Numerical Methods Homework 1

David Wiczer

January 23, 2016

1 The Problem

You will compute the discrete-time version of a Mortensen-Pissarides model with aggregate fluctuations. In the slides, I laid out the basic problem: find the labor market tightness for each value of a the shock. With N values, this is an $N \times N$ system of equations to solve.
Use the following specification:

δ	0.0081	Separation rate
α	0.72	Elasticity of matching[1]
A	0.158	Matching efficiency
$m(u,v)$	$min[1, Au^{\alpha}v^{1-\alpha}]$	Matching function
ρ_z	0.9895	Autocorrelation of weekly productivity
σ_{ϵ}	0.0034	Standard Deviation for innovations
μ	0.72	Bargaining weight for workers
b	0.4	Unemployment utility
κ	0.6	Posting cost is about 3 days of output
β	0.999	Weekly discount rate

Once you've solved it, simulate some realizations of the productivity and compute time-series of the endogenous variables. What's up with it?

2 Some guildines on solving it

- Note this is a very persistent process, so use a lot of grid points (30-50)
- Solving for $\log\theta$ may be better than θ. That ensures that the solver can choose values for $-\infty < \log\theta < \infty$ and $0 < \theta < \infty$.
- First set up all of the environment, then define a function that takes values for $\log\theta$ and pumps out the N-dimensional residual. Then let your root finder minimize this residual.

3 An alternative calibration

Hagedorn and Manovskii (2008) solved the same thing with the following calibration

μ	0.05	Bargaining weight for workers
b	0.95	Unemployment utility
Everything else the same.		

Again, draw a sequence of productivity shocks and simulate out the endogenous variables. Why is it changed?