EE311 Microeconomics Theory

Monopoly

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Topics to be Discussed

- Characters of monopoly
- Sources of monopoly power
- Profit maximisation
- The importance of price elasticity of demand
- The welfare implication of Monopoly
- Limiting Market Power
- The Multiplant Firm

Characters of Monopoly

1. One seller - many buyers
2. One product (no substitutes)
3. Barriers to entry
4. Price Maker

Sources of Monopoly Power

- Technical barriers
  - Economies of scale that makes a firm to be a natural monopoly, eg: Satellites, public transport, utilities like electricity)
- Legal barriers:
  - Patents, Copyrights to protect innovation
    - Medicines, Movies
  - Concessions or licenses
    - Sin Products: Alcohol
    - Sources of income: TV or radio broadcasting
    - Environment protection: forest, mineral
    - Consumer protection: Medical services

Sources of Monopoly Power

- Creation of barriers (man-made monopoly):
  - Owner of vital resources
  - Trade secrets
  - Strategies to deter entry
  - Collusion Lobby or State capture (Investment Banks and the FED)

Profit Maximisation

Since there is only one firm in the market, the monopolist faces the market demand curve.

With the downward sloping demand curve, the monopolist is a price maker.

Concept of MR = MC

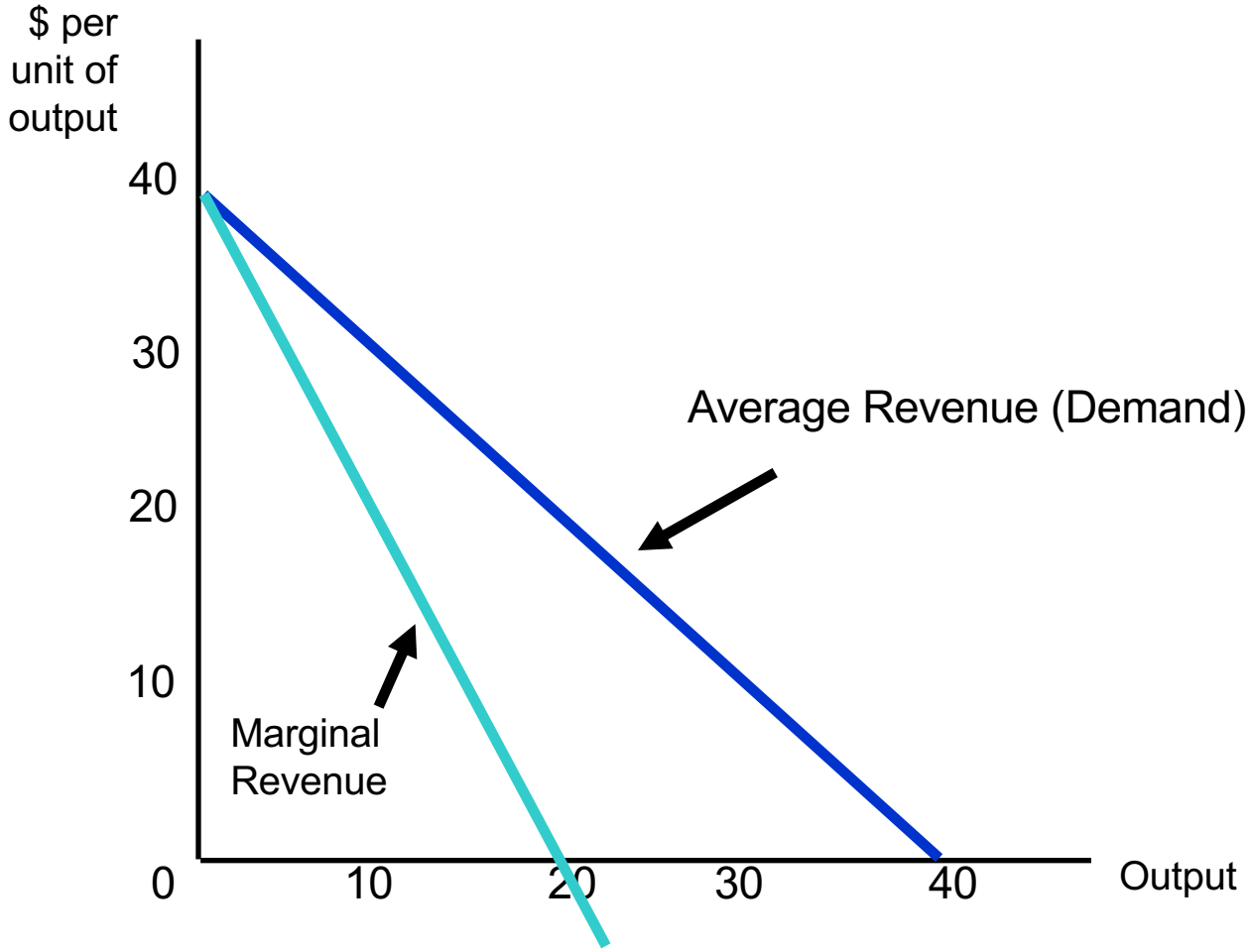
Profit Maximisation

Profit = TR - TC

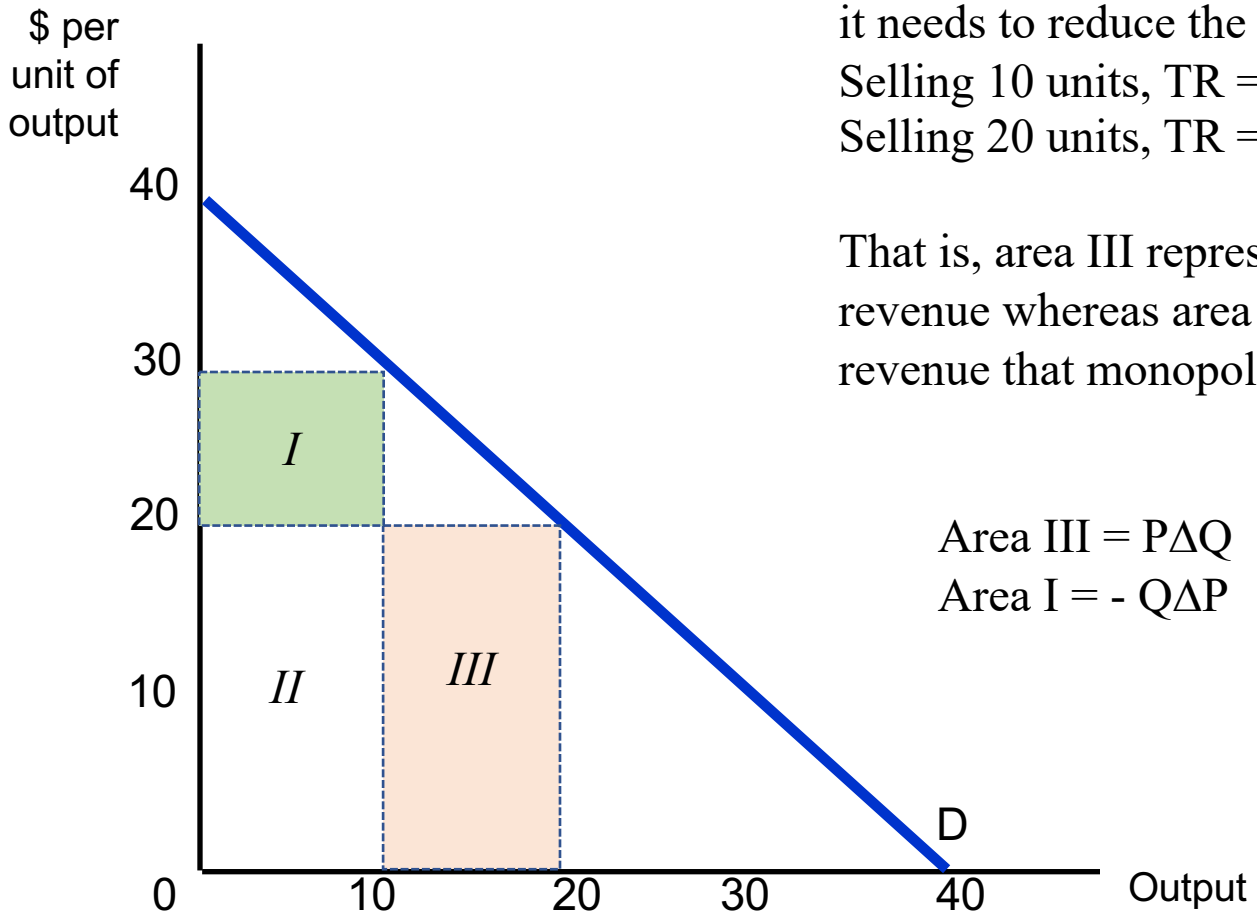
Marginal and Average Revenue for a Linear Demand Curve

Suppose that the equation of the market demand curve is $P = a - bQ$, what are the expressions for the average and marginal revenue curves?

