Comment on Drautzburg and Uhlig, Fiscal Stimulus and Distortionary Taxation

Lars E.O. Svensson
Sveriges Riksbank
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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:
  
  \[
  r_t \equiv i_t - \pi_{t+1|t} \\
  c_t = c_{t+1|t} - \sigma(r_t - \rho_t) \\
  \alpha \equiv C/Y \\
  y_t = \alpha c_t + (1 - \alpha)g_t \\
  c_t = \frac{1}{\alpha} y_t - \frac{1 - \alpha}{\alpha} g_t 
  \]

- 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:
  
  \[
  \frac{1}{\alpha} \tilde{y}_t - \frac{1 - \alpha}{\alpha} \tilde{g}_t = \frac{1}{\alpha} \tilde{y}_{t+1|t} - \frac{1 - \alpha}{\alpha} \tilde{g}_{t+1|t} - \sigma(\tilde{r}_t - \rho_t) 
  \]

Fiscal policy and the neutral interest rate

- Neutral (real) interest rate:
  
  \[
  \tilde{r}_t \equiv \rho_t + \frac{1}{\sigma \alpha} E_t \Delta \tilde{y}_{t+1} - \frac{1 - \alpha}{\sigma \alpha} E_t \Delta \tilde{g}_{t+1} 
  \]

- Potential output depends on fiscal expenditure:
  
  \[
  u'(\tilde{Y}_t - G_t) \equiv \frac{v'(\hat{H}_t)}{W_t / P_t} = \frac{v'(\hat{H}_t)}{f'(\hat{H}_t)} = \frac{v'(f^{-1}(\tilde{Y}_t))}{f'(f^{-1}(\tilde{Y}_t))} \equiv \tilde{v}'(\tilde{Y}_t) \\
  \frac{d\tilde{Y}_t}{dG_t} = \frac{\tilde{v}''}{\tilde{v}'' - u''} \equiv m < 1 \\
  \frac{e\tilde{Y}_t}{eG_t} = \frac{d\tilde{Y}_t}{dG_t} \frac{G}{\tilde{Y}} = m(1 - \alpha) \equiv \gamma < 1 
  \]

- Neutral (real) interest rate:
  
  \[
  \tilde{r}_t = \rho_t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) E_t \Delta \tilde{g}_{t+1} 
  \]
Fiscal policy and the neutral interest rate

- Fiscal policy and the neutral interest rate:
  \[ \bar{r}_t = \rho_t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) E_t \Delta g_{t+1} \]
  \[ E_t \Delta g_{t+1} \Rightarrow \bar{r}_t \uparrow \]

- Output gap:
  \[ y_t - \bar{y}_t = (y_{t+1}|t - \bar{y}_{t+1}|t) - \sigma \alpha (r_t - \bar{r}_t) \]
  \[ = \left(\bar{y}_{t+T} - \bar{y}_{t+T}|t\right) - \sigma \alpha \sum_{\tau=0}^{T-1} (r_{t+\tau}|t - \bar{r}_{t+\tau}|t) \]

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

Use fiscal policy to increase neutral rate

- Shift up neutral-rate path:
  \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t \uparrow \]
  \[ \bar{r}_t \equiv \rho_t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) E_t \Delta g_{t+1} \uparrow \]
  \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t = \sum_{\tau=0}^{T-1} \rho_{t+\tau}|t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) (g_{t+T}|t - g_t) \uparrow \]

- Reduce long-run government expenditure growth:
  \[ g_{t+T}|t - g_t \downarrow \]

- Increase current expenditure, lower future expenditure:
  \[ g_t \uparrow, g_{t+T}|t \downarrow \]

Fiscal policy and the neutral interest rate

- Nominal (market) rate \( i_t \), policy rate \( \bar{i}_t \), spread \( \delta_t \): \[ i_t = \bar{i}_t + \delta_t \]
- Real (market) rate \( r_t \): \[ r_t \equiv i_t - \pi_{t+1}|t = \bar{i}_t + \delta_t - \pi_{t+1}|t \]
- Monetary policy stance:
  \[ \sum_{\tau=0}^{T-1} (r_{t+\tau}|t - \bar{r}_{t+\tau}|t) = \sum_{\tau=0}^{T-1} \bar{i}_{t+\tau}|t + \sum_{\tau=0}^{T-1} \delta_{t+\tau}|t - (p_{t+T}|t - p_t) - \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t \]

- 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!):
    \[ \sum_{\tau=0}^{T-1} \bar{i}_{t+\tau}|t \downarrow \]
  - 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: \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t \uparrow \]

Distortionary taxation and potential output

- Potential output decreasing in distortionary taxes:
  \[ \tilde{y}_t(g_t) \rightarrow \tilde{y}_t(g_t, \tau_t) \]
  \[ \tau_t \uparrow \Rightarrow \tilde{y}_t \downarrow \]

- Direct effect on output at given output gap:
  \[ y_t = \tilde{y}_t(g_t, \tau_t) \]

- Effect on neutral rate through \( \tilde{y}_{t+T}|t - \bar{y}_{t+T}|t \):
  \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t = \sum_{\tau=0}^{T-1} \rho_{t+\tau}|t + \frac{1}{\sigma \alpha} \left[ \tilde{y}_{t+T}|t (\bar{g}_{t+T}|t, \tau_{t+T}|t - \tilde{y}_t (g_t, \tau_t)) \right] - \frac{1 - \alpha}{\sigma \alpha} (g_{t+T}|t - g_t) \]

Use fiscal policy to increase neutral rate

- Shift up neutral-rate path:
  \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t \uparrow \]
  \[ \bar{r}_t \equiv \rho_t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) E_t \Delta g_{t+1} \uparrow \]
  \[ \sum_{\tau=0}^{T-1} \bar{r}_{t+\tau}|t = \sum_{\tau=0}^{T-1} \rho_{t+\tau}|t + \frac{1 - \alpha}{\sigma \alpha} (m - 1) (g_{t+T}|t - g_t) \uparrow \]

- Reduce long-run government expenditure growth:
  \[ g_{t+T}|t - g_t \downarrow \]

- Increase current expenditure, lower future expenditure:
  \[ g_t \uparrow, g_{t+T}|t \downarrow \]
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?