Econ 312 Part B, Spring 2021

Problem Set 1

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1. Consider a standard Cobb-Douglas production function:

$$Y = AK^{\alpha}L^{\beta}, \quad \alpha + \beta < 1; \alpha > 0, \beta > 0 \tag{1}$$

where A is a Hicks-neutral productivity shock and K and L are capital and labor, respectively. Y is output.

The function is assumed to be policy invariant (i.e., the parameters A, α, β are invariant to policy changes – economists since Frisch call this autonomy, see, e.g., Heckman, 2008 on reading list). Equation (1) is *structural* in the sense of Hurwicz (1962). Why? Define the outcomes $Y(k)$ as Y when $K = k$, and L is fixed at l and A at a. $Y(k')$ is Y when $K = k', L = l$ $A = a$.

(a) Are $Y(k), Y(k')$ potential outcomes? Outputs of a structural model? What is the difference? What is the difference between a causal parameter and comparisons of structural functions evaluated at different points of their arguments?

(b) What is ATE for the policy of fixing $K = k$ and $K = k'$? How is it related to the marginal product of k? The chord of the function with respect to K holding L and A fixed?

2. Watch the short Feynman video. Read the papers by Christensen and Miguel (2018) and Chang and Li (2015). In light of results reported in these papers, is Feynman right? Is economics a pseudoscience?

3. Simulate a normal Generalized Roy model using the parameters used by Heckman et al. (2006) Figure 1. Use samples of size 100.

   (a) Compute ATE, TOT, MTE, for values of $Cov(\frac{Y_0}{\sigma_0}, \frac{Y_1}{\sigma_1})$ ranging from 1 to -1 in steps of .25.

   (b) For each case, give LATE for a unit downward change in C.

   (c) What is PRTE for a unit downward change in C?

   (d) Write this model as a random coefficient regression model with $Y = DY_1 + (1-D)Y_0$ as the dependent variable. $D = 1$ corresponds to being in Sector 1, $D = 0$ otherwise. When is least squares a consistent estimator of ATE? TOT?

4. Read (skim) Friedman's, *A Theory of the Consumption Function* (1957), which established the permanent income theory, a core concept in modern economics. Does Friedman use valid p-values? How does he reason (i.e., make his case for permanent income)? How does he use hypothesis testing? What size and power does he use for his tests? What are the roles of consilience and replication in his analysis? Why is the book so convincing empirically?

References

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