CH 10 : Perfectly competitive market (EE211, SELF REVIEW)

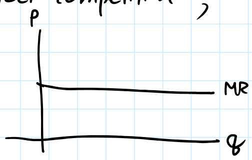
CH 11 : Monopoly (For Basic knowledge → self-review
For New knowledge → in-class lecture)

Monopoly & Monopoly pricing

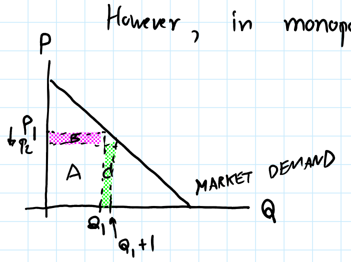
- 1st degree price discrimination
- 2nd " ———— "
- 3rd " ———— "
- Two-Part Tariff
- Bundling < Pure bundling / Mixed bundling
- Peak load pricing
- Intertemporal Price Discrimination
- Tie-in-Sale.
- etc.

Monopoly

Fact #1 In Perfect competition, MR = P = AR



However, in monopoly, MR < P (Why?)



A monopolist captures a whole market demand curve. Then, to be able to sell more Q, he must lower price.

At P_1 : $TR_1 = A+B$

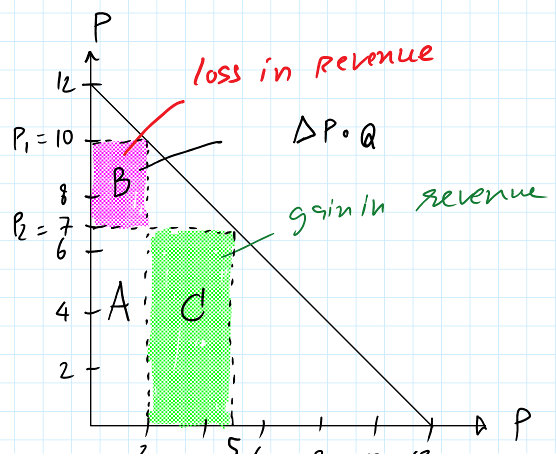
At P_2 : $TR_2 = A+C$

$\Delta TR = (A+C) - (A+B) = +C - B$

$= P_2 - B$

$\therefore MR < P_2$

Consider A market Demand Curve : $P = 12 - Q$



AREA

At $P_1 = 10$, $Q_1 = 2$, $TR_1 = P_1 \times Q_1 = 10 \times 2 = 20$ (A+B)

At $P_2 = 7$, $Q_2 = 5$, $TR_2 = P_2 \times Q_2 = 7 \times 5 = 35$ (A+C)

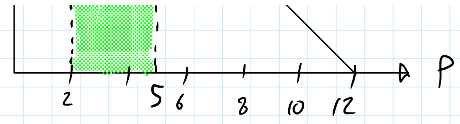
$\Delta TR = TR_2 - TR_1 = 35 - 20 = 15$

$\underbrace{(A+C) - (A+B)}_{= C - B}$

$= C - B$

+3·7 = +21   −2·3 = −6

AREA B = loss in revenue



$= C - B$

$+3 \cdot 7$
$= +21$

$-2 \cdot 3$
$= -6$

$+15$

AREA B = loss in revenue due to the Fact that the First 2 units must be sold at the new lower price

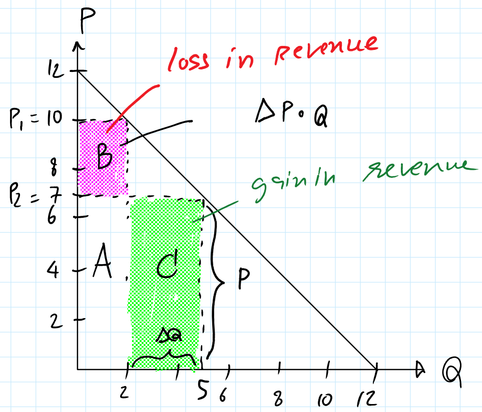
$$\text{AREA } B = (7 - 10) \cdot 2 = -6$$

= CHANGE IN PRICE (ΔP) × QUANTITY (Q)

$$\boxed{\text{AREA } B = -(\Delta P \cdot Q)}$$

we put minus sign to ensure that area is a positive number.

AREA C = gain in revenue due to more sales.



AREA $C' = \underbrace{(5-2)}\cdot\underbrace{7}$

$= 3 \cdot 7 = 21$

$$\boxed{\text{AREA } C' = \Delta Q \cdot P}$$

Recall that $\Delta TR = C' - B$

$$= (P \cdot \Delta Q) - (-\Delta P \cdot Q)$$

$$\Delta TR = P \cdot \Delta Q + \Delta P Q$$

$$\frac{\Delta TR}{\Delta Q} = \frac{P \cdot \Delta Q + \Delta P \cdot Q}{\Delta Q}$$

$$\boxed{MR = P + \frac{\Delta P}{\Delta Q} Q}$$

Recall that $E^D = \dfrac{\%\Delta Q}{\%\Delta P} = \dfrac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} = \dfrac{\Delta Q}{\Delta P} \cdot \dfrac{P}{Q}$

$$MR = P + \frac{\Delta P}{\Delta Q} \cdot Q \cdot \frac{P}{P}$$

$$= P + \frac{\Delta P}{\Delta Q} \cdot \frac{Q}{P} \cdot P$$

$$= P + \frac{1}{\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}} \cdot P$$

$$= P + \frac{1}{E^D} \cdot P$$

$$\boxed{MR = P\left(1 + \frac{1}{E^D}\right)} \quad \text{OR} \quad \boxed{MR = P\left(1 - \frac{1}{|E^D|}\right)}$$

