25 August 2023

# Profit- Maximising under Monopoly

Profit = Total Revenue - Total cost

$\pi = TR - TC$

change in profit $\frac{\Delta \pi}{\Delta Q} = \frac{\Delta TR}{\Delta Q} - \frac{\Delta TC}{\Delta Q}$

$\frac{\Delta \pi}{\Delta Q} = MR - MC$

At maximum profit, change in profit = 0

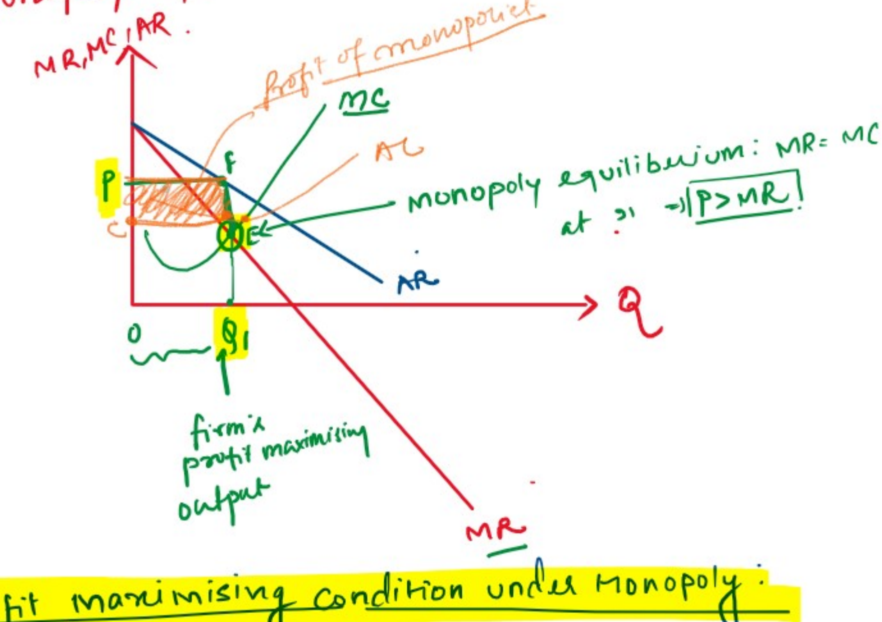
$\frac{\Delta \pi}{\Delta Q} = 0$

$MR - MC = 0$

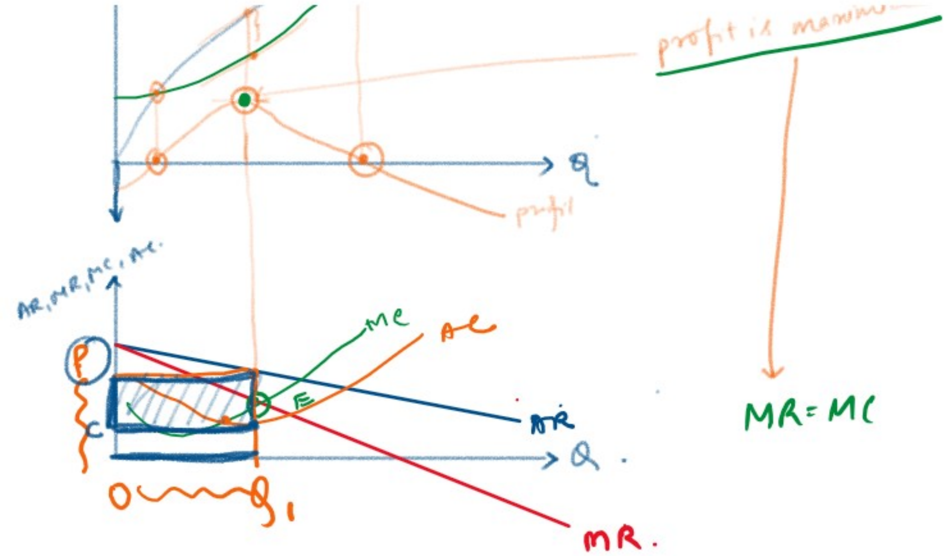
$\boxed{MR = MC}$

In monopoly, $\boxed{\underset{AR}{P} > MR = MC}$

Diagrammatically : Monopoly equilibrium → $\boxed{MR = MC}$




## Derivation of Profit maximising condition under Monopoly :




## A Rule of Thumb for Pricing (Mark-up price).

Marginal Revenue, $MR = \frac{\Delta TR}{\Delta Q}$

or, $MR = \frac{\Delta (PQ)}{\Delta Q}$

or, $MR = P\cancel{\frac{\Delta Q}{\Delta Q}} + Q\frac{\Delta P}{\Delta Q}$

or, $MR = P + Q\frac{\Delta P}{\Delta Q}$

or, $MR = P + P\left[\frac{Q}{P} \times \frac{\Delta Q}{\Delta P}\right]$

Reciprocal of elasticity of Demand

$\varepsilon_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$

$\boxed{\frac{1}{\varepsilon_d} = \frac{\Delta P}{\Delta Q} \times \frac{Q}{P}}$

$MR = P + P\left[\frac{1}{\varepsilon_d}\right]$

Now in equilibrium at profit maximising point,

$MR = MC$

$P + P\left(\frac{1}{\varepsilon_d}\right) = MC$

$\Rightarrow P - MC = -P\left(\frac{1}{\varepsilon_d}\right)$

