

E731 Labor Economics I: Homework #1

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Directions: Answer the questions on separate sheets of paper. The results should be typed, single sided, 12 pt font, stapled, and with your name. You should include your programs as an Appendix. You are encouraged to work in groups of 2 and no more than 3. The assignment is due Wednesday September 28, 2016 in class.

1. Consider the consumer's maximization problem

$$\max_{C,H} C^\beta L^{1-\beta} \text{ s. t. } L + H = T \text{ and } C = wH + N$$

- Solve for the reservation wage
- Set up the lagrangian, and solve first order conditions for optimal hours of work for an interior solution
- Derive the uncompensated wage effects, income effects, and compensated wage effects

2. Define the MRS function as  $\ln M(N, H, \varepsilon) = \alpha_0 + \alpha_1 N_i + Z_{2i} \alpha_2 + \gamma H_i + \varepsilon_i$   
and the wage function as  $\ln w_i = \beta_0 + Z_{1i} \beta_1 + \eta_i$

- Show that in equilibrium  $H_i = \frac{1}{\gamma} (\ln w_i - \alpha_0 - \alpha_1 N_i - Z_{2i} \alpha_2 - \varepsilon_i)$
- Using the Stata data set, MROZ.DTA, that is described at the bottom of this document,
  - Compute the following variables:  
 nonlabor income (in \$1000s), N, as  $\text{PRIN} = (\text{FAMINC} - \text{WHRS} * \text{WW}) / 1000$   
 age squared,  $\text{WA2} = \text{WA} * \text{WA}$   
 experience squared,  $\text{AX2} = \text{AX} * \text{AX}$   
 age\*education,  $\text{WAVE} = \text{WA} * \text{WE}$
  - What are the mean and median values of WHRS and WW for the pooled sample of workers and nonworkers, as well as conditional on working? What is the labor force participation rate?
  - Are there economically and statistical differences in average demographics (age, education, number of kids, experience) between workers and nonworkers? Does this point to possible selection on observables?
  - Estimate the reduced form labor force participation rate as a function of KL6, K618, WA, WA2, WE, N, HA, HE, WMED, WFED, UN, CIT using LP, probit, and logit. What is the estimated marginal effect of WE on LFP from each model (evaluated at the mean)? Is there a difference in the marginal effects if you evaluate at the function of the mean of the regressors instead of the mean of the function?

From the reduced form probit LFP model construct the Inverse Mills Ratio to be used below
- Estimate the equilibrium hours of work model in part 2a and compare how the uncompensated wage effects, compensated wage effects, and nonlabor income effects AND elasticities vary when the model is estimated via
  - OLS on pooled workers and nonworkers. For  $Z_{2i}$  include KL6, K618, WA, WA2, WE. For the missing wages of nonworkers use the predicted log wage based on the same regressors as the LFP model plus AX and AX2
  - OLS on workers only
  - Two-step Heckit. Is there evidence on nonrandom sample selection?
  - Two-step Heckit with the log wage treated as endogenous. Is there still evidence of nonrandom selection? Test using the Hausman-Wu test of exogeneity of the wage rate
  - Tobit
  - Tobit with the log wage treated as endogenous

**Filename: MROZ.DTA**

THE MROZ DATA FILE IS TAKEN FROM THE 1976 PANEL STUDY OF INCOME DYNAMICS, AND IS BASED ON DATA FOR THE PREVIOUS YEAR, 1975. OF THE 753 OBSERVATIONS, THE FIRST 428 ARE FOR WOMEN WITH POSITIVE HOURS WORKED IN 1975, WHILE THE REMAINING 325 OBSERVATIONS ARE FOR WOMEN WHO DID NOT WORK FOR PAY IN 1975. A MORE COMPLETE DISCUSSION OF THE DATA IS FOUND IN MROZ [1987], APPENDIX 1. THE DATA SET CONSISTS OF 753 OBSERVATIONS ON 19 VARIABLES:

1. LFP A dummy variable = 1 if woman worked in 1975, else 0
2. WHRS Wife's hours of work in 1975
3. KL6 Number of children less than 6 years old in household
4. K618 Number of children between ages 6 and 18 in household
5. WA Wife's age
6. WE Wife's educational attainment, in years
7. WW Wife's average hourly earnings, in 1975 dollars
8. RPWG Wife's wage reported at the time of the 1976 interview (not the same as the 1975 estimated wage). To use the subsample with this wage, one needs to select 1975 workers with LFP=1, then select only those women with non-zero RPWG. Only 325 women work in 1975 and have a non-zero RPWG in 1976.
9. HHRS Husband's hours worked in 1975
10. HA Husband's age
11. HE Husband's educational attainment, in years
12. HW Husband's wage, in 1975 dollars
13. FAMINC Family income, in 1975 dollars. This variable is used to construct the property income variable.
14. MTR This is the marginal tax rate facing the wife, and is taken from published federal tax tables (state and local income taxes are excluded). The taxable income on which this tax rate is calculated includes Social Security, if applicable to wife.
15. WMED Wife's mother's educational attainment, in years
16. WFED Wife's father's educational attainment, in years
17. UN Unemployment rate in county of residence, in percentage points. This taken from bracketed ranges.
18. CIT Dummy variable = 1 if live in large city (SMSA), else 0
19. AX Actual years of wife's previous labor market experience