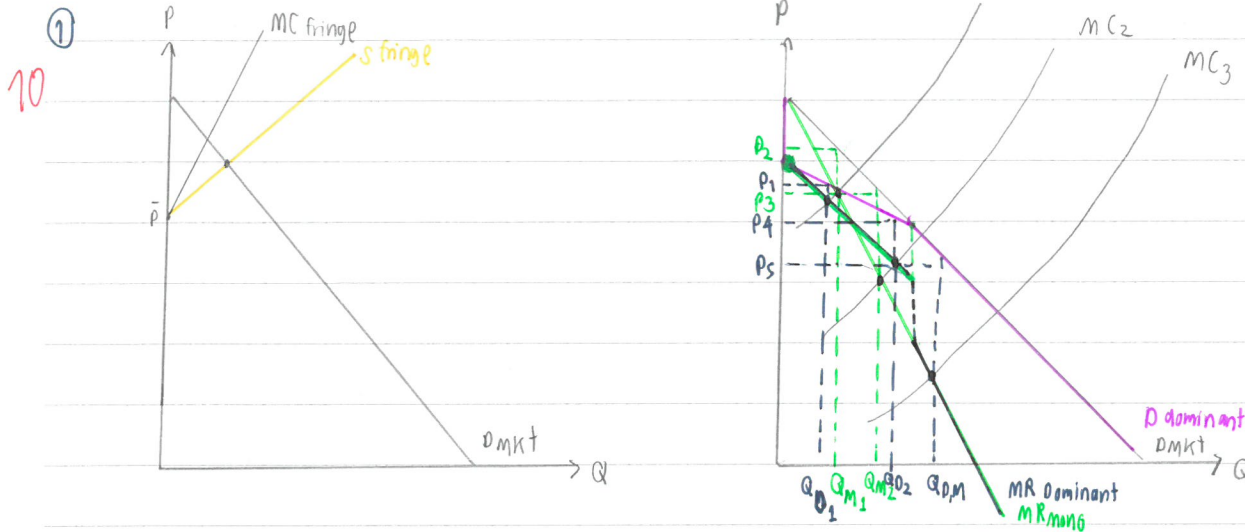


EE481: Homework 1 Solution.

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when both profit-maximizing dominant firm and monopoly firm choose the price and quantity to supply into the market, they will choose where marginal revenue equals to marginal cost. the difference between dominant firm and monopoly firm is they're facing the different demand curve, dominant firm faces D^{dominant} while monopoly firm faces market demand (D_{mkt})

case 1

when marginal cost curve is MC_1 , dominant firm will produce at $MR_{\text{dominant}} = MC_1$ where the equilibrium is (Q_{D1}, P_1) but monopoly firm will produce at $MR_{\text{mono}} = MC_1$ where the equilibrium is at (Q_{M1}, P_2) which means that in this case, monopoly firm will produce more quantity than dominant firm due to higher demand faced and higher marginal revenue

case 2

when marginal cost curve is MC_2 , dominant firm will produce at $MR_{\text{dominant}} = MC_2$ where the equilibrium is at (Q_{D2}, P_4) but monopoly firm will produce at $MR_{\text{mono}} = MC_2$ where the equilibrium is at (Q_{M2}, P_3) which means that in this case, dominant firm will produce more than monopoly firm while having lower demand but higher marginal revenue.

case 3

when marginal cost curve equals to both MR_{mono} and MR_{dominant} , in this case is MC_3 . The equilibrium in this case will be equal at $(Q_{D,M}, P_5)$ since both dominant firm and monopoly firm will face the same demand curve, market demand, and marginal revenue curve.

In conclusion, a profit-maximizing dominant firm can produce more than if it were a monopoly when the dominant firm faces lower demand & higher marginal revenue.