Average and Marginal Revenue



A Closer Look at Marginal Revenue



When a monopolist wishes to sell more, it needs to reduce the unit price.
Selling 10 units, TR = area I + area II.
Selling 20 units, TR = area II + area III

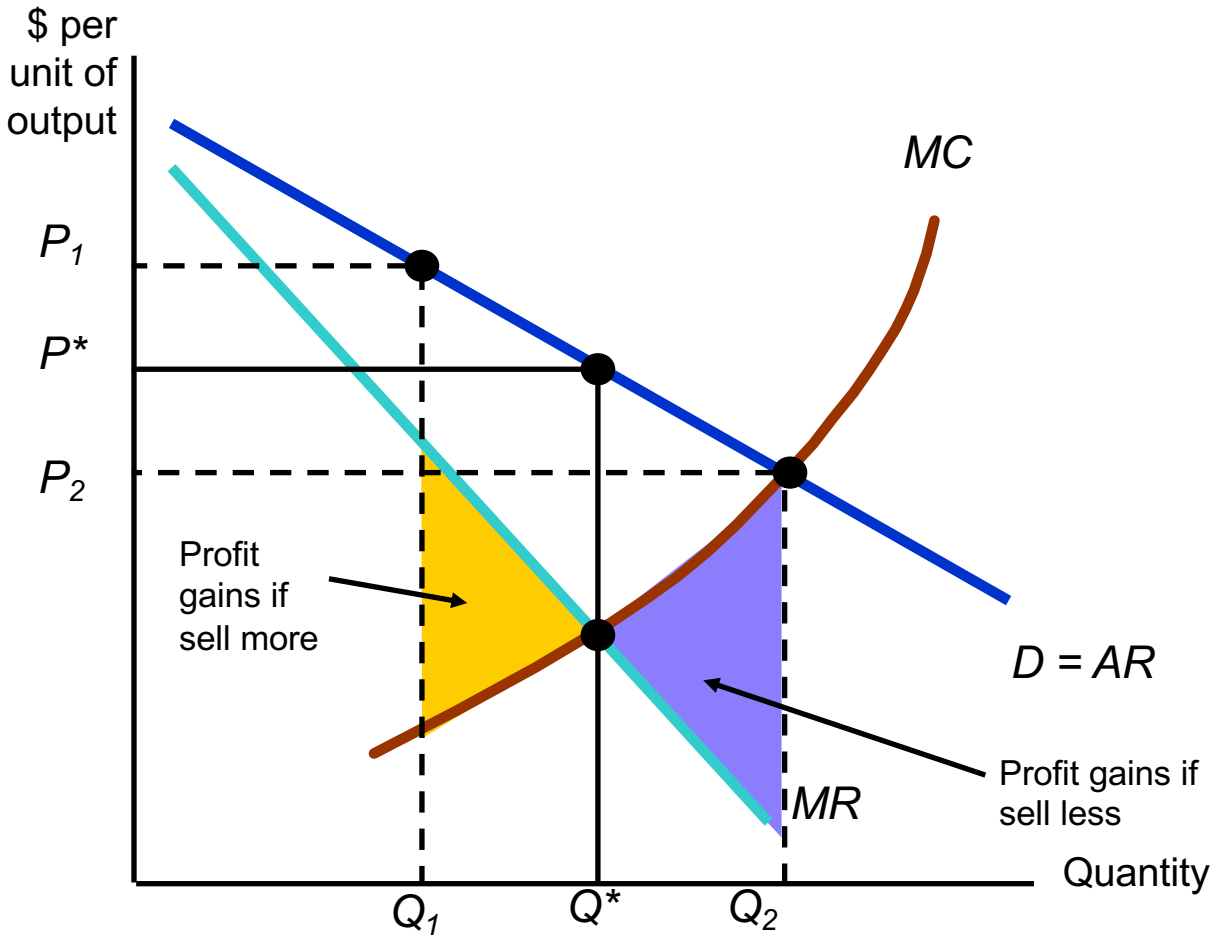
That is, area III represents additional revenue whereas area I represents the revenue that monopolist sacrifices.

