Homework Exercises 8: Monopolistic Competition and Oligopoly

1a. Using the figures given, we can compute total revenue, marginal revenue and marginal cost.

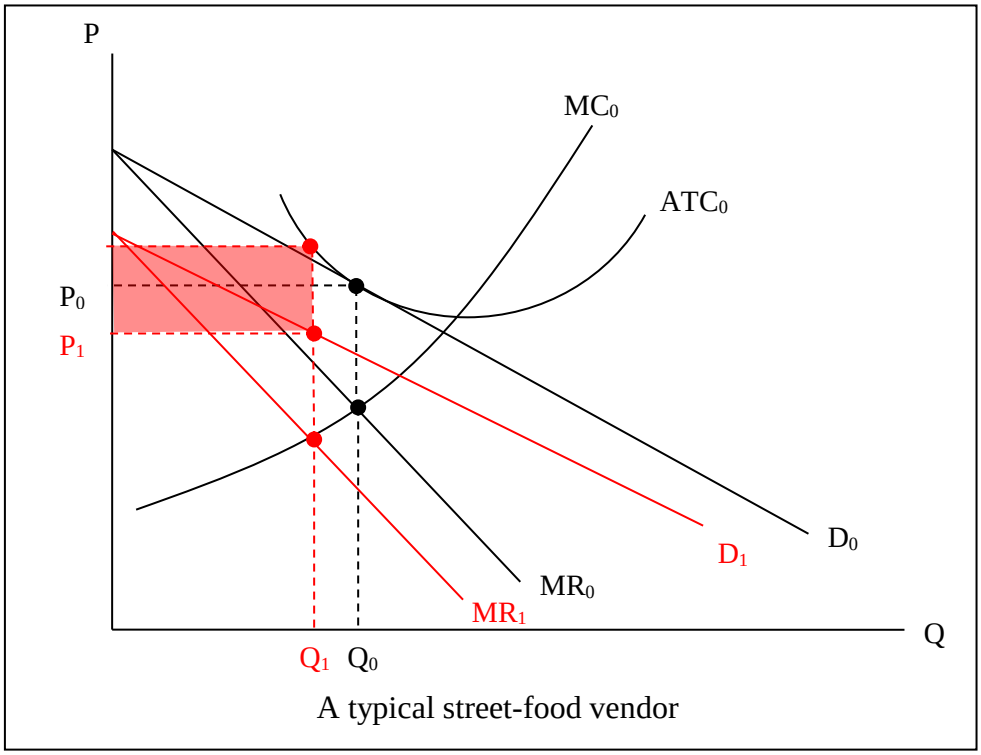
P	*Q*	*TR*	*MR*	*TC*	*MC*
100	100	10,000		10,500	
80	140	11,200	30	10,800	7.50
60	200	12,000	13.33	11,300	8.33
40	310	12,400	3.64	12,290	9.00
20	550	11,000	-5.83	14,760	10.29

1b. An optometry practice might face a downward-sloping demand curve if it could differentiate its product through location, hours of operation, ambiance, quality of service, or frame selection.

1c. The profit-maximizing price is \$60 and the profit-maximizing number of eye exams per week is 200.

2. In the short run, the tax will shift each firm's *ATC* curve upward but will have no effect on their *MC* or *MR* curves. Therefore, price and output levels will remain the same, but profit will be reduced by the amount of the tax. However, the tax will cause the typical firm to go from earning zero economic profit to suffering a loss. In the long run, exit will occur, shifting each remaining firm's demand curve rightward, until each firm is earning zero economic profit. This will occur at a higher price than without the tax.

3.



A typical street-food vendor

According to the article, the street-food market is dominated by small vendors producing differentiated products in terms of tastes and quality. Besides, there is no barrier to entry as evident in 7-Eleven's recent entry. Therefore, it is reasonable to assume the street-food market is **monopolistically competitive**.