2. Demand curve $\Rightarrow Q(p) = p^\epsilon$

- Elasticity of demand $= \frac{dQ}{dp} \cdot \frac{p}{Q}$

$$= \epsilon p^{\epsilon-1} \cdot \frac{p}{Q}$$

$$= \epsilon \cdot \frac{p^\epsilon}{p} \cdot \frac{1}{Q}$$

But $Q = p^\epsilon$, therefore

$$\text{Elasticity of demand} = \epsilon \cdot \frac{p^\epsilon}{p^\epsilon} = \epsilon \neq$$

- If $\epsilon = -2$, what is profit-maximizing price?

Profit-max condition for a monopoly

$$\frac{p - mc}{p} = \frac{1}{|\epsilon|}$$

$$\frac{p - 1}{p} = \frac{1}{2}$$

$$p - 1 = \frac{p}{2}$$

$$2p - 2 = p$$

$$p = 2 \neq$$

3 (Game Theory)

(a) Suppose firms choose prices simultaneously. Describe the game and solve it.

- As firms choose price simultaneously, each firm will doing the best by taking the other firm behavior into account.

- Since production cost per handset is \$40. If firm prices \$100, the profit will be $\$100 - \$40 = \$60$.
If firm prices \$90, the profit will be $\$90 - \$40 = \$50$.

		Ericsson	
		\$100	\$90
Nokia	\$100	500, 800	400, 1100
	\$90	900, 700	800, 900

		Ericsson	
		\$100	\$90
Nokia	\$100	30k, 48k	24k, 55k
	\$90	45k, 42k	40k, 45k

For Nokia: If Ericsson choose \$100, it will price \$90 because the payoff will be (95k, 42k) which is higher than (30k, 48k). If Ericsson pick \$90, Nokia still choose \$90 with payoff (40k, 45k). Hence, price \$90 is the dominant strategy for Nokia.

For Ericsson: If Nokia chooses \$100, it'll price at \$90 with payoff (24k, 55k). If Nokia sets price at \$90, it still pick \$90 with payoff (40k, 45k). Therefore, setting price at \$90 is the dominant strategy for Ericsson.

To conclude, pricing at \$90 is the dominant strategy for both Ericsson and Nokia. So, the nash equilibrium is (\$90, \$90) with payoff (40000, 45000) ✓

(b) Suppose that Ericsson has a limited capacity of 800 units per quarter. Moreover, all of the demand fulfilled by Ericsson is transfer to Nokia. How would the analysis change?

As the Ericsson's capacity is limited at 800 at the leftover demand will be transferred to Nokia, ceteris paribus, the new game is given below.

		Ericsson	
		\$100	\$90
Nokia	\$100	500, 800	700, 800
	\$90	900, 700	900, 800

		Ericsson	
		\$100	\$90
Nokia	\$100	30k, 48k	42k, 40k
	\$90	45k, 42k	45k, 40k

For Nokia: If Ericsson choose \$100, Nokia will doing the best by choosing \$90 with payoff (45k, 42k). If Ericsson picks \$90, it will choose \$90 with payoff (45k, 40k). So, setting price at \$90 is the dominant strategy for Nokia.

For Ericsson: If Nokia decide to choose \$100, Ericsson will choose \$100 with payoff (30k, 48k). If Nokia goes for \$90, Ericsson will go for \$100 with payoff (45k, 42k). Hence, the dominant strategy for Ericsson is \$100.

To sum up, the dominant strategy for Nokia stay the same at \$90, while Ericsson's dominant strategy changes to \$100. The new nash equilibrium is (\$90, \$100) with payoff (45000, 42000).

Notice that Nokia's payoff is higher than previous case while Ericsson earns less payoff. ✓

(c) Suppose you work for Nokia. Your Chief Intelligence Officer (CIO) is unsure whether Ericsson is capacity constrained or not. How much would you value this piece of info?

Nokia's dominant strategy is setting price at \$90 whether Ericsson capacity constrained or not. Hence, this piece of info has no value. ✓