Area III = PΔQ
Area I = - QΔP

A Rule of Thumb for Pricing (1)

$$MR = \frac{dTR}{dQ} = \frac{d(PQ)}{dQ}$$

Monopolist's Output Decision



Identifying Profit/ Loss

Monopoly power, however, does not guarantee profits.

Profit depends on average cost relative to price.

One firm may have more monopoly power, but lower profits due to high average costs

A Rule of Thumb for Pricing (II)

$$MR = P + Q\frac{dP}{dQ}$$

$$Ed = \frac{P}{Q}\frac{dQ}{dP} \quad \Rightarrow \quad MR = P + P\frac{1}{Ed}$$

A Rule of Thumb for Pricing (III)

Profit maximisation: MC = MR

$$MC = P + P\frac{1}{Ed} \quad \Rightarrow \quad P = \frac{MC}{1 + \frac{1}{Ed}}$$

$$\frac{P - MC}{P} = -\frac{1}{Ed}$$

A monopolist never produce in the range where $|E_D| < 1$

If $|E_D| = 1$, P is infinity.

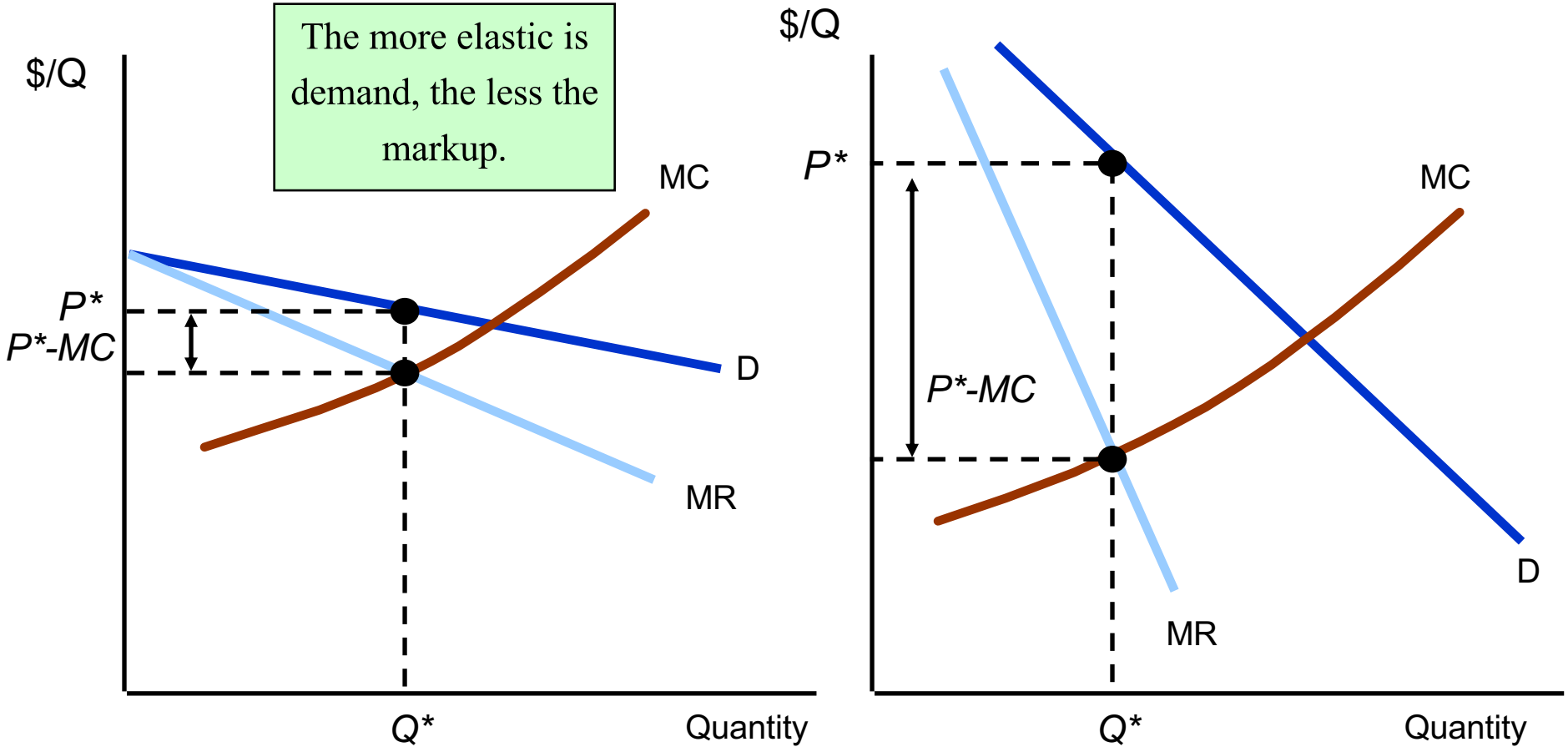
When $|E_D| < 1$, TR can be increased by increasing the price.

