Economics 8861.01
Project 2
Professor Sanjay Chugh
Fall 2015

You will implement a "shooting algorithm" via a first-order approximation, in the context of discovering how the fluctuations of a partial equilibrium labor search and matching model differ in terms of some key parameters.

The partial, symmetric equilibrium is defined as state-contingent sequences for labor and real wages $\left\{n_{t+1}, \theta_t, w_t\right\}_{t=0}^{\infty}$ that satisfy the representative firm's vacancy posting condition

$$\frac{\gamma}{k_t^f} = \left(\frac{1}{1+r}\right) E_t \left\{ z_{t+1} - w_{t+1} + \frac{(1-\rho_x)\gamma}{k_{t+1}^f} \right\} ,$$

the law of motion for labor

$$n_{t+1} = (1-\rho_x) n_t + v_t k_t^f ,$$

and the generalized Nash bargaining condition

$$w_t = \eta\left(z_t + \gamma\theta_t\right) + (1-\eta) b ,$$

(with $\theta \equiv v/u$ as usual by the overall labor market), subject to the exogenous law of motion for aggregate labor productivity

$$\ln z_{t+1} = (1-\rho_z)\ln \bar{z} + \rho_z \ln z_t + \varepsilon_{t+1}^z ,$$

in which $\varepsilon_t^z \approx$ i.i.d. $N(0, \sigma_z^2)$ and initial labor n_0.

For each of the two variants of the model you will study (described further below), set the following parameters to be identical: $\gamma = 0.50$ is the vacancy posting cost, $r = 0.01$ is the net real interest rate, $\rho_x = 0.10$ is the exogenous separation rate, and $\bar{z} = 1$, $\rho_z = 0.95$ and $\sigma_z = 0.007$ characterize the exogenous process. The matching technology is $m(u_t, v_t) = \psi \cdot u_t^{\alpha} v_t^{1-\alpha}$ in every period, with $\alpha = 0.40$ and $\psi = 0.77$ (the "matching efficiency" parameter).

Model Variant 1

Set the Nash bargaining parameter $\eta = 0.05$ and the non-employment payoff b = 0.95. This defines the initial deterministic steady state.

Model Variant 2

Set the Nash bargaining parameter $\eta = 0.40$ and the non-employment payoff b = 0.5. This defines the final deterministic steady state.

TO DO

- For each of the model variants above, compute the deterministic steady state.

- Simulate the model for $T^{initial}$ periods (it is up to you to decide $T^{initial}$) around the initial deterministic steady state. Calculate and report standard business cycle statistics (including how you treated the simulated data).

- In period T, a "once-and-for-all shock" occurs in the parameters η and b (which defines the final deterministic steady state, aka Model Variant 2).

- Compute a linearization around the steady state (which of the two deterministic steady states to approximate around is left up to you). Display the g_x and h_x matrices.

- Using the linearized decision rules from above, determine (and report) how many periods S it takes to converge from the initial deterministic steady state to the final deterministic steady state.

- Simulate the model for T^{final} (it is up to you to decide T^{final}) periods around the final deterministic steady state. Calculate and report standard business cycle statistics (including how you treated the simulated data).

What to Submit: **A paper set up along the same lines as in Project 1. The experiments that you MUST compute and report are those described above. Provide as much intuition as you can. (Hint: some simple diagrams may easily convey the basic results along with any tabulated statistics you provide).**

In the final section (before the Conclusion), compute and report other experiments you can think of that may shed light on the results of the model.