$\Rightarrow \boxed{\frac{P - MC}{P} = -\frac{1}{\varepsilon_d}}$

this difference between P and MC is markup price

means, $P > MC$

higher P than MC

... the markup

$P = \frac{MC}{\ldots}$

means, ...
higher P than MC
higher is the markup price.

$$\boxed{P = \frac{MC}{1 + \left(\frac{1}{\varepsilon_d}\right)}}$$

(this price is mark-up over the MC)

Monopoly power? It is the power of charging a higher price.

Higher the price charged ⇒ higher is the monopoly power.

This was given by an economist "Lerner"

And monopoly power can be expressed as

**Lerner's Index** ie, $L = \frac{P - MC}{P}$

ability to charge a higher price than MC

This monopoly power can be expressed in terms of elasticity of demand.

That is. $\boxed{L = \frac{-1}{\varepsilon_D} = \frac{P - MC}{P}}$

This L varies between $\underline{\underline{0}}$ and $\underline{\underline{1}}$

(a) when $L = 0$ ⇒ no monopoly power ⇒ perfect competition

In perf comp: $\varepsilon_d \to \infty \therefore L = \frac{1}{\infty} \to 0$

(b) when $L \to 1$ ⇒ monopoly power.

interpretation:

① higher the price (P) from MC ie $P > MC$ ⇒ L is high ⇒ Monopoly power is high.

② Since $L = \frac{-1}{\varepsilon_D}$

⇒ Monopoly power is inversely related to elasticity of demand.

(That is if elasticity is high, then value of L is low that is less monopoly power)

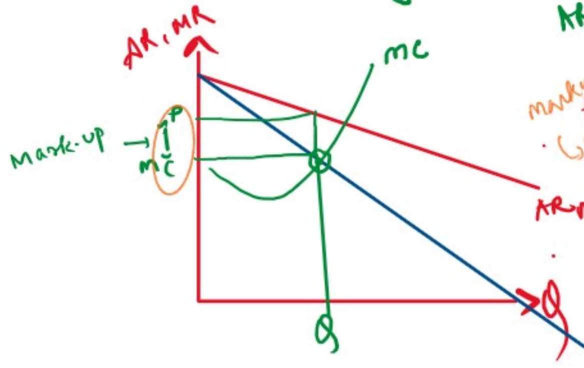
and if elasticity is less then high monopoly power.

