Homework 2

Econ 8180: Empirical IO.

Due on February 16, 2023
Each group hands in only one homework.

Download from Collab the file railway.dta containing the raw data used by Porter in the cartel stability paper. The variables are as defined in the paper.

1. *Compute the sample moments and compare to those given in the paper (Table 2). Do they match exactly?*

2. *Reproduce Columns 1 and 2 in Table 3 in Porter.*

   (a) I have defined monthly dummies as four-week dummies. For example month 1 has five weeks in the data, but I want you to define a month as having just four weeks. So month1=1 if week=1 or week=2 or week=3 or week=4.

   (b) I have defined the variables *DM1, DM2, DM3, and DM4*. Why do we need these variables?

   (c) Reproduce Column 1 of Table 3 in Porter (Command: *reg3*). Do your results match exactly? How do your standard errors look compare to those in the Table? If there is any difference, why do you think this happens?

3. *Reproduce Columns 3 and 4 in Table 3 in Porter using* $I_t = PO_t$.

   (a) Save the dataset as a raw file (Command: *outfile*).

   (b) Start using *Matlab*. Matlab is analogous to Stata in the sense that you need to write an .m file while before you had to write a .do file.

   (c) You must create two .m files. One is the basic .m file, which calls the function to be maximized (or minimized) and the other is a .m file which will be the function that we want to maximize.

   (d) First maximize the likelihood $L(I_1, ..., I_T) = \prod_{t=1}^{T} h(y_t|I_t)$,with $h(y_t|I_t)$ as given at the top of page 306.Notice that you must also estimate the variance-covariance matrix. Notice also that in practice we actually minimize the likelihood by setting a negative sign in front of it because Matlab has only a minimizing function.

(e) What results do you find? How do they compare with those in the table? And with those you found in part 2? Comment.

4. *Reproduce Columns 3 and 4 in Table 3 in Porter estimating $\hat{I}_t$ using the methodology presented by Porter. In practice:*

   (a) In a new .m file write first down the likelihood function $L = \prod_{t=1}^{T} f(y_t)$, where $f(y_t)$ is given at page 306.

   (b) Write then the Kiefer's algorithm that updates w_t^0 by the Bayes rule. To do this you must create anoter .m function, say Kiefer.m.

   (c) What results do you find? How do they compare with those in the table? And with those you found in part 2 and 3? Comment.