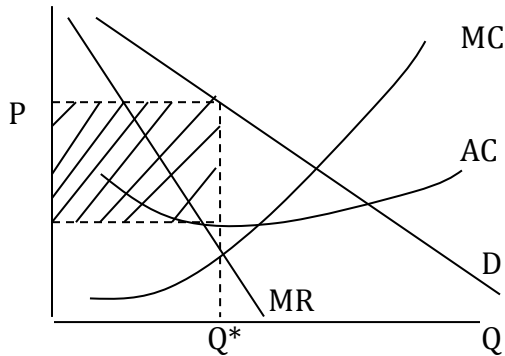


**Homework 8**  
**Econ 361**  
**Intermediate Microeconomic Analysis**  
**30 points**

**1. (6 points) How are firms in a monopolistically competitive market like perfect competitors? How are they like monopolies? Explain conceptually, graphically, and in terms of the profit maximizing problem and equation that characterizes the optimum.**

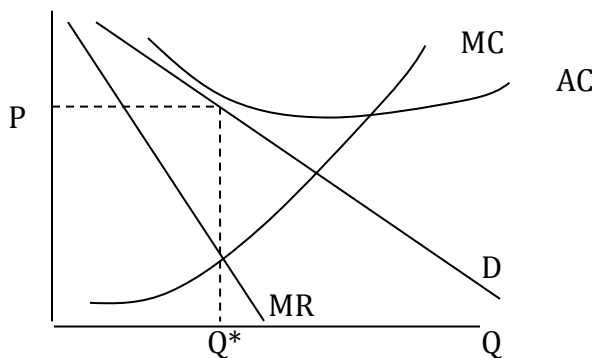
Monopolistically competitive firms are like perfect competitors, as both will earn zero economic profit in the long run. There are free entries and exits.

Short Run



They are like monopoly because they have differentiated products and produce at a quantity less than the efficient quantity and charges at prices higher than marginal cost. They both face a downward-sloping demand curve and  $MR < P$ .

Long Run



## 2. (5 points) Why aren't monopolistic competitors regulated like monopolies are?

There are two main reasons why monopolistic competitors are not regulated:

First, there are enough firms in the market to compete, so they do not enjoy much market power and thus generate small deadweight loss. In fact, as demand curves are relatively elastic, average cost will be close to minimum.

Second, consumers earn extra utility from the diversity of products offered in a monopolistically competitive industry. The gain from product diversity outweighs the inefficiency in cost.

## 3. (8 points)

**Two firms are the sole producers in a market with demand given by:**

$$P = 300 - 2Q, \text{ where } Q = Q_1 + Q_2.$$

**Firm 1 has marginal cost given by  $MC_1 = 20 + Q_1$**

**Firm 2 has marginal cost given by  $MC_2 = 20 + Q_2$**

**a. Unable to recognize the potential for collusion, the two firms act as short-run perfect competitors. What are the equilibrium values of  $Q_1$ ,  $Q_2$ , and  $P$ ? What are each firm's profits?**

$$P = 300 - 2Q_i$$

$$MC = 20 + Q_i$$

$$P = MC$$

$$300 - 4Q_i = 20 + Q_i$$

$$280 = 5Q_i$$

$$Q = 56$$

$$P = 76$$

$$\text{Profit} = 1568 \text{ for both firms}$$

**b. Top management in both firms is replaced. Each new manager independently recognizes the oligopolistic nature of the industry and plays Cournot. What are the equilibrium values of  $Q_1$ ,  $Q_2$ , and  $P$ ? What are each firm's profits?**

$$P = 300 - 2Q_1 - 2Q_2$$

$$MR_1 = 300 - 4Q_1 - 2Q_2 = MC = 20 + Q_1$$

$$Q_1 = (280 - 2Q_2) / 5 = Q_2$$

$$Q_1 = Q_2 = 40$$

$$P = 300 - 80 - 80 = 140$$

Profit = 4000 for both firms

**c. Suppose that the manager of Firm 2 guesses correctly that Firm 1 is playing Cournot, so Firm 2 plays Stackelberg. What are the equilibrium values of  $Q_1$ ,  $Q_2$ , and  $P$ ? What are each firm's profits?**

$$Q_1 = (280 - 2Q_2) / 5 = Q_2$$

$$TR = P Q_2 = (300 - 2Q_2 - 2(280 - 2Q_2)/5) Q_2$$

$$MR = 620/3 - 4/3 Q_2 = MC = 20 + Q_2$$

$$Q_2 = 49$$

$$Q_1 = 36$$

$$P = 130$$

Approximately, Profit Firm 1 = 3312  
Approximately, Profit Firm 2 = 4150

**d. If the managers of the two companies collude, what are the equilibrium values of  $Q_1$ ,  $Q_2$ , and  $P$ ? What are each firm's profits?**

To find this, add the two marginal cost curves together horizontally...you must rearrange to get the  $Q$ s on the left hand side:

$$\begin{array}{r} Q_1 = MC - 20 \\ + Q_2 = MC - 20 \\ \hline Q_T = 2MC - 40 \end{array}$$

so  $MC = 20 + \frac{1}{2} Q_T$

Set this equal to MR:

$$300 - 4Q = 20 + \frac{1}{2} Q$$

$$280 = 9/2 Q$$

$$Q_T^* = 280 (2/9) = 62.222\dots$$

When  $Q = 62.222\dots$ ,  $MR = 51.1111\dots$

Set each marginal cost equal to this marginal revenue to find each firm's share:

$$MC_1 = 20 + Q_1 = 51.1111\dots$$

$$MC_2 = 20 + Q_2 = 51.1111\dots$$

So  $Q_1 = Q_2 = 31.1111\dots$

Price is determined by plugging total  $Q$  into the demand curve...profits follow.

**4. (6 points) Chapter 13, page 519, exercise 7.**

- a. *Open* is the dominant strategy for both countries.

If Japan chooses Open, then US does best by choosing Open. If Japan Closes, US still better off by choosing Open. Similar analysis can apply to Japan. Therefore, both countries will choose Open in equilibrium.

- b. The irrationality of US politicians could change the equilibrium to the lower-left cell, (Close, Open).

If US wants to penalize Japan, they will choose Close, but Japan still has a dominant strategy stay Open.

**5. (5 points) Are players are more likely to collude in a game that is played a finite number of times than they are in a game that is played an infinite number of times? Explain.**

In a game that is played an infinite number of times, the game theory literature suggests that optimal strategy for both the players is a tit-for-tat strategy. For example, if price is the variable of choice, both players will start by charging a high price. Even if one competitor believes there is only some chance that the other is playing tit-for-tat, he will still find it rational to start by charging a high price and maintain it, because the expected gains from cooperation will outweigh those from undercutting. This will be true even if the probability that I am playing tit-for-tat is small. However, for finite numbers, both competitors will choose the rational outcome to undercut each other. They will want low price for the last month, then the second last month....until every month is low price.