ECON 8803 Syllabus
Health Economics II, Spring 2024
Problem set 1, due Thursday, February 15

1 Logit demand

Download the data on over-the-counter (OTC) headache medicine from Canvas. The data is at the store-week level for four brands and three package sizes. A brand-size pair is a product j.

Consider the utility function for product j in store-week (market) t for consumer i:

$$\begin{aligned} u_{ijt} &= X_{jt}\beta - \alpha p_{jt} + \xi_{jt} + \varepsilon_{ijt} \\ &= \delta_{jt} + \varepsilon_{ijt} \end{aligned}$$

where ε_{ijt} is an i.i.d. draw from a type I extreme value distribution, X_{jt} are observed product characteristics, and ξ_{jt} are unobserved product characteristics.

1. Generate a table of summary statistics that provides the mean of each of the following for each brand-size pair: market share of sales, unit price, price/50 tab, and wholesale price.

For all problems below, display your results in a regression table or multiple tables, making clear which model each set of results corresponds to.

2. Estimate the demand model by OLS using price and promotion as product characteristics.
3. Estimate the demand model by OLS using price and promotion as product characteristics, also including brand-size dummies.
4. Estimate the demand model by OLS using price and promotion as product characteristics, also including store-brand-size (the interaction of store and product) dummies.
5. Estimate models 2-4 using the wholesale price as an instrument.
6. Estimate models 2-4 using a Hausman instrument (i.e. the average price of the same product in other stores).
7. Discuss how your results vary across the specifications according to the dummies included and instruments used. Which specification(s) do you think address the endogeneity issue best?
8. Using the analytic formula for the demand elasticity of the logit model and your results from models 2-4, compute the mean own-price elasticities for all products in the market. Discuss your findings.
9. Under the assumptions of the logit model, the expected consumer surplus that an individuals receives from getting to choose the OTC headache medicine that maximizes their utility is

$$\begin{aligned} \mathbb{E}[CS_i] &= \frac{1}{\alpha}\mathbb{E}[\max_j \delta_{jt} + \varepsilon_{ijt}] \\ &= \frac{1}{\alpha}\ln\Big(\sum_{j=1}^{J}\exp(\delta_{jt})\Big), \end{aligned}$$

where J is the number of available products. Using the analytic formula for expected consumer surplus and your results from models 2-4, compute the change in consumer surplus generated if the store brand options are no longer offered. How do your results compare across specifications?

2 Adverse selection and (selection on) moral hazard

Define each of the following terms and describe the data and identifying variation necessary to estimate their effects in health insurance markets: adverse selection, moral hazard, and selection on moral hazard. What approaches have the papers discussed in class taken to estimate these effects? What have these papers found and concluded?