Comment on Drautzburg and Uhlig, Fiscal Stimulus and Distortionary Taxation

Lars E.O. Svensson

Sveriges Riksbank

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

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:

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

Fiscal policy and the neutral interest rate

- 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

$$\begin{aligned} u'(\bar{Y}_t - G_t) &= \frac{v'(\bar{H}_t)}{\bar{W}_t/\bar{P}_t} = \frac{v'(\bar{H}_t)}{f'(\bar{H}_t)} = \frac{v'(f^{-1}(\bar{Y}_t))}{f'(f^{-1}(\bar{Y}_t))} \equiv \tilde{v}'(\bar{Y}_t) \\ \frac{d\bar{Y}_t}{dG_t} &= \frac{\tilde{v}''}{\tilde{v}'' - u''} \equiv m < 1 \\ \frac{e\bar{Y}_t}{eG_t} &= \frac{\bar{y}_t}{g_t} = \frac{d\bar{Y}_t}{dG_t} \frac{G}{Y} = m(1-\alpha) \equiv \gamma < 1 \end{aligned}$$

- Neutral (real) interest rate:

$$\bar{r}_t = \rho_t + \frac{1-\alpha}{\sigma\alpha}(m-1) \mathrm{E}_t \Delta g_{t+1}$$

Fiscal policy and the neutral interest rate

- Fiscal policy and the neutral interest rate:

$$\bar{r}_t = \rho_t + \frac{1-\alpha}{\sigma\alpha}(m-1)\mathrm{E}_t\Delta g_{t+1}$$

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

- Output gap:

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

- Output:

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

- Monetary policy stance: $r_t - \bar{r}_t$, $\sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t})$

Fiscal policy and the neutral interest rate

- Nominal (market) rate i_t, policy rate i_t^p, spread δ_t: $i_t = i_t^p + \delta_t$
- Real (market) rate r_t: $r_t \equiv i_t - \pi_{t+1|t} = i_t^p + \delta_t - \pi_{t+1|t}$
- Monetary policy stance:

$$\sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t}) = \sum_{\tau=0}^{T-1} i^p_{t+\tau|t} + \sum_{\tau=0}^{T-1}\delta_{t+\tau|t} - (p_{t+T|t} - p_t) - \sum_{\tau=0}^{T-1}\bar{r}_{t+\tau|t}$$

- Increase output gap: $\sum_{\tau=0}^{T-1}(r_{t+\tau|t} - \bar{r}_{t+\tau|t}) \downarrow$
  - Extend period of low policy rate (monetary policy, ZLB!): $\sum_{\tau=0}^{T-1} i^p_{t+\tau|t} \downarrow$
  - Keep spreads down (credit policy, credit easing): $\sum_{\tau=0}^{T-1}\delta_{t+\tau|t} \downarrow$
  - Keep inflation expectations up: $(p_{t+T|t} - p_t) \uparrow$
  - Use fiscal policy to increase neutral rate: $\sum_{\tau=0}^{T-1}\bar{r}_{t+\tau|t} \uparrow$

Use fiscal policy to increase neutral rate

- Shift up neutral-rate path:

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

$$\begin{aligned} \bar{r}_t &\equiv \rho_t + \frac{1-\alpha}{\sigma\alpha}(m-1)\mathrm{E}_t\Delta g_{t+1} \uparrow \\ \sum_{\tau=0}^{T-1}\bar{r}_{t+\tau|t} &= \sum_{\tau=0}^{T-1}\rho_{t+\tau|t} + \frac{1-\alpha}{\sigma\alpha}(m-1)(g_{t+T|t} - g_t) \uparrow \end{aligned}$$

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

Distortionary taxation and potential output

- Potential output decreasing in distortionary taxes:

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

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

- Direct effect on output at given output gap:

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

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

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

Specific comments on Drautzburg-Uhlig

- Explain intuition and differences from other papers!
- Intuition why ZLB doesn't seem to matter?
- Model crisis other than bond premium shock?
- Pre-announced vs. immediate stimulus?
- Other taxes: Consumption, capital?
- Government spending and welfare?
- Public investment as in Baxter-King 93?