Suppose the street-food industry is initially in its long-run equilibrium. In the following figure, a typical street-food vendor produces Q_0, at which $MC_0 = MR_0$, and set its price at P_0, earning zero economic profit. When 7-Eleven enters the market selling a close substitute with relatively low prices, **the demand facing an existing firm will drop**. The demand curve facing a typical firm and its MR curve will shift to the left D_1 to MR_1. Each individual firm will produce Q_1 at which $MC_0 = MR_1$, and set its price at P_1, incurring an economic loss as shown by the shaded area. If an existing cannot cover its variable costs, it may shutdown in the short run.

If the economic loss persists, it may exit the market in the long run. It is also possible that other firms (including some 7-Eleven), with even higher costs or less loyal customers, may exit the market before this particular firm does, so that demand facing this vendor will increase (back to D_1) and it can still survive in the long run.

4a. In the payoff matrices below, Road Kill's payoffs are listed first:

		Sal Monella	
		Clean up	Don't Cleanup
Road Kill Café	Clean up	5,000 5,000	-3,000 12,000
	Don't Cleanup	12,000 -3,000	7,000 7,000

4b. Both Road Kill Café and Sal Monella have a dominant strategy: to clean up.

4c. If Road Kill Café and Sal Monella act independently, they'll both clean up and earn $5,000.

4d. When facing the same decision repeatedly infinitely, Sal Monella and Road Kill Café might decide to cooperate. By both agreeing to *not* clean up, they can increase their income to $7,000 each.

4e.

		Sal Monella	
		Clean up	Don't Cleanup
Road Kill Café	Clean up	5,000 5,000	-3,000 6,000
	Don't Cleanup	6,000 -3,000	7,000 7,000

The restaurants no longer have dominant strategies. Road Kill's best response:

- Clean, if Sal Monella chooses to clean;
- Don't clean, if Sal Monella chooses not to clean.

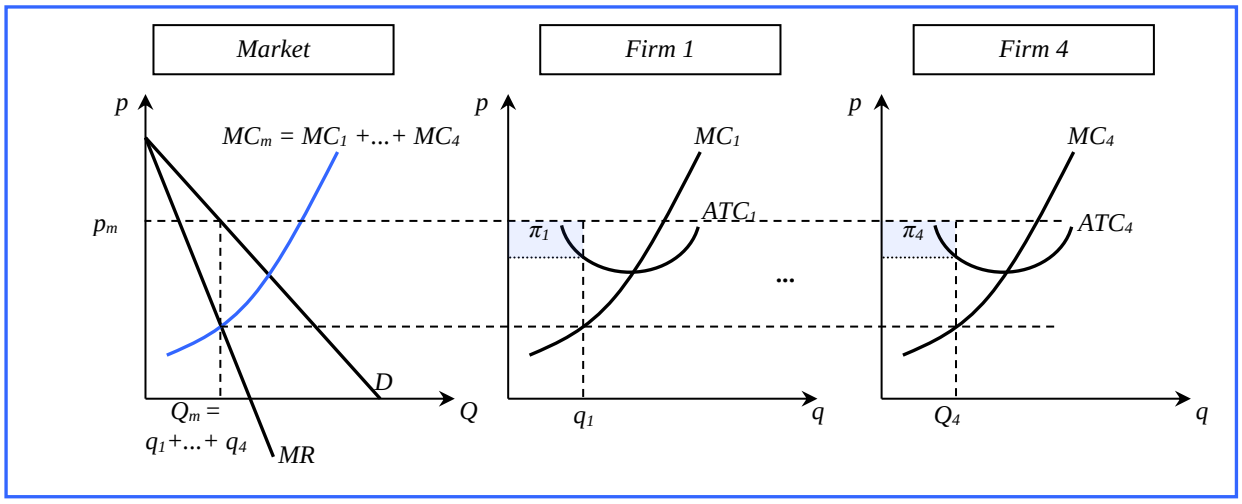
Similarly, Sal Monella's best response:

- Clean, if Road Kill chooses to clean;
- Don't clean, if Road Kill chooses not to clean.

If they act independently, there are two Nash equilibria: both clean or both not to clean.