A Rule of Thumb for Pricing (IV: Markup Pricing)

$$P = \frac{MC}{1 + \frac{1}{Ed}}$$

Elasticity of Demand and Markup Pricing

The more elastic is demand, the less the markup.



- Supermarkets:
  - there are several firms with similar products
  - Often buy in large quantities

$$E_d = -10 \text{ for individual stores}$$

$$P = \frac{MC}{1 + \left(1/-10\right)} = \frac{MC}{0.9} = 1.11(MC)$$

Prices set about 10-11% above MC.

- Convenience Stores
  - Often buy when goods are ran out in small quantities

$E_d = -5$

$P = MC/(1+(1/-5)) = MC/0.8 = 1.25\ MC$

Prices set about 25% above MC.

- Convenience stores have more monopoly power.
- Convenience stores do have higher profit margins than supermarkets however
  - Volume is far smaller and average fixed costs are larger
- Supermarkets have larger sale volumes and has higher negotiation power over suppliers

Remarks

- (P – MC)/P is the profit markup over the MC as a percentage of the selling price.
- So it can be used to measure monopoly power; that is, the extent to which price is greater than MC for each firm.
- This is determined by:

  1) Elasticity of market demand

  2) Number of firms in market

  3) The interaction among firms

Measuring Monopoly Power

- Lerner's Index of Monopoly Power
  - $L = (P - MC)/P$
    - The larger the value of L (between 0 and 1) the greater the monopoly power.
  - L is expressed in terms of E_D
    - $L = (P - MC)/P = -1/E_D$
    - E_D is elasticity of demand for a firm, not the market

Elasticity of Market Demand

- The less elastic the demand curve, the more monopoly power a firm has.
- With one firm their demand curve is market demand curve
  - Degree of monopoly power determined completely by elasticity of market demand
- With more firms, individual demand may differ from market demand
  - Demand for a firm's product is more elastic than the market elasticity

Number of Firms

- The monopoly power of a firm falls as the number of firms increases all else equal
  - More important are the number of firms with significant market share
  - Market is highly concentrated if only a few firms account for most of the sales
- Firms would like to create barriers to entry to keep new firms out of market

