EC8602: Problem Set 2

(Due December 3)

Build a computer program to simulate the stationary equilibrium of Hopenhayn's (1992) model of a competitive industry. Make simplifying assumptions as needed. As a guide to choosing parameter values (including the Markov process for productivity), try to get the simulation to generate establishment level so that statistics from the simulated data approximate Table I in Dunne, Roberts, and Samuelson (1989).

Below are some suggestions (you are free to ignore these suggestions). Restict productivity levels φ to lie on a finite set of points in the unit interval, say $\varphi_1, \ldots, \varphi_S$. The Markov process for productivity will reduce to a stochastic S by S matrix P. You will need to set values to the elements of P keeping in mind the restrictions that Hopenhayn imposes. You will also need to specify the distribution ν of productivity for entrants, which is simply an S-vector.

The state of the industry will be described by the S-vector μ with μ_s being the number of firms with $\varphi = \varphi_s$. It appears that given the entry mass M and the exit rule x equation (12) can be solved by linear algebra to deliver μ. I think there is one added complication that arrises from discretizing the productivity levels: Sometimes x will equal a particular productivity level, say φ_s, in which case equilibrium may require that firms with this level of productivity randomize with a probability $0 < p < 1$ of exiting. Although x, M, and p are endogenous, it is useful to think of one step of the program being to derive the implied vector μ.

You will also need to specify the industry demand curve, the industry supply curve for labor, and the firm's production function. Assume Cobb Douglas (log linear) functional forms. Note that given x, and μ the value function of a firm (across all productivity states) can be solved by matrix algebra. With the value function in hand, you can calculate whether the conjectured values for x and M are consistent with a stationary equilibrium given c_e and c_f. By a process of iteration, I believe you will quickly be able to find the stationary equilibrium.

Finally, with a stationary equilibrium in hand, you can simulate the behavior of individual establishments. Simulating the behavior of many, you can calculate statistics analgous to Table I in Dunne, Roberts, and Samuelson (1989). I will want to see the entire program, how it works, and the results.