the zero lower bound.
2. **Impulse Responses:** Allow for the natural transitions between states rather than assuming the economy remains in each state indefinitely.
3. **Computation of Multipliers:** Avoid common biases based on (1) units problems and (2) failing to account for the full response of G .

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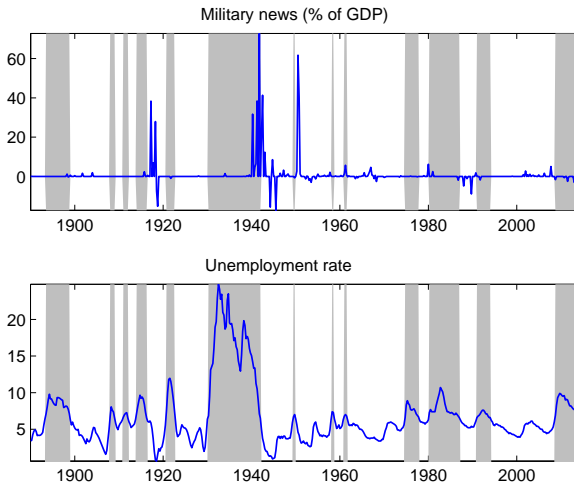
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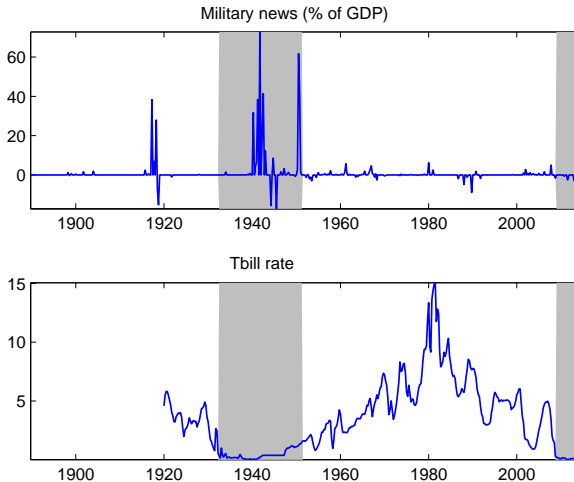
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- ▶ We define slack using an unemployment rate threshold.
- ▶ We define ZLB periods as 1932q2-1951q1 and 2008q4 - 2013q4.

DATA BY SLACK STATE



Shaded areas indicate time periods when the unemployment rate is above 6.5 %

DATA BY ZLB STATE



Shaded areas indicate time periods when interest rates are at the ZLB or monetary policy is extremely accommodative

ECONOMETRIC FRAMEWORK: JORDA (2005) LOCAL PROJECTION METHOD

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LINEAR MODEL

$$z_{t+h} = \alpha_h + \psi_h(L)y_{t-1} + \beta_h \text{shock}_t + \varepsilon_{t+h}, \text{ for } h = 0, 1, 2, \dots$$

where

- ▶ y_{t-1} is a vector of control variables
- ▶ $\psi_h(L)$ is a polynomial in the lag operator
- ▶ Coefficient β_h gives the response of z_{t+h} to the shock at horizon h .

ECONOMETRIC FRAMEWORK: JORDA (2005) LOCAL PROJECTION METHOD

STATE DEPENDENT MODEL

$$z_{t+h} = I_{t-1} [\alpha_{A,h} + \psi_{A,h}(L)y_{t-1} + \beta_{A,h}shock_t] \\ + (1 - I_{t-1}) [\alpha_{B,h} + \psi_{B,h}(L)y_{t-1} + \beta_{B,h}shock_t] + \varepsilon_{t+h}.$$

where

- ▶ The dummy variable, $I_t = 1$ if in state A.
- ▶ Coefficient $\beta_{A,h}$ gives the **state A** response of z_{t+h} to the shock at horizon h .
- ▶ Coefficient $\beta_{B,h}$ gives the **state B** response of z_{t+h} to the shock at horizon h .

AVOIDING BIASES IN CALCULATING MULTIPLIERS

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- ▶ In separate work, we show that this method can lead to biased estimates of multipliers.
- ▶ Thus, we use the Hall-Barro-Redlick transformation, which converts all variables to the same units before estimation.

