Labor Field Exam (Summer 2017)

Part I. (ECON 250A)

Answer both questions in this part. The two questions in this part are worth a total of 100 points (1/2 of the exam total). Question 1 is worth 60 points and should take 50-55 minutes. Question 2 is worth 40 points and should take 35-40 minutes.

1. (Labor Supply)

Uber drivers can work as many hours as they want, and pay a "tax" $\tau = 0.25$ to the company on all fares they earn. A recent experiment offers a driver the following deal: in return for paying a weekly fixed fee of $\$F = 100$ to Uber, the driver gets to keep 100% of his or her fare. Suppose for simplicity that the average hourly gross earnings of an Uber driver are $w(= \$20)$ per hour

a) assume that a driver faces the same conditions each week, and evaluates the offer assuming that her consumption will be equal to her Uber earnings in the week (i.e., **ignore savings**). Draw a diagram of the budget constraints facing a driver under the control scenario (no fixed fee, $\tau = 0.25$) and under the treatment scenario ($F = 100$, $\tau = 0$).

b) Consider a driver who is initially working 20 hours per week. Show that this driver will definitely take up the option of switching to the treatment scenario.

c) Suppose you could observe a sample of workers who were intially all working 20 hours per week, and could observe their hours in the treatment regime. Explain how you would derive an estimate of the compensated elasticity of labor supply, ϵ^c.
Hint: recall the "Slutsky compensated" labor supply function, which allows a worker to afford a given point on a budget constraint. How is the elasticity of this function related to the compensated elasticity?

d) Consider drivers who is initially driving $h^0 < 20$ hours. Derive an approximate expression for the decision rule of a driver over whether to take up the treatment offer that depends on w, τ, F, ϵ^c . Show that when $\epsilon^c > 0$ some drivers will prefer the treatment regime to the control.
Hint: Using the expenditure function, derive an exact expression for whether a driver prefers control or treatment. Then use a second order approximation.

e) Suppose you observed hours per week for people in the treatment group prior to the experiment, and observed whether or not they decided to pay the fee. Using you answer from (d) explain how you could estimate $\epsilon^c > 0$.

f) **contrary to what we have been assuming so far**, suppose that drivers can borrow and lend freely between periods at an interest rate of 0, and that a driver's utility in week t is additively separable in consumption (c_t) and hours (h_t):

$$u(c_t, h_t) = \ln c_t - a\left(\frac{\eta}{1+\eta}\right) h_t^{1+\frac{1}{\eta}}$$

where a is a preference term that can vary across drivers.

(i) letting λ_t represent the marginal utility of wealth of a driver in week t, derive the optimal choice of consumption and hours to work in period t, conditional on λ_t, when the driver faces a gross wage w_t and pays a "tax rate" τ. These will be functions of w_t, τ, λ_t.

(ii) suppose that $\lambda_t = \lambda$ is assumed to be constant for a given driver. Draw a diagram illustrating the optimal intertemporal choices of a given driver in the absence and presence of the treatment, assuming that the driver opts to pay the fee F when offered the opportunity.

Hint: if λ_t is constant regardless of hours choices within period t, what must be true about the driver's consumption in the presence and absence of the treatment?

(iii) assuming that a member of the treatment group decides to take up the option of paying the fee, give an expression for the change in her hours from the week before the experiment starts to the first week of the experiment.

Hint: use the labor supply function you derived in part (i).

(iv) (Harder) Derive an approximate expression for the decision rule of an intertemporally optimizing driver with constant marginal utility of wealth about whether to pay the fee if offered the opportunity.

Hint: when the marginal utility of wealth is constant the individual receives net lifecycle utility $u(c_t^*, h_t^*) + \lambda S_t$ in period t, where S_t is her net savings in the period, and c_t^*, h_t^* are the optimal choices for the period.

2. Racial/Gender Gaps and Discrimination

Write a short essay on the topic of **either** (a) differences in labor market outcomes of different race groups **or** differences in labor market outcomes of females and males.

In either case, be sure to briefly summarize:

a) the "classic" model of employer taste based discrimination derived by Becker in the 1950's

- what does this model assume (Hint: how is a given individual's wage determined?)
- what does it predict
- to what extent is this model still relevant in modern labor markets

b) models based on search/matching or frictions

- how do these depart from Becker?
- what are key differences in predictions?

c) **for race:** models based on rational stereotyping with pre-market investments (e.g. Coate and Loury type models)

for gender: models based on assumptions about family specialization (e.g., differential child care choices)

d) any recent topics/developments/papers that you think are particularly relevant or insightful

Note: you only have about 35 minutes so try to be organized and concise. Mention formal modeling ideas as much as possible.

PART II (ECON 244)

This question is worth 100 points.

Consider the following triangular model of treatment effects:

$$Y_i(1) = \mu_1 + \rho_1 v_i + \varepsilon_{i1}$$

$$Y_i(0) = \mu_0 + \rho_0 v_i + \varepsilon_{i0}$$

$$D_i = 1\{\gamma Z_i > v_i\}$$

$$Y_i = DY_i(1) + (1 - D) Y_i(0)$$

where $\theta \equiv (\mu_1, \mu_0, \rho_0, \rho_1, \gamma)$ are constants and Z_i is a binary random variable taking values in $\{0, 1\}$. Assume that

$$v_i | Z_i, \varepsilon_{i0}, \varepsilon_{i1} \sim Uniform(0, 1)$$

$$E[\varepsilon_{id} | v_i, Z_i] = 0 \text{ for } d \in \{0, 1\}$$

1. Answer the following questions assuming you have an *iid* random sample of size N comprised of the observations $\{Y_i, D_i, Z_i\}_{i=1}^N$

a) Derive an expression for $P(D_i = 1|Z_i)$

b) Derive an expression for $E[v_i|D_i = 1, Z_i]$

c) Use your answer above to derive an expression for $E[Y_i|D_i = d, Z_i]$ for $d \in \{0, 1\}$

d) Use your answers above to propose a 2-step "control function" estimator of (ρ_0, μ_0) (hint: note that compliance is '1-sided' here which prevents you from fitting an OLS regression of Y on $(1, Z_i)$ in the $D_i = 1$ sample)

e) Derive an expression for the local average treatment effect (LATE) in terms of the elements of θ

f) Propose an estimator of LATE that uses the control function estimates of (ρ_0, μ_0) from part d).

g) How does your proposed LATE estimator differ from IV? Discuss your answer.