Econometrics I, Part II
Assignment 5
Fall 2007

Today’s Date: Wednesday, 12/5
Answers will be discussed in class, 12/11. The assignment will not be graded.

Please answer each question and show all of your work. Clearly indicate your final response to each question.

1. You have cross-sectional data (that is, from a point-in-time sample) that includes the wage rate of those currently employed and the proportion of individuals unemployed. We can summarize all of the information by the sequence \( \{w_i\}_{i=1}^N \), where \( w_i = 0 \) for individuals who are unemployed and otherwise > 0.

Consider estimation of a stationary search model in which there is no on-the-job search. The rate of arrival of offers while unemployed is \( \lambda > 0 \), the separation rate from jobs is \( \eta > 0 \), the utility flow in the unemployment state is \( b \), and the discount rate is \( \rho > 0 \). Individuals are assumed to be expected wealth-maximizers, and as such, employ a reservation wage strategy in deciding whether to accept a job offer. The distribution of job offers is given by \( G \).

You know the true value of the discount rate to be \( \rho = .01 \). Determine whether the model is identified under the falling two assumptions regarding \( G \). If the model is identified, provide a description of the estimation procedure you would employ to obtain maximum likelihood estimates of the identified parameters. If it is not identified, clearly show why this is the case.

(a) \( G \) is uniform with support \([0, d]\), \( d > 0 \), with \( d \) unknown.
(b) \( G \) is uniform with support \([a, d]\), \( 0 \leq a < d \), with \( a \) and \( d \) unknown.

2. Individuals have Cobb-Douglas preferences over consumption and leisure,

\[
    u_i(c, l) = \alpha_i \ln(l) + (1 - \alpha_i) \ln(c).
\]

Their total time endowment is \( T \). They have no nonlabor income (i.e., \( Y_i = 0 \) for all \( i \)). Individual earnings are taxed. The marginal tax rate is \( 0.2 \) for all earnings up to 200, at which point it increases to 0.4. The distribution of \( \alpha \) in the population is given by

\[
    G(\alpha) = \alpha^\delta, \quad \alpha \in (0, 1), \quad \delta > 0.
\]

You have access to a random sample of observations with information on (gross) wage rates for those who are working, along with hours of work, \( \{w_i, h_i\}_{i=1}^N \), where
$h_i = 0 \Rightarrow w_i = 0$ (that is, is unobserved). Write down the (conditional) likelihood function for the subsample of observations for which $h_i > 0$. Is the parameter $\delta$ identified using only the subsample of working individuals? If so, what makes it possible to consistently estimate a population parameter using an (endogenously) selected subsample?