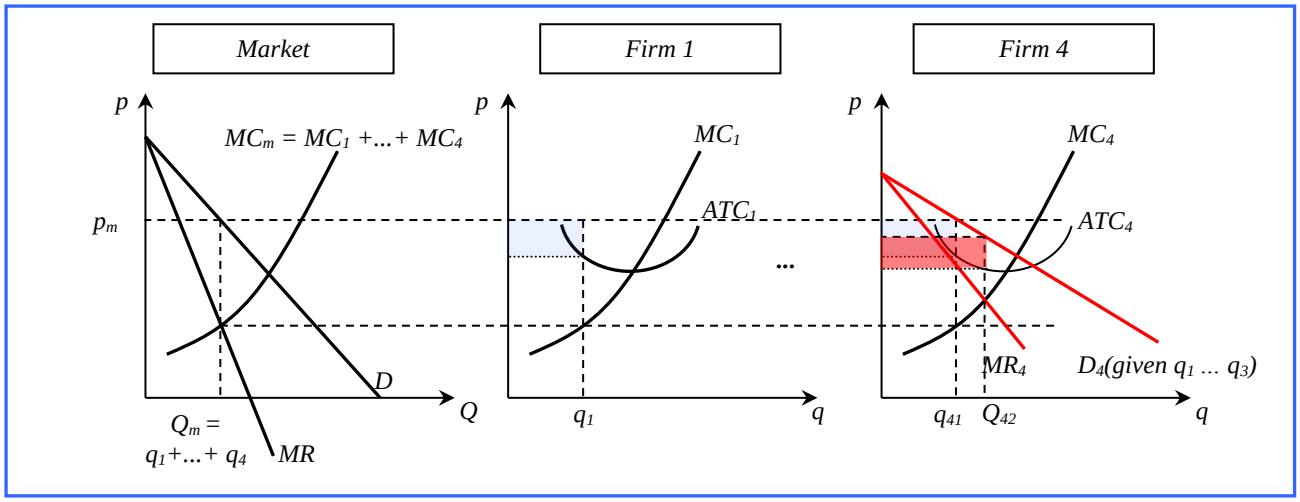
5a. Suppose the four express-package companies have reached a collusive agreement, the four firms, FedEx, UPS, DHL and TNT form a cartel and act as a monopoly. They coordinate their profit-maximizing output and price like a multi-plant monopoly.

Assuming homogeneous product, the demand curve facing the cartel is the market demand. The cartel will produce the profit-maximizing output Q_m at which MR = MC_m, which is obtained by horizontal summation of the MC curves of the four firms. By limiting quantities, it allows them to set a higher price at p_m. The cartel will then allocate their outputs such that $MC_1 = \ldots = MC_4$. Given the cartel's decision to produce Q_m, the firms will sell q_1, ..., q_4 and earns the profits of π_1, ..., π_4 respectively.



5b. The major difficulty in maintaining the collusion is that each cartel member has an *incentive to cheat*. It is because if the other members stick to the agreement, a firm can earn even more by increasing its own production.

To illustrate, consider one particular cartel member, firm 4. Given other firms produce their agreed output levels, we can derive the residual demand curve facing firm 4, d_4. To maximize its own profit, firm 4 has an incentive to produce at which $MR_4 = MC_4$, i.e. $q_{4,2}$.The total output will increase above Q_m, resulting in lower price. Therefore, firm 4 gains at the expense of those firms sticking with the agreement.



Because each member has an incentive to cheat, for a cartel to succeed, the cartel must have some way to enforce and monitor its agreement. If UPS and TNT merged, it should be reasonable to believe the cartel would be more stable. Because there will be fewer firms in the market, the cost of reaching and maintaining an agreement is lowered.

In general, the cartel should be more sustainable. The reason is that the barrier to entry is high (may be even higher after the merger) and the demand (or growth in demand) is relatively stable. Therefore, given these firms are going to compete in the market for long term, it is reasonable to expect the cartel would be more stable.