That is if $e_D > 1$ ⇒ elastic ⇒ less monopoly

(b) when $L \to 1 \Rightarrow$ monopoly power.

that is if $e_D > 1 \Rightarrow$ elastic $\Rightarrow$ less Monopoly

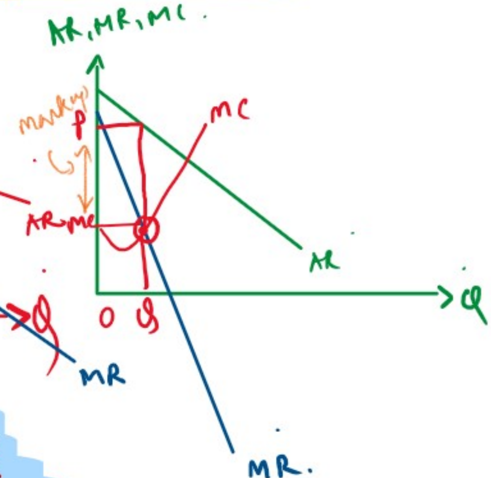
if $e_D < 1 \Rightarrow$ inelastic $\Rightarrow$ More "




(a) case of elastic demand

(that is high elasticity)

(Low monopoly power)




(b) Case of inelastic demand

(that is less elastic)

High monopoly power

## Three very important point:

1. A monopolist will always produce in the elastic portion of demand curve

   (never produce in the inelastic portion)

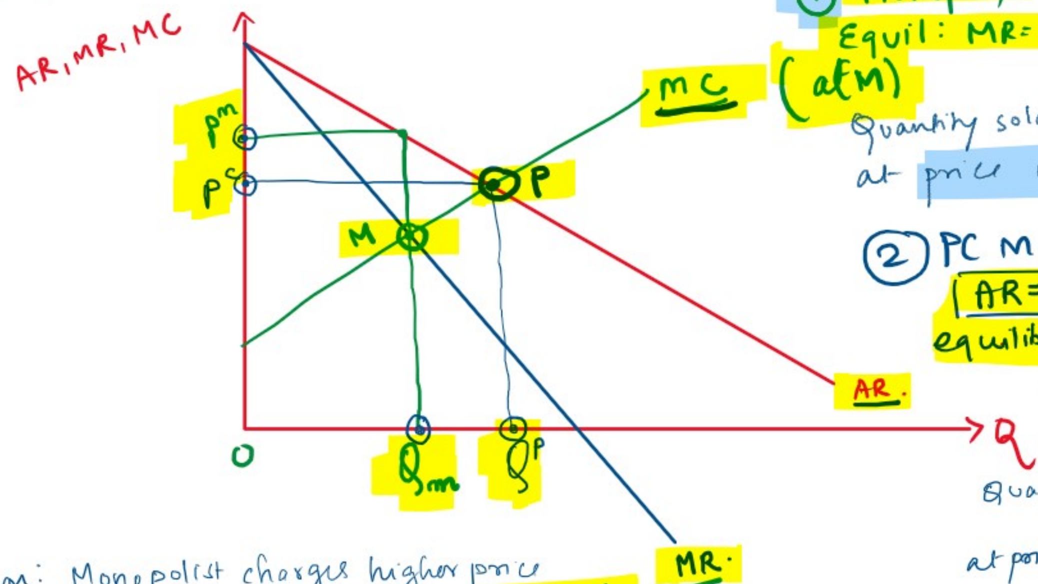
2. A monopolist do not have any supply curve, due to the following reason $\Rightarrow$ there is no one-to-one relation between P and Q.

3. A monopolist always charges a higher price than a perfect competitive market and sell a lower Quantity than in a pc market.

Due to this
a) there is fall in consumer surplus in Monopoly
b) increase in producer's surplus in monopoly
c) and there is social cost of monopoly or also called dead-weight loss of changing from perfect competition to monopoly market.

## Comparison between Price and Quantity in Monopoly and perfect competition:

## Comparison between price and quan… perfect competition:




1. Monopoly

Equil: MR = MC.

(at M)

Quantity sold is $Q^m$ at price $OP^m$.

2. PC Market

$\boxed{AR = MC}$

equilibrium is at point P.

Quantity sold is $Q^p$ at price $OP^c$.

So conclusion: Monopolist charges higher price $OP^m > OP^c$ and sell lower Quantity $OQ^m < OQ^p$