Econ 312 Part B, Spring 2021

Problem Set 3

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1. Answer all of the questions posed in

   (a) Classical Discrete Choice Theory presentation (before the appendix)

   (b) The four Roy presentations posted for the class.

2. Compare the Thurstone Random Coefficient model with the McFadden Conditional Logit model.

   (a) Discuss sources of heterogeneity (why people are different). McFadden talks about "preference shocks." What are other interpretations of these "shocks."

   (b) Suppose that in the Thurstone model $\eta^3 \neq 0$. How can you solve problem P-3 with this model? (Forecasting the demand for a new good never previously in the marketplace?) Adapt the posted notes to assume that η^1, η^2, η^3 are all iid $N(0, \sigma_\eta^2)$, prove identification if possible and derive the prediction equation.

   (c) How does the nested logit model solve the red bus–blue bus problem? Derive it from the GEV.

3. Define "index sufficiency." What role does it play in selection models, matching, and in IV models? Discuss how to use the probability of

selection (the "propensity score") $\Pr(D = 1|Z = z)$ in IV, selection models, and in matching?

4. Compare the "Neyman-Rubin" model for causality with the Generalized Roy model for the General no-normal models

   (a) What policy questions does each address?

   (b) How does each deal with unobservables?

   (c) How does "SUTVA" compare with "autonomy" Frisch (1938) as a model condition?

   (d) Distinguishing fixing from conditioning

5. For a group of I persons (fixed) with a possible pair of outcomes $(Y_{0i}, Y_{1i}), i = 1, \ldots, I$. Let $D_i = 1$ if a person is randomly assigned to "1" and $D_i = 0$, otherwise. $Y_i = D_i Y_{1i} + (1 - D_i)Y_{0i}$.

   You are interested in testing $H_0 : Y_{0i} = Y_{1i}, i = 1, \ldots, I$ for your sample.

   For a fixed I, compute the distribution of the test statistic T where at least one observation has $D_i = 1$ and another has $D_i = 0$.

$$T = \frac{\sum Y_i D_i}{\sum D_i} - \frac{\sum Y_i (1 - D_i)}{\sum (1 - D_i)}$$

   ,

   and you consider all possible permutations of D_i for values of D_i with $J_1 = \sum_{i=1}^{I} D_i$ and $J_2 = \sum_{i=1}^{I} (1 - D_i)$. The sampling distribution of the statistic is generated by taking all admissible permutations of D_i.

6. Suppose that you want to know the determinants (causes) of voting one way or another on an issue. You are given a sample of people who, as a group, are known to be much more likely to vote one way than the population at large. How can you use this sample to determine the causes of voting in a certain way for the general population (e.g., $D = 1$ are votes for $D = 0$ votes against)? X are the determinants of voting. You seek to estimate $\Pr(D = 1|X)$ for the population as a whole (and not just your sample).

7. For the sample of women using the file "nlsy79_extract.dta" posted in the Modules section, compute the reservation wage for working in the market using information on employment, hours of work, and hourly wages earned for working women. You know for each person Z (determinants of wages), X (determinants of reservation wages (assets; other source of income)). Do women who work have above market average hourly wages or below average hourly wages? Plot the distributions of latent market wages, hours of work, and reservation wages. Plot the predicted vs actual hours worked, employment and market wages.

References

Frisch, R. (1938). Autonomy of economic relations: Statistical versus theoretical relations in economic macrodynamics. Paper given at League of Nations. Reprinted in D.F. Hendry and M.S. Morgan (1995), *The Foundations of Econometric Analysis*, Cambridge University Press.