

Problem Set 2

Market Power and Public Policy ECON 465

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1. (25 points) Cournot

Suppose that we have a market with three firms, A, B, and C. They have cost functions given by $TC^A = 2q_A$, and $TC^B = 8q_B$, $TC^C = 8q_C$ (note that B and C have the same cost function). The demand curve is given by $Q = 10 - \frac{1}{2}P$.

- (a) (3 points) What is the socially optimal outcome in this market, in terms of total quantity and prices?
- (b) (5 points) What is the outcome in this market, in terms of prices and quantity, if firms compete in quantities (Cournot Competition).
- (c) (7 points) What is consumer and producer surplus (hint for producer surplus, compute total profits)? What is the welfare loss from cournot? (draw a diagram to help you with this one)
- (d) (4 points) Suppose firms A and B merge. Compute the new quantities and prices, discuss.
- (e) (4 points) What is welfare effect of this merger, in terms of producer and consumer surplus? Why is this? (Hint what is industry average cost)
- (f) (2 points) Would these two firms find the merger profitable?

2. Bertrand (10 points)

Following the Bertrand model of oligopoly, assume that firms make simultaneous price decisions with constant marginal costs. Suppose that there are two producers of Cement for the U.S. market. The demand for cement is:

$$Q^d = 200 - \frac{P}{2}$$

There are two producers, Holcim which produces in the United States and Cemex which produces in Mexico. Holcim has costs $TC = 10Q$, while Cemex which has to import Cement from abroad has costs $TC = 20Q$.

- (a) (1 point) What are the marginal costs of each firm?
- (b) (2 points) What is Cemex's best response given the price that Holcim is charging? Remember that there are 3 cases we need to consider...
- (c) (2 points) What is Holcim's best response given the price that Cemex is charging? Note how Cemex and Holcim's best responses are different.
- (d) (2 points) Plot Holcim and Cemex's Best-Response Curves. What will be the Nash Equilibrium in this Game? At the Nash Equilibrium what is the quantity of cement imported from Mexico?
- (e) (2 points) What would happen if Cemex was unable to ship cement to the U.S. so Holcim was a monopolist. Compare consumer surplus when Holcim is a Monopolist versus when it competes against Cemex.

(f) (1 point) What is the Nash Equilibrium if Cemex's Cost Function is $C(Q) = 240Q$?

3. (4 points) Antitrust Policy

For this question it will be useful to read the paper "Antitrust Policy: A Century of Economic and Legal Thinking" and Chapter 1 of "Lectures on Antitrust" that I handed out.

- (a) (2 points) What is the difference between rule of reason, and per se violations of antitrust laws?
- (b) (1 point) Which set of laws covers vertical issues such as exclusion?
- (c) (1 point) What is Hart-Scott-Rodino and the horizontal merger guidelines?

4. (10 points) Various papers we've read

- (a) (4 points) In "Do Firms Underinvest in Long-Term Research? Evidence from Cancer Clinical Trials", the following table shows the relationship between clinical trials and characteristics of different cancers. Explain this table. What would the coefficients look like (signs) if cancer drugs all had the same patent protection in terms of number of years on the market?

TABLE 3—SURROGATE ENDPOINTS, SURVIVAL TIME, AND R&D INVESTMENTS

	(1)	(2)	(3)
<i>Panel A. Level of R&D, dependent variable: number of clinical trials (mean = 945)</i>			
Five-year survival rate	-0.865*** (0.310)	-1.108*** (0.284)	-0.933*** (0.283)
(0/1: hematologic)	0.753*** (0.185)	0.578*** (0.176)	0.466** (0.201)
log(Market size)	—	0.231*** (0.057)	—
log(Life-years lost)	—	—	0.261*** (0.073)
<i>Panel B. Composition of R&D, dependent variable: number of clinical trials (mean = 945)</i>			
(Five-year survival rate) × (0/1: hematologic)	2.266*** (0.408)	2.140*** (0.541)	1.963*** (0.613)
Five-year survival rate	-1.122*** (0.343)	-1.309*** (0.297)	-1.133*** (0.303)
(0/1: hematologic)	-0.077 (0.189)	-0.216 (0.228)	-0.261 (0.252)
log(Market size)	—	0.226*** (0.056)	—
log(Life-years lost)	—	—	0.253*** (0.073)

Notes: This table shows two analyses of how cancer R&D differs on hematologic malignancies relative to other cancers, as a way of shedding light on how surrogate endpoints—which are more commonly used for hematologic malignancies—affect R&D investments. Panel A regresses the number of clinical trials enrolling patients of that cancer-stage from 1973–2011 on the five-year survival rate among patients diagnosed with each cancer-stage between 1973–2004 (the cohorts for which five-year survival is uncensored) and an indicator for hematological malignancies. Panel B regresses the number of clinical trials enrolling patients of that cancer-stage from 1973–2011 on the five-year survival rate among patients diagnosed with each cancer-stage between 1973–2004, an indicator for hematological malignancies, and an interaction between these two variables. The level of observation is the cancer-stage. Estimates are from quasi-maximum likelihood Poisson models. Standard errors are clustered at the cancer level. "Market size" denotes the number of patients diagnosed with that cancer-stage between 1973–2009. "Life-years lost" denotes age-gender-year specific life expectancy (in the absence of cancer) in the year of diagnosis, less observed survival time in years, averaged over patients diagnosed with that cancer-stage between 1973–1983 (to minimize censoring) multiplied times market size. The number of observations is 201 in columns 1 and 2, and 192 in column 3, because 9 cancer-stages had no patients diagnosed between 1973–1983. For details on the sample, see the text and Data Appendix.

- ***Significant at the 1 percent level.
- **Significant at the 5 percent level.
- *Significant at the 10 percent level.

- (b) (4 points) In the Staples and Office Max Merger, what argument did the government bring to claim that the merger would substantially raise prices? Suppose that I wanted to do the same analysis for the market for sandwiches, what issues would come up with this methodology? Suppose I wanted to do this approach for a merger between Apple and Samsung in the market for smartphones, what issues would crop up here?
- (c) (3 points) The figure below comes from “Efficiencies brewed: pricing and consolidation in the US beer industry”. Explain what this figure shows, and what this means for the economic analysis of the Coors-Miller merger.

FIGURE 4

AVERAGE LOG PRICE CHANGES AGAINST PREDICTED CHANGE IN HHI AND REDUCTION IN DISTANCE TO NEAREST COORS BREWERY BY MARKET

Notes: The two graphs in the first row plot the average log price change in a lager-style beer after the Miller/Coors merger against the predicted increase in the HHI and the reduction in distance to the nearest Coors brewery. Each point represents one of 48 geographic markets. Distance is measured as the reduction in hundreds of driving miles to the nearest Coors brewery. The predicted change in HHI is calculated using sales data on all beers from the five months preceding the merger’s approval date of June 2008 and it is scaled between 0 and 1. The change in average log price is calculated using data from January 2007 through December 2011. The two graphs in the second row plot the residuals from a regression of the average log price change on the reduction in distance (or change in HHI) against the residuals from a regression of the change in HHI (or change in distance) on change in distance (or change in HHI). Least squares fitted lines are drawn through each scatter plot.

