Econ 101: Managerial Economics

Instructor: Prof. Dan Friedman
TAs: Jean Paul Rabanal, Aadil Nakhoda

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Answers to Additional MT Review Questions

Q1) You own a scooter repair shop in downtown Santa Cruz. You find that your production function is $Q = K^{\frac{1}{2}}L^{\frac{2}{3}}$,where K is the number of machines you purchase. Due to a leasing contract between the supplier and yourself, you cannot purchase anymore of or get rid of any machines. You have already spent a total of \$180 on 9 machines. The wage you face for labor, L, is \$100 per day. If you price each repair at \$200, what is the profit -maximizing level of labor you will hire.

Ans: $L = 64$

Q2) CBA firm has \$2 million in sales, a Lerner index of 0.8 and marginal cost of \$100 and competes against a 1000 firms in its relevant market.

a)What price does the firm charge its consumers?

Ans: $P = (\frac{1}{1-L})MC = (\frac{1}{1-0.8})100 = (\frac{1}{0.2})100 = 500$

b)By what factor does the firm markup its price over marginal cost?

Ans: The markup factor is:

$\frac{1}{0.2} = 5$

c)Another firm, ZXY, charges \$300 for the same product. If Lerner index and the associated markup are the only differences between CBA and ZXY, which one has greater market power?

Ans: If marginal costs are the same between the two firms, the markup is then 3 (300/100), which implies that CBA has greater market power than ZXY. Another way to look at it is that ZXY is selling at a lower price than CBA, even though they face the same marginal costs.

Q3) The inverse market demand in a homogeneous-product Cournot duopoly is

$P = 200 - 6(Q_1 + Q_2)$ and costs are $C_1(Q_1) = 10Q_1$ and $C_2(Q_2) = 30Q_2$.

a) Determine the reaction function for each firm

Ans: a) Reaction function for firm 1:

$MR_1 = MC_1$

$200 - 6Q_2 - 12Q_1 = 10$
$Q_1 = \frac{200-10}{12} - \frac{1}{2}Q_2 = \frac{190}{12} - \frac{1}{2}Q_2$
Reaction function for firm 2:
$Q_2 = \frac{200-30}{12} - \frac{1}{2}Q_2 = \frac{170}{12} - \frac{1}{2}Q_1$
b)Calculate each firm's equilibrium output
Ans: Equilibrium output of each firm:
$Q_1 = \frac{190}{12} - \frac{1}{2}(\frac{170}{12} - \frac{1}{2}Q_1)$
$Q_1 = \frac{190}{12} - \frac{170}{24} + \frac{1}{4}Q_1$
$\frac{3}{4}Q_1 = 8.75$
$Q_1 = \frac{35}{3}$
$Q_2 = \frac{100}{12} = \frac{25}{3}$
c)Calculate the equilibrium market price
Ans: $P = 200 - 6(\frac{35}{3} + \frac{25}{3}) = 80$
d) Calculate the profit each firm earns in equilibrium
Ans:
Firm 1: $\pi = PQ - 10Q = 80(\frac{35}{3}) - 10(\frac{35}{3}) = 70(\frac{35}{3}) = 816.67$
Firm 2:$\pi = PQ - 30Q = 80(\frac{25}{3}) - 30(\frac{25}{3}) = 50(\frac{25}{3}) = 416.67$

4)Two firms compete in a market to sell a homogeneous product with inverse demand function $P = 100 - 2Q$. Each firm produces at a marginal cost of \$10 and has no fixed costs. Use this to compare the output levels and profits in settings characterized by:
a) Stackelberg (Firm 1 is the leader)
b)Bertrand (Firm 1 and Firm 2 produce the same amount)
c)Collusive behavior
Ans: a) Stackelberg
$Q_1 = \frac{100+10-20}{2(2)} = \frac{90}{4} = 22.5$
$Q_2 = \frac{100-10}{2(2)} - \frac{1}{2}(22.5) = 11.25$
To calculate the profit:
$P = 100 - 2(22.5 + 11.25) = 100 - 2(33.75) = 100 - 67.50 = 32.50$
For firm 1:
$PQ_1 - 10Q_1 = 32.50(22.5) - 10(22.5) = 22.5(22.5) = 506.25$
For firm 2:
$PQ_2 - 10Q_2 = 32.5(11.25) - 10(11.25) = 22.5(11.25) = 253.13$
b) Bertrand
$P = MC$
$P = 10$
$Q = 45$
$Q_1 = 22.5$, $Q_2 = 22.5$
Profits:
Firm 1
$PQ_1 - 10Q_1 = 10(22.5) - 10(22.5) = 0$
Firm 2
Profit is zero. This is true for Bertrand model.
c) Collusion

Monopoly outcome but output shared
$100 - 4Q = 10$
$Q = 22.5$
$Q_1 = 11.25, Q_2 = 11.25$
$P = 50$
Profits:
Firm 1: $11.25(50) - 10(11.25) = 450.0$
Firm 2: $11.25(50) - 10(11.25) = 450.0$
Same profits for both firms

5)

		Firm B	
	Strategy	High Price	Low Price
Firm A	High Price	$40, 40$	$-10, 50$
	Low Price	$50, -10$	$0, 0$

a) Identify the dominant strategy (if there is any).
Ans: The dominant strategy is low price for Firm A and low price for Firm B.
b) Identify one-shot pure Nash equilibrium (if there is any).
Ans: The Nash Equilibrium is low price by Firm A and low price by Firm B. (Try to see why High by A and High by B is not a Nash equilibrium)