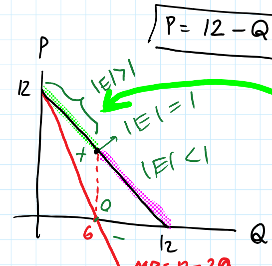
Fact #2 Marginal revenue (MR) is negatively related with Price elasticity of Demand (E^D)

IF $|E^D| = 1$, MR = 0.

IF $|E^D| > 1$, MR is positive.

IF $|E^D| < 1$, MR is negative

$$\boxed{P = 12 - Q}$$



Let's find MR equation:

$$TR = P \cdot Q = (12 - Q) \cdot Q = 12Q - Q^2$$

$$\frac{dTR}{dQ} = \frac{d(12Q - Q^2)}{dQ} = 12 - 2Q$$

$$\boxed{MR = 12 - 2Q}$$

Monopolist will want to lower the price to attract more sales in order to raise his revenue ONLY WHEN Demand is price elastic ($\%\Delta Q > \%\Delta P$)

price elastic (%ΔQ > %ΔP)

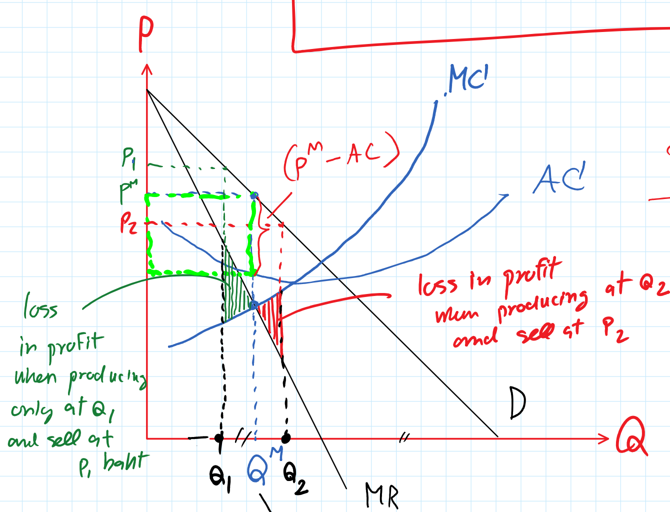
Fact#3 A monopolist will choose level of output where marginal revenue (MR) = marginal cost (MC).

$$\max_{Q} \pi(Q) = TR(Q) - TC(Q)$$

$$\frac{d\pi(Q)}{dQ} = \frac{dTR(Q)}{dQ} - \frac{dTC(Q)}{dQ} = 0$$

$$= MR(Q) - MC(Q) = 0$$

$$\boxed{MR(Q^*) = MC(Q^*)}$$



Profit maximizing output level by a monopolist

Monoponist's output decision

$$\pi^M = \underbrace{(P^M - AC)}_{} \cdot Q^M$$

Profit per unit of output or profit margin

Rule of Thumb for pricing

Recall that $MR = P\left(1 + \frac{1}{E^D}\right)$ or $MR = P\left(1 - \frac{1}{|E^D|}\right)$

To maximize profit, set $MR = MC$:

$$P\left(1 + \frac{1}{E^D}\right) = MC$$

$$P + \frac{P}{E^D} = MC$$

$$P - MC = -\frac{P}{E^D}$$

$$L = \boxed{\frac{P - MC}{P} = -\frac{1}{E^D}}$$

is called "Lerner Index" to measure

is called " <u>Lerner Index</u> " to measure degree of monopoly markup.

$$\boxed{P = \frac{MC'}{1 + \frac{1}{E^D}}}$$

can be used to measure "degree of mark up".

E^D	$\frac{P}{MC'} = \frac{1}{\left(1 + \frac{1}{E^D}\right)}$	$L = \frac{P - MC'}{P} = -\frac{1}{E^D}$
-1.01	101	0.99
-1.1	11	0.91
-2	$2 \rightarrow \frac{P}{MC'} = 2 \rightarrow P = 2MC'$	0.5
-3	$1.5 \rightarrow P = 1.5MC'$	0.33
-5	$1.25 \rightarrow P = 1.25MC'$	0.2
-10	1.11	0.1
-100	1.01	0.01
$-\infty$	1 $\left(\frac{P}{MC'} = 1 \text{ or } P = MC'!\right)$	0

less elastic ↑

more elastic ↓

- Lerner index is between 0 and 1 : $0 \leq L \leq 1$.
  The higher the L index, the higher degree of markup.
  The lower the L index the lower degree of markup.