Homework 6: Industrial Organisation

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N.B. The code for this exercise was written in `R` and is available on my Github account. www.github.com/dhananjayghei/io_estimation.

Some basics

1. Read the data into a statistical package and look at summary statistics to convince yourself that the data was read in correctly. Try a simple OLS regression of log(QUANTITY) on a constant, log(PRICE), LAKES, and (twelve of) the seasonal dummy variables. If you were to view this as an estimate of a demand curve what would the price elasticity of demand be? Why does this number seem unreasonable?

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2. Try doing the regression instead using instrumental variable with the COLLUSION variable as the instrument for PRICE. How does the reported price elasticity change. Is the estimate closer to that in Porter's paper or that in Ellison's paper and why? How do you interpret the coefficient on the LAKES variable? On the seasonal dummies? What is the R-squared of the regression and what do you make of it?

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3. Try the regression with the DM1-DM4 and COLLUSION as instruments for price. Do the estimates "improve" in any way?

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4. Estimate a supply equation as in Porter and Ellison using the LAKES variable as an instrument for quantity. What does the magnitude of the coefficient on COLLUSION tell us about the effect of collusion on prices? What might the coefficient on QUANTITY in this regression indicate about the nature of costs in the JEC?

Model derivation and interpretation

1. Suppose that rather than the log-log specification of demand you've been using so far, you tried others and found that a linear specification of demand like

$$Q_t = \alpha_0 + \alpha_1 P_t + \alpha_2 Lakes_t + u_t$$

seemed most appropriate. Show that for this demand curve the optimal price for a monopolist with a constant marginal cost of c to set is

$$P_t = c - \frac{1}{\alpha_1} Q_t$$

Given this result, what functional form would you choose for the supply curve in this model?

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2. What pricing rule would result with this demand curve if the industry instead consisted of perfectly competitive firms with total costs of the form $c(Q_t) = c_0 Q_t + c_1 Q_t^2$ setting price equal to marginal cost? Could one use an approach like Porter's to distinguish between these two models of behavior? Talk about why this is an important question.

Causes of price wars

1. Using the collusion variable generate an indicator variable for the start of a price war. Perform a probit regression with this indicator as a dependent variable and with QUANTITY, LAKES, and DM1-DM4 (or a subset thereof) as explanatory variables. What inferences might you want to draw about whether price wars are more likely to occur in booms from the coefficients on the first two variables? Why are these variables not really the right ones to be using in the equation?