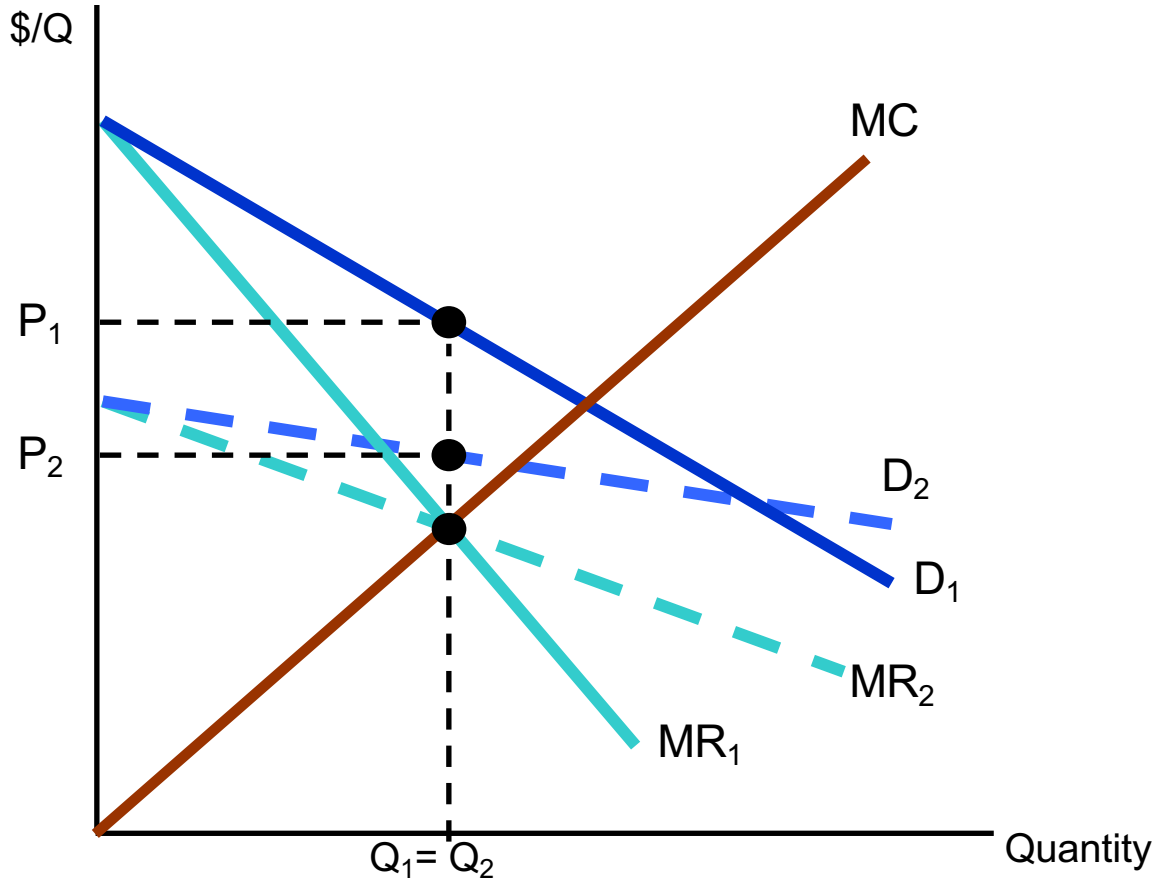
Interaction Among Firms

- If firms are aggressive in gaining market share by, for example, undercutting the other firms, prices may reach close to competitive levels.
- If firms collude, they could generate substantial monopoly power
- Markets are dynamic and therefore, so is the concept of monopoly power

