

Homework Number 6, Estimating a Search Model

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1 Estimating a Block Recursive Model

To complete this homework you must:

- A. Estimate the level of unemployment insurance b necessary to generate an unemployment rate of 6.5% in the ergodic steady state of the economy described in HW5.
- B. Put a standard error on this parameter.

2 Solution Algorithm

- 1. Turn your old code into a function
- 2. You pass the function b , and it will then tell you how far you are from your moment (it will spit out Q , see below), which will be the S.S. level of unemployment
- 3. Define the moment as in Hamilton (1994) (p. 411 if you want to read more)

$$h(b, u_t) = u_t - .065$$

- 4. Define the sample average $g(b, \{u_t\}_{t=1}^T)$ across time periods within your simulation run:

$$g(b, \{u_t\}_{t=1}^T) = \frac{1}{T} \sum_{t=1}^T h(b, u_t)$$

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5. Define the \hat{b}_T to be the argmax of the following scalar objective (in general with multiple moments you will weight them)

$$Q(b, \{u_t\}_{t=1}^T) = g(b, \{u_t\}_{t=1}^T)^2$$

6. Use `fminsearch` or any other minimization routine to find the minimum of Q by searching over values of b .
7. Now put a standard error on your parameter.
8. In general \hat{b}_T will depend on the weighting matrix (but it is unitary in this example), and since $g(b, \{u_t\}_{t=1}^T)$ is a sample mean of a process whose population mean is zero, it should satisfy the central limit theorem (this allows you to then use the delta method and solve for the distribution of \hat{b}_T)
9. Define the limiting distribution of \hat{b}_T as (where b_{true} is the true underlying parameter)

$$\hat{b}_T \sim N(b_{true}, \left(\frac{dg(b, \{u_t\}_{t=1}^T)}{db} \right)^2 / T)$$

10. Solve for the numeric derivative of g (i.e. perturb b and see how much g changes), and then compute the standard error.