Comment on Drautzburg and Uhlig, Fiscal Stimulus and Distortionary Taxation

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Atlanta Fed, January 2010

Outline

- Some basic analytics of fiscal policy, monetary policy, the neutral real interest rate, and output determination in the simplest New Keynesian model
  - Cf. Christiano-Eichenbaum-Rebelo 09, Erceg-Lindé 09, Eggertsson 09, Drautzberg-Uhlig 10, **Woodford 10**
  - Necessary to get intuition behind Drautzberg-Uhlig
- A few specific comments about Drautzberg-Uhlig

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Fiscal policy and the neutral interest rate

- Simplest New Keynesian model:

$$\begin{aligned} r_t &\equiv i_t - \pi_{t+1|t} \\ c_t &= c_{t+1|t} - \sigma(r_t - \rho_t) \\ \alpha &\equiv C/Y \\ y_t &= \alpha c_t + (1-\alpha) g_t \\ c_t &= \frac{1}{\alpha} y_t - \frac{1-\alpha}{\alpha} g_t \end{aligned}$$

- Aggregate demand:

$$\frac{1}{\alpha} y_t - \frac{1-\alpha}{\alpha} g_t = \frac{1}{\alpha} y_{t+1|t} - \frac{1-\alpha}{\alpha} g_{t+1|t} - \sigma(r_t - \rho_t)$$

- Potential (flexprice) output and neutral (real) interest rate:

$$\frac{1}{\alpha} \bar{y}_t - \frac{1-\alpha}{\alpha} g_t \equiv \frac{1}{\alpha} \bar{y}_{t+1|t} - \frac{1-\alpha}{\alpha} g_{t+1|t} - \sigma(\bar{r}_t - \rho_t)$$

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- Neutral (real) interest rate:

$$\bar{r}_t \equiv \rho_t + \frac{1}{\sigma\alpha}\mathrm{E}_t\Delta\bar{y}_{t+1} - \frac{1-\alpha}{\sigma\alpha}\mathrm{E}_t\Delta g_{t+1}$$

- Potential output depends on fiscal expenditure

$$u'(\bar{Y}_t - G_t) = \frac{v'(\bar{H}_t)}{\bar{W}_t/\bar{P}_t} = \frac{v'(\bar{H}_t)}{f'(\bar{H}_t)} = \frac{v'(f^{-1}(\bar{Y}_t))}{f'(f^{-1}(\bar{Y}_t))} \equiv \tilde{v}'(\bar{Y}_t)$$

$$\frac{d\bar{Y}_t}{dG_t} = \frac{\tilde{v}''}{\tilde{v}'' - u''} \equiv m < 1$$

$$\frac{e\bar{Y}_t}{eG_t} = \frac{\bar{y}_t}{g_t} = \frac{d\bar{Y}_t}{dG_t}\frac{G}{Y} = m(1-\alpha) \equiv \gamma < 1$$

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$$\mathrm{E}_t\Delta g_{t+1} \downarrow \Longrightarrow \bar{r}_t \uparrow$$

- Output gap:

$$\begin{aligned} y_t - \bar{y}_t &= (y_{t+1|t} - \bar{y}_{t+1|t}) - \sigma\alpha(r_t - \bar{r}_t) \\ &= \underbrace{y_{t+T|t} - \bar{y}_{t+T|t}}_{\approx 0} - \sigma\alpha \sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t}) \end{aligned}$$

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$$y_t \approx \bar{y}_t - \sigma\alpha \sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t}) = \gamma g_t - \sigma\alpha \sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t})$$

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Fiscal policy and the neutral interest rate

- Nominal (market) rate i_t, policy rate i_t^p, spread δ_t: $i_t = i_t^p + \delta_t$
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Use fiscal policy to increase neutral rate

- Shift up neutral-rate path:

$$\sum_{\tau=0}^{T-1} \bar{r}_{t+\tau|t} \uparrow$$

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- Reduce long-run government expenditure growth:
  $g_{t+T|t} - g_t \downarrow$
- Increase current expenditure, lower future expenditure:
  $g_t \uparrow, \; g_{t+T|t} \downarrow$

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Distortionary taxation and potential output

- Potential output decreasing in distortionary taxes:

$$\bar{y}_t(g_t) \rightarrow \bar{y}_t(g_t, \tau_t)$$

$$\tau_t \uparrow \Rightarrow \bar{y}_t \downarrow$$

- Direct effect on output at given output gap:

$$y_t = \bar{y}_t(g_t, \tau_t) + ...$$

- Effect on neutral rate through $\bar{y}_{t+T|t} - \bar{y}_t$:

$$\sum_{\tau=0}^{T-1} \bar{r}_{t+\tau|t} = \sum_{\tau=0}^{T-1} \rho_{t+\tau|t} + \frac{1}{\sigma\alpha}[\bar{y}_{t+T|t}(g_{t+\tau|t}, \tau_{t+\tau|t}) - \bar{y}_t(g_t, \tau_t)] - \frac{1-\alpha}{\sigma\alpha}(g_{t+T|t} - g_t)$$

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- Potential output decreasing in distortionary taxes:

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