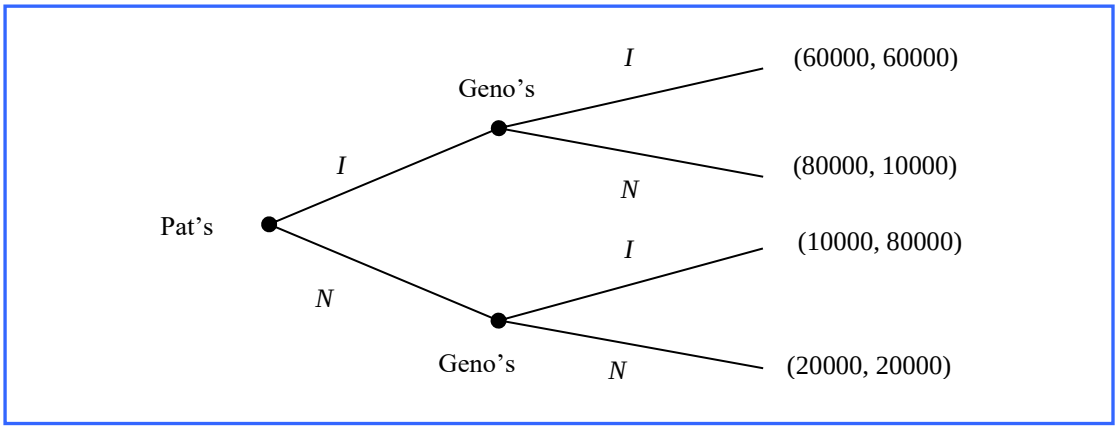
You might also argue that when two firms merged, they will be become bigger than the others. It is expected that they would share a higher output quota and hence higher profit. The increased profit inequalities may actually increase the difficulty in maintaining the agreement, as the other two firms might have a higher incentive to cheat.

6a. The payoff matrix is show below:

		Geno's	
		Introduce (I)	**Don't Introduce (N)**
Pat's	**Introduce (I)**	\$60,000, \$60,000	\$80,000, \$10,000
	Don't Introduce (N)	\$10,000, \$80,000	\$20,000, \$20,000

Both Geno's and Pat's have a dominant strategy: Introduce desserts.

6b. The game tree is show below:



6c. By backward induction, consider Stage 2:

Geno's best strategy:

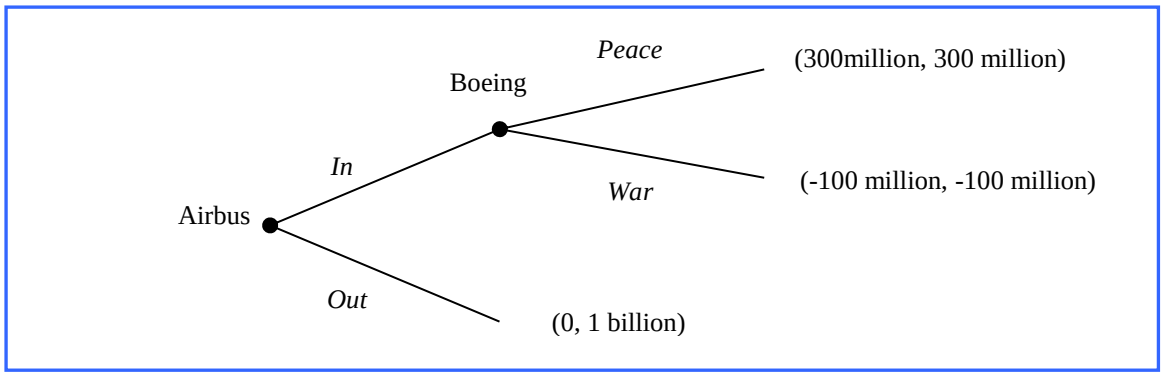
- If Pat's chooses I: Geno's best choice is to choose I (60000 > 10000)
- If Pat's chooses N: Geno's best choice is to choose I (80000 > 20000)

Stage 1:

Knowing Geno's best strategy is to choose I under both situation, Pat's best strategy is to chooses I (60000 > 10000).

Therefore, the predicted outcome is both will introduce desserts.

7a. The game can be represented by the following game tree:



7b. By backward induction, consider Stage 2:

Boeing's best strategy is to choose Peace, i.e. peacefully compete with Airbus, as 300 m > -100 m, if Airbus chooses to enter the market (In),

Stage 1:

Knowing Boeing's best strategy is to choose Peace, Airbus' best strategy is to chooses In (300 m > 0).

Therefore, the predicted outcome is Airbus will enter and Boeing will choose to compete peacefully.