Today’s Date: Thursday, 11/29  
Due Date: Friday, 12/7

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

In this exercise you are asked to estimate a neoclassical labor supply model in which a large proportion of the population are at a corner solution (i.e., don’t participate). We will continue to use our Cobb-Douglas utility function specification, so that the utility of individual $i$ is given by

$$u_i(c,l) = \alpha_i \ln l + (1 - \alpha_i) \ln c,$$

where $l$ is the amount of leisure consumed by the agent, $l \in [0,T]$, and $c$ is their consumption of a market good. The income available to the agent is given by

$$Y + w(T - l),$$

where $Y$ is nonlabor income and $w$ is the offered wage rate. We assume each woman’s preference parameter is determined by an independent draw from the fixed distribution $G(\alpha)$, the support of which is $(0,1)$.

The data available to you are selected from the October 2002 CPS. Rows correspond to married women between the ages of 35 and 44, inclusive. The information you are to use from the data set are the woman’s weekly hours, her wage rate (only observed for working women), and her nonlabor income (which mainly consists of her husband’s income, treated as exogenous).

1. Using only information from the working women, can you determine each woman’s value of $\alpha$? You should assume that all information on $h, w,$ and $Y$ is perfectly measured.

2. From this selected sample, compute a nonparametric estimator of the distribution of $\alpha$ in the subpopulation of working women, and call your estimator of this distribution $\hat{H}$. Does $\text{plim} \hat{H} = G$? Why or why not?

3. Now you are to assume that $G$ has a parametric distribution in the population, namely,

$$G(\alpha; \delta) = \alpha^\delta, \quad \alpha \in (0,1), \quad \delta > 0.$$

Write down the conditional likelihood function, the one which only uses data from the employed subsample. Find the point estimate of $\delta$ and its asymptotic standard error. Test whether $\alpha$ follows a uniform distribution in the population.
4. Given the correctness of the parametric distributional assumption for $G$, the parameter $\delta$ is all you need to know to characterize preferences in the population. Is this enough information to conduct policy experiments of a “general equilibrium” nature? What other information, within the confines of this model, would you need to have to conduct such experiments? (One such experiment could be changing the tax schedule from a flat tax to a progressive tax, for example). Describe a strategy to expand the model so that such experiments could be performed.

Data

The data set is in a text file named hours.txt so that you can use it with whichever programming language you choose. The data are extracted from the October 2002 Current Population Survey, and contain observations on married women 35-44 years of age. Individuals who report themselves as unemployed have been excluded. The layout is

<table>
<thead>
<tr>
<th>Column</th>
<th>Variable</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>35 – 44</td>
</tr>
<tr>
<td>2</td>
<td>Schooling</td>
<td>Years Completed</td>
</tr>
<tr>
<td>3</td>
<td>Weekly hours</td>
<td>0 if not working</td>
</tr>
<tr>
<td>4</td>
<td>Hourly Wage</td>
<td>0 if not working</td>
</tr>
<tr>
<td>5</td>
<td>Y</td>
<td>Nonlabor income</td>
</tr>
</tbody>
</table>

Total sample size is 588.