Answers to problem set on Clarida, Gali & Gertler (1999)

Section 3 model gives:

$$r_t = \frac{1}{\varphi} g_t + \frac{(1-\rho)\lambda q}{\varphi} u_t$$

$$i_t = \frac{1}{\varphi} g_t + \left(1 + \frac{(1-\rho)\lambda}{\rho \varphi \alpha}\right) \alpha q \rho u_t$$

$$x_t = -\lambda q u_t$$

$$\pi_t = \alpha q u_t$$

1) Write π_t in terms of x_t.

$$u_t = -\frac{1}{\lambda q} x_t$$

$$\pi_t = \alpha q \left(-\frac{1}{\lambda q} x_t\right) = -\frac{\alpha}{\lambda} x_t$$

Note: doesn't look like a Phillips curve.

2) Write i_t in terms of π_t

$$u_t = \frac{1}{\alpha q} \pi_t$$

$$i_t = \frac{1}{\varphi} g_t + (\quad) \alpha q \rho \left(\frac{1}{\alpha q} \pi_t\right)$$

$$= \frac{1}{\varphi} g_t + (\quad) \rho \pi_t$$

In the regression, residual would be $\frac{1}{\varphi} g_t$.

Answers (cont).

a) Coefficient on π_t: $\left(1+\frac{(1-\rho)\lambda}{\rho\varphi\alpha}\right)e$

b) It <u>would</u> be consistent with model: say ρ is small, α big etc.

c) Taylor principle is that $r_t > 0$ when $\pi^e > \hat{\pi}$ where here $\hat{\pi} = 0$.

Recall $\pi_t = \alpha q u_t$ so ${}_t\pi^e_{t+1} = \alpha q \rho u_t$

Write r_t in terms of π^e.

$$u_t = \frac{1}{\alpha q \rho}\pi^e$$

$$r_t = \frac{1}{\varphi} g_t + (1-\rho)q\left(\frac{1}{\alpha q \rho}\pi^e\right)$$

$$= \frac{1}{\varphi} g_t + \frac{(1-\rho)\lambda}{\alpha\rho\varphi}\pi^e$$

so Taylor principle is satisfied.

3) This VAR is equivalent to running a regression:

$$i_t = \beta_\pi \pi_t + \beta_x x_t + \text{lags} \ldots + \varepsilon_t$$

then regressing x_{t+1}, π_{t+1} etc. on ε_t.

In first regression, π_t & x_t will be collinear because both are linear functions of u_t,

So you can't say what β_π, β_x will be.

a) But you know "shock" to i_t:

$$\varepsilon_t = g_t$$

b) g_t is uncorrelated with u_{t+1}, so it's uncorrelated with x_{t+1}, π_{t+1} etc.

So you'll find x_{t+1}, π_{t+1} appear to be unaffected by shocks to i.

4) Assuming $g = 0$, put x_t in terms of r_t:

$$u_t = \frac{\varphi}{(1-\rho)\lambda q} r_t$$

$$x_t = -\lambda q \left(\frac{\varphi}{(1-\rho)\lambda q} r_t \right) = -\frac{\varphi}{(1-\rho)} r_t$$

So estimated coefficient is $-\frac{\varphi}{(1-\rho)}$, <u>not</u> same as $-\varphi$!