Econ 3385: Measuring Market Power

Problem Set 2

For this problem set, we'll continue to analyze whales_demand.csv. You can use the R code from lecture 2 for hints.

Questions

1. Consider this model of the demand and supply for oil

$$Q_y^{oil,D} = \beta_0 + \beta_1 P_y^{oil} + \epsilon_y^D$$

$$Q_y^{oil,S} = \gamma_0 + \gamma_1 P_y^{oil} + \epsilon_y^S$$

$$Q_y^{oil,D} = Q_y^{oil,S}$$

   - Under what condition does a regression of equilibrium quantity on price recover consistent estimates of β_0 and β_1?
   - Show that this condition fails here by deriving an expression for equilibrium price as a function of ϵ_y^D and ϵ_y^S.

2. `shipwrecks` is a measure of what share of whaling ships have recently been lost at sea. Write down a new model of demand and supply where this variable (call it Z_y) is a *supply shifter*.

   - Derive a new expression for equilibrium price as a function of ϵ_y^D and ϵ_y^S and Z_y.

3. What are the conditions that need to hold for a 2SLS regression of quantity on price instrumented with Z_y to recover consistent estimates of β_0 and β_1?

   - Use the expression you derived in question 2 to show these conditions hold.

4. Now let's run some regressions. Run a "first stage" regression of price on your instrument, Z_y.

   - Report the estimated parameters and standard errors in a table.
   - Do the estimates make sense? Why or why not?

5. Now, use the estimated first stage regression to generate predicted prices, $\hat{P}_y^{oil}$, which are a function of Z_y and the estimated first stage coefficients.

   - HINT: use the R function `predict()` or the command `predict` in Stata.

6. Now run the second stage regression of quantity on $\hat{P}_y^{oil}$.

   - Report the estimated parameters and standard errors in a table.
   - Does the estimate of β_1 have the right sign? Is it statistically significant at the 5% level?
   - Interpret the magnitude of the coefficient.

7. Repeat steps 4-6 for sperm oil.

   - How does the price coefficient in demand for sperm oil compare to the price coefficient in demand for non-sperm oil? Provide an interpretation.
   - If the price of sperm oil increases, what should happen to demand for non-sperm oil? How could we model this?