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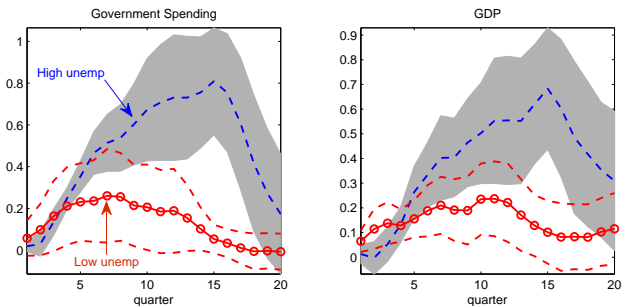
- ▶ Policymakers care about the response of Y relative to the *cumulative* change in G.

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- ▶ Policymakers care about the response of Y relative to the *cumulative* change in G.
- ▶ Thus, we compute our multipliers by comparing the ratios of the cumulative changes up to each horizon.

RESULTS FROM THE SLACK MODEL



Blue dashed lines are responses in high unemployment state, red lines with circles are responses in low unemployment state.

MULTIPLIERS DURING TIMES OF SLACK

Multipliers account for dynamics of G, and are defined as:

$$\frac{\sum_{i=1}^M \Delta Y_i}{\sum_{i=1}^M \Delta G_i}$$

	Linear Model	High Unemp	Low Unemp	P-value for difference across states
2 year integral	0.75	0.69	0.79	0.661
4 year integral	0.84	0.76	0.96	0.342

ROBUSTNESS CHECKS FOR SLACK

- ▶ Using a time-varying unemployment rate threshold
- ▶ Using linearly interpolated data
- ▶ Using 7 quarter moving average of output growth as threshold
- ▶ Controlling for taxes
- ▶ Excluding World War II
- ▶ Blanchard-Perotti identification

MULTIPLIERS AT THE ZLB

Multipliers account for dynamics of G, and defined as:

$$\frac{\sum_{i=1}^M \Delta Y_i}{\sum_{i=1}^M \Delta G_i}$$

	Linear Model	Near Zero Lower Bound	Normal	P-value for difference across states
2 year integral	0.75	0.81	0.54	0.327
4 year integral	0.84	0.76	0.84	0.888

ROBUSTNESS CHECKS FOR ZLB

- ▶ Defining ZLB as time periods when the T-bill rate is less than 50 basis points
- ▶ Blanchard-Perotti identification
- ▶ Controlling for taxes

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- ▶ Defining ZLB as time periods when the T-bill rate is less than 50 basis points
- ▶ Blanchard-Perotti identification
- ▶ Controlling for taxes
- ▶ **Exception:** Larger multipliers in ZLB when we exclude World War II: 1.59 at 2 years, 1.11 at 4 years.

Caveats:

- ▶ F-statistics for news during non-WWII ZLB state are below 1.
- ▶ Not robust to controlling for taxes

COMPARISON TO AUERBACH-GORODNICHENKO (2012)

MULTIPLIERS USING AG POST-WWII SAMPLE AND IDENTIFICATION

	Recession	Expansion	Difference
AG-12's Method			
5 year integral	2.24	-0.33	2.57

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MULTIPLIERS USING AG POST-WWII SAMPLE AND IDENTIFICATION

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AG-12's Method			
5 year integral	2.24	-0.33	2.57
Jordà Method			
5 year integral	0.84	-0.59	1.43
2 year integral	0.24	0.36	-0.12

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5 year integral	0.84	-0.59	1.43
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AG Estimates with Natural Transitions			
5 year integral	1.07	0.14	0.93

CONCLUSION

- ▶ We find no difference in multipliers across slack states- all multipliers in the linear and state dependent models are estimated to be between 0.7 and 1.
- ▶ Our results primarily differ from Auerbach and Gorodnichenko (2012) because our estimates incorporate the natural propensity of the economy to transition between states.
- ▶ In most specifications we find no evidence of higher multipliers when interest rates are at the ZLB.

“The widespread tendency in empirical studies of economic behavior to discard war years as “abnormal,” while doubtless often justified, is, on the whole, unfortunate. The major defect of the data on which economists must rely—data generated by experience rather than deliberately contrived experiment—is the small range of variation they encompass. Experience in general proceeds smoothly and continuously. In consequence, it is difficult to disentangle systematic effects from random variation since both are of much the same order of magnitude.

From this point of view, data for wartime periods are peculiarly valuable. At such times, violent changes in major economic magnitudes occur over relatively brief periods, thereby providing precisely the kind of evidence that we would like get by “critical” experiments if we could conduct them. Of course, the source of the changes means that the effects in which we are interested are necessarily intertwined with others that we would eliminate from a contrived experiment. But this difficulty applies to all our data, not to data for wartime periods alone.”

— Milton Friedman, *American Economic Review*, 42(2), (1952)