Labor Economics
Fall 2010
Final Examination

Instructions: Please answer all of the following questions. While you have 6 days to complete the exam (due the beginning of class on 12/15), I am not looking for (incredibly) lengthy responses, but rather succinct, well-organized ones. If you feel that a question is ambiguous, ask me about it (probably via email at cjf2@nyu.edu is best) and I will circulate any relevant clarifications or corrections to all of you. Good luck!

1. We discussed the Roy model in various guises throughout the semester, and in this question you are asked to nest the Roy model in a partial equilibrium setting. In particular, say that there are 2 occupations in a society, and that each individual chooses to supply time (inelastically) to one of them. Each individual $i$ has an inherent ability to perform task $j$, $j = a, b$, given by $\theta_{ij}$. The wage paid in to individual $i$ if she works in task $j$ is given by

$$y_{ij} = r_j \theta_{ij}.$$

Individuals are ln wage maximizers and individual $i$ chooses occupation $a$ if $\ln y_{ia} \geq \ln y_{ib}$. Let the inverse demand function for labor in occupation $j$ be given by

$$r_j = A_j - B_j H_j,$$

where

$$H_a = \int \int \theta_a \chi[\ln r_a + \ln \theta_a \geq \ln r_b + \ln \theta_b] f(\theta_a, \theta_b) d\theta_a d\theta_b,$$

where $f(\theta_a, \theta_b)$ is the bivariate density of $\theta_a$ and $\theta_b$ and $\chi[L] = 1$ when $L$ is true and 0 when $L$ is false. So $H_a$ measures the total amount of worker ability in occupation $a$. $H_b$ is defined similarly.

Assume that the distribution of $(\ln \theta_a, \ln \theta_b)$ is bivariate normal with mean vector $\mu$ and covariance matrix $\Sigma$. Given values of $A_a, A_b, B_a, B_b, \mu$, and $\Sigma$, describe the equilibria of the model in terms of existence and uniqueness and the general properties of the solution(s). Solve the model numerically and describe the properties of any numerical solutions you obtain (here I am suggesting performing some crude empirical numeric statics exercises by changing key primitive parameters and noting the impacts on model solutions).

Finally, you are to consider whether this model is estimable (i.e., identified) under the following two scenarios. If you find that a model is not estimable, suggest what you think might be reasonable restrictions on the parameter space that would enable estimation of a restricted version of the model.
(a) You have access to a large random sample of population members in which the earnings $y_i$ and occupation $d_i$ ($d_i = 1$ if $i$ is in job $a$ and 0 otherwise), $i = 1, ..., N$ are available.

(b) Assume that
\[ r_{jk} = A_j - B_j H_{jk} + \varepsilon_{jk} \]
where $k$ indicates geographic market $k$ and $\varepsilon_{jk}$ is independently and identically distributed as a normal with mean 0 and variance $\sigma^2$ for all $(j, k)$. You have access to a large random sample from each of $K$ separate locations on the earnings and occupation of sample members, as in Part a, and $K$ is large. Can you consistently estimate all of the primitive parameters of this revised model, including the additional parameter $\sigma^2$?

2. Consider the standard two-state stationary search model characterized by the rate of arrival of job offers, $\lambda$, the dissolution rate of jobs, $\eta$, the discount rate, $\rho$, the flow utility value of unemployment, $b$, and the (gross) wage offer distribution $F$. Assume that the utility flow in unemployment is equal to
\[ u_N = b^\delta \]
where $\delta \in (0, 1]$ and $b$ is the flow unemployment benefit flow. The utility flow when employed at a job paying wage $w$ is $w^\delta$.

Unemployment benefits are financed through payroll taxes. In particular, there is a tax rate $\tau$ on the earnings of the employed, and the steady state balanced budget condition is that
\[ Ub = \tau \bar{w} E, \]
where $U$ is the steady state proportion of unemployed, $\bar{w}$ is the average gross wage of the employed, and $E$ is the steady state proportion of the employed.

(a) For given values of all of the primitive parameters, including the tax rate $\tau$, describe the behavior of searchers in terms of their offer acceptance policy.

(b) Describe the solution of the social planner’s problem in terms of choice of $\tau$. Assume that the objective of the social planner is to maximize steady state welfare.

(c) According to Flinn and Heckman (1982), when $\delta = 1$ and $u_N$ is treated as a “free” parameter, all parameters of this model are identified except for $u_N$ and $\rho$ if we have access to a random sample from the steady state labor market distribution that includes the wages of the employed and the duration of ongoing search spells of the unemployed (subject to $F$ satisfying the technical condition of ‘recoverability’). If we observe $\tau$, but $\delta$ is unrestricted, are we able to identify all of the primitive parameters? Why or why not?
3. The following three (sub) questions concern static labor supply behavior in a household. The first part refers to the case in which there exists a household utility function (i.e., the “unitary” modeling framework), while the second asks you to employ a cooperative bargaining setup. The third asks for a comparison between the approaches.

(a) A household has the utility function given by

\[ u(c, l_h, l_w) = \alpha_1 \ln(c) + \alpha_2 \ln(l_h) + (1 - \alpha_1 - \alpha_2) \ln(l_w), \]

where \( c \) is total household consumption of a market good with price \( p_c \), \( l_h \) is the leisure of the husband, \( l_w \) is the leisure of the wife, and the \( \alpha \)'s satisfy the usual restrictions. Each spouse has a time endowment of 1. Each spouse has a nonlabor income of \( y_s = 1 \), \( s = h, w \), and each faces a wage offer \( w_s \), \( s = h, w \). Determine the labor supply policy of the household. Do labor market participation decisions exhibit a critical value property?

(b) Each household member has a utility function given by

\[ u_p(c_p, l_p, \theta) = \beta_{1,p} \ln(c_p) + \beta_{2,p} \ln(l_p) + (1 - \beta_{1,p} - \beta_{2,p})\theta, \ p = h, w, \]

and each individual has a nonlabor income level of \( y_s = 1 \), the cost of private consumption is the same for each individual and is equal to \( p_c \), \( \theta \) is a marriage-specific “match” value, and the \( \beta \)'s satisfy the usual restrictions. The next best option (outside of the marriage) is living alone, in which case the match value is equal to 0. Given that the spouses engage in cooperative behavior and that symmetric Nash bargaining is used to divide the surplus from the marriage, characterize labor supply decisions in this setting (theoretically and/or numerically). As before, pay particular attention to labor market participation decisions.

(c) Which framework do you prefer from a theoretical perspective? Why? Say you were to estimate a static model of family labor supply. Which setup would you use (assuming that you have to choose between these two)? List any important differences in the two models in terms of empirical implications and data requirements. In particular, what types of data are required to estimate \( \alpha_1 \) and \( \alpha_2 \) (or distributions of these values in the population) under the unitary assumption? What types of data are required to estimate the \( \beta \)'s (or the distribution of the \( \beta \)'s when assuming population heterogeneity) under the nonunitary setup?