

**Professor Federico Ciliberto**

*I allow collaboration on homework assignments, and encourage you to work in study groups. PLEASE HAND IN ONE HOMEWORK PER GROUP. You cannot turn in photocopies of the assignment. I will not accept late assignments.*

Handed Out on 3/18/2023  
Due on 3/30/2023

Consider the dataset for homework 3

## 1 Preparing the Dataset for Bresnahan and Reiss

- Prepare the dataset so that there are only three variables: market size, market distance, and number of firms in a market.
- The unit of observation is a market.
- Drop all ticket carriers that appear less than 5% of the time in all the sample. You should only have AA, CO, DL, NW, TW, UA, US. Simply drop the observations for ticketing carriers that are different than these.

## 2 Replicating Bresnahan and Reiss [1990,1991]

- Consider the following reduced form profit function:

$$\pi_{im}(N) = X_m\alpha + g(N_m) + \epsilon_{0m},$$

where

$$g(N_m) = \theta_1 I_{m,N=1} + \theta_2 I_{m,N=2} + \theta_3 I_{m,N=3} + \theta_4 I_{m,N=4} + \theta_5 I_{m,N=5} + \theta_6 I_{m,N=6} + \theta_7 I_{m,N=7}.$$

Here,  $I_{m,N=1}$  is a dummy equal to 1 if there is only one firm in the market.  $I_{m,N=2}$  is a dummy equal to 1 if there are two firms in the market, and so on. Assume  $\epsilon_{0m} \sim N(0, 1)$ .

1. What do the parameters say? Why? Interpret.
2. What restrictions do you need to make on the parameters so that you can estimate this model? Why?
3. Now estimate the model using Maximum Likelihood.