Monopoly, oligopoly and monopolistic competition

A video game company has a monopoly on the sale of a particular console. The market demand for this console is $Q_D = 230 - 2P$, where Q_D is the quantity demanded and P is the price. The marginal revenue function is as follows: $MR = 115 - q$. The company has the following cost function $C(q) = 30 + q$ and the marginal cost is: $MC = 1$

1. Find the quantity and price that maximize the company's profit in the monopoly case. What is the profit?
2. Now, suppose there are two companies in this market (oligopoly) and both have the same costs. Each company decides to produce half of the quantity found in the monopoly case (because they form a cartel). What is the price in the oligopolistic market? Since one of the companies is producing half of the monopoly quantity, is it convenient for the other to also offer the same quantity? That is, are there incentives for deviation?
3. Now assume that we are in the initial situation, but there are several companies in this market competing monopolistically, such that the demand is: $Q = 230/N - 2P$. The marginal revenue is: $MR = 115/N - q$. If a regulator wants the price in this market to be equal to 12, how many companies should be allowed to compete monopolistically?
4. Finally, imagine that after a few years the market has become perfectly competitive. The equilibrium of this is achieved with a $P = 0.5$. Is it in the interest of the video game company considered in the initial situation to enter this market?

Oligopoly and Nash

Two companies, A and B, are the only producers of a product in an oligopolistic market. Each company must decide whether to maintain its current production or increase it. If both maintain their production, each will obtain a profit of $10,000$. If one company increases its production while the other maintains it, the company that increases will obtain a profit of $14,000$ and the other a profit of $6,000$. If both increase their production, each will obtain a profit of $8,000$.

1. Represent the situation as a payoff matrix, where the rows represent the strategies of company A and the columns represent the strategies of company B.
2. Identify the Nash equilibrium or equilibria in this game
3. Now assume that in cases where one firm increases production and the other maintains production, the firm that increases can transfer an amount of money K to the firm that decides to maintain production. Find the value or values of K for which the firm maintaining production has no incentive to increase. Explain this situation and give your opinion on whether firms would benefit from having the possibility of transferring part of their profits.

Solution

1. To maximize profits, the firm must equate marginal revenue (MR) with marginal cost (MC).

$$115 - q = 1$$

$$q = 114$$

The price then is:

$$114 = 230 - 2P$$

$$P = 58$$

The profits are:

$$\pi = 58 * 114 - (30 + 114) = 6468$$

2. If there are two companies in the market and each produces half the quantity found in the monopoly case, then each company produces $Q = \frac{1}{2} * 114 = 57$. The total quantity in the market is equal to before. The price is the same as before. If one company offers 57, it would be more convenient for the other to offer more and obtain a higher profit.

3. If the regulator wants the price to be 12, there need to be 5 companies in the market competing since this would lead to the following:

$$MR = MC$$

$$115/5 - q = 1$$

$$q = 22$$

$$P = 115/5 - 22/2 = 12$$

4. If the price is $P = 0.5$, by equating marginal price to marginal cost we have $0.5 \neq 1$. Therefore, the firm will not be able to sell in this market, because if it enters it would be experiencing increasingly negative profits for each unit sold.

1. Matrix:

		Company A	
		Increase	Maintain
Company B	*Increase*	$(8000, 8000)$	$(14000, 6000)$
	Maintain	$(6000, 14000)$	$(10000, 10000)$

2. The Nash equilibrium is $(increase, increase)$.

3. If the firms could transfer 2000, they could ensure that the other does not decide to increase production.

$$6000 + K = 10000$$

$$K = 2000$$