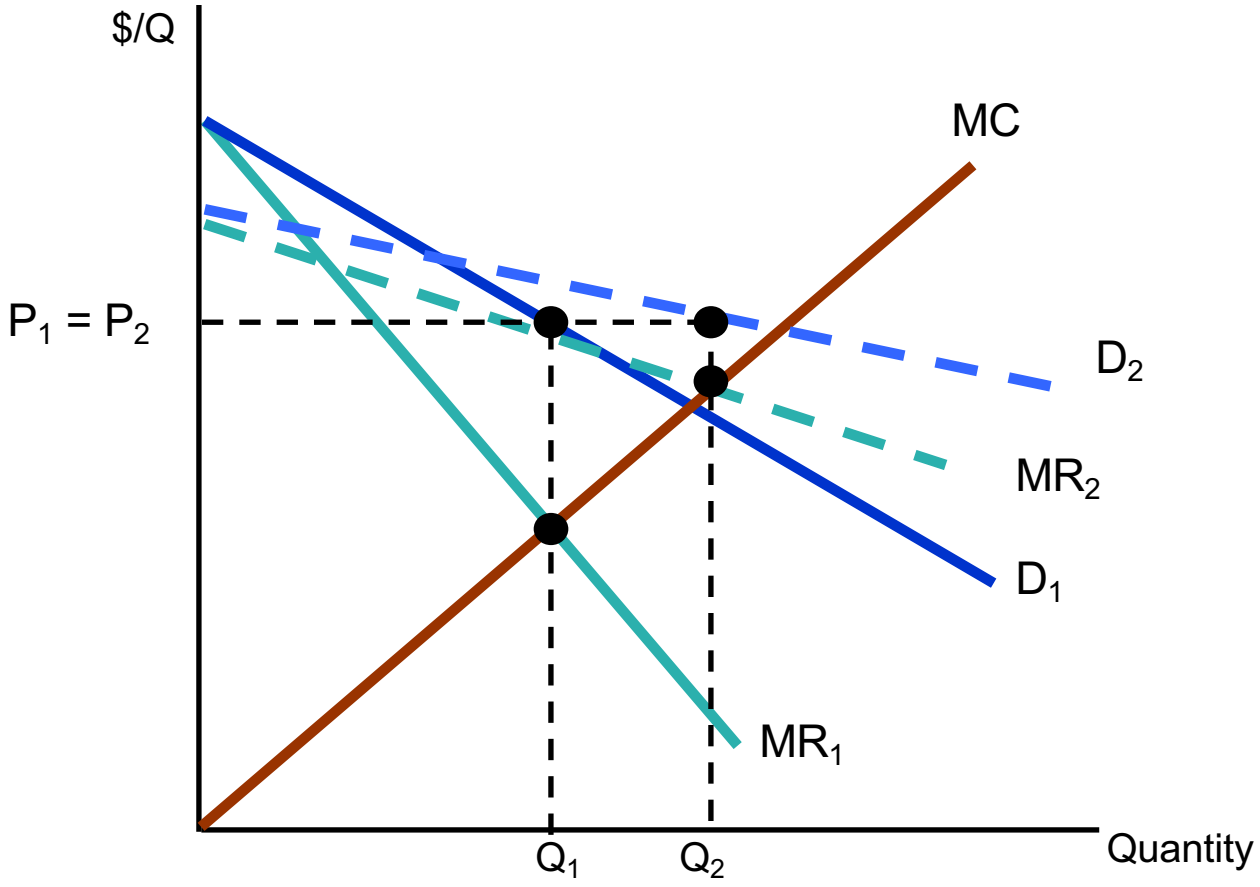
NO SUPPLY CURVE FOR A MONOPOLIST.

- In perfect competition, the market supply curve is determined by marginal cost.
- For a monopoly, output is determined by marginal cost and the shape of the demand curve.
- Shifts in demand do not trace out price and quantity changes corresponding to a supply curve.
- Shifts in demand lead to
  - Changes in price with no change in output
  - Changes in output with no change in price
  - Changes in both price and quantity

Shift in demand leads to change in price but same quantity



Shift in demand leads to change in quantity but same price



- Shifts in demand usually cause a change in both price and quantity.
- Competitive market supplies specific quantity at every price
  - This relationship does not exist for a monopolistic market

Welfare Implication of Monopoly

Deadweight Loss and Rent-Seeking Activities

Regulating Monopoly

Regulating Natural Monopoly

- Natural Monopoly
  - A firm that can produce the entire output of an industry at a cost lower than what it would be if there were several firms.
  - Usually arises when there are large economies of scale
- The firm would lose money and can't cover average costs if marginal cost pricing is used.
- Compromise by using Average Cost Pricing
  - Regulate the price where AC = D.

The Multi-plant Firm

- For some firms, production takes place in more than one plant each with different costs
- Firm must determine how to distribute production between both plants
  - Production should be split so that the MC in the plants is the same
  - Output is chosen where MR=MC. Profits is therefore maximized when MR=MC at each plant

The Multi-plant Firm

- We can show this algebraically:
  - Q_1 and C_1 is output and cost of production for Plant 1
  - Q_2 and C_2 is output and cost of production for Plant 2
  - $Q_T = Q_1 + Q_2$ is total output
  - Profit is then:

$$p = PQ_T - C_1(Q_1) - C_2(Q_2)$$

The Multi-plant Firm

- Firm should increase output from each plant until the additional profit from last unit produced at Plant 1 equals 0

$$\frac{\Delta\pi_1}{\Delta Q_1} = \frac{\Delta(PQ_T)}{\Delta Q_1} - \frac{\Delta C_1}{\Delta Q_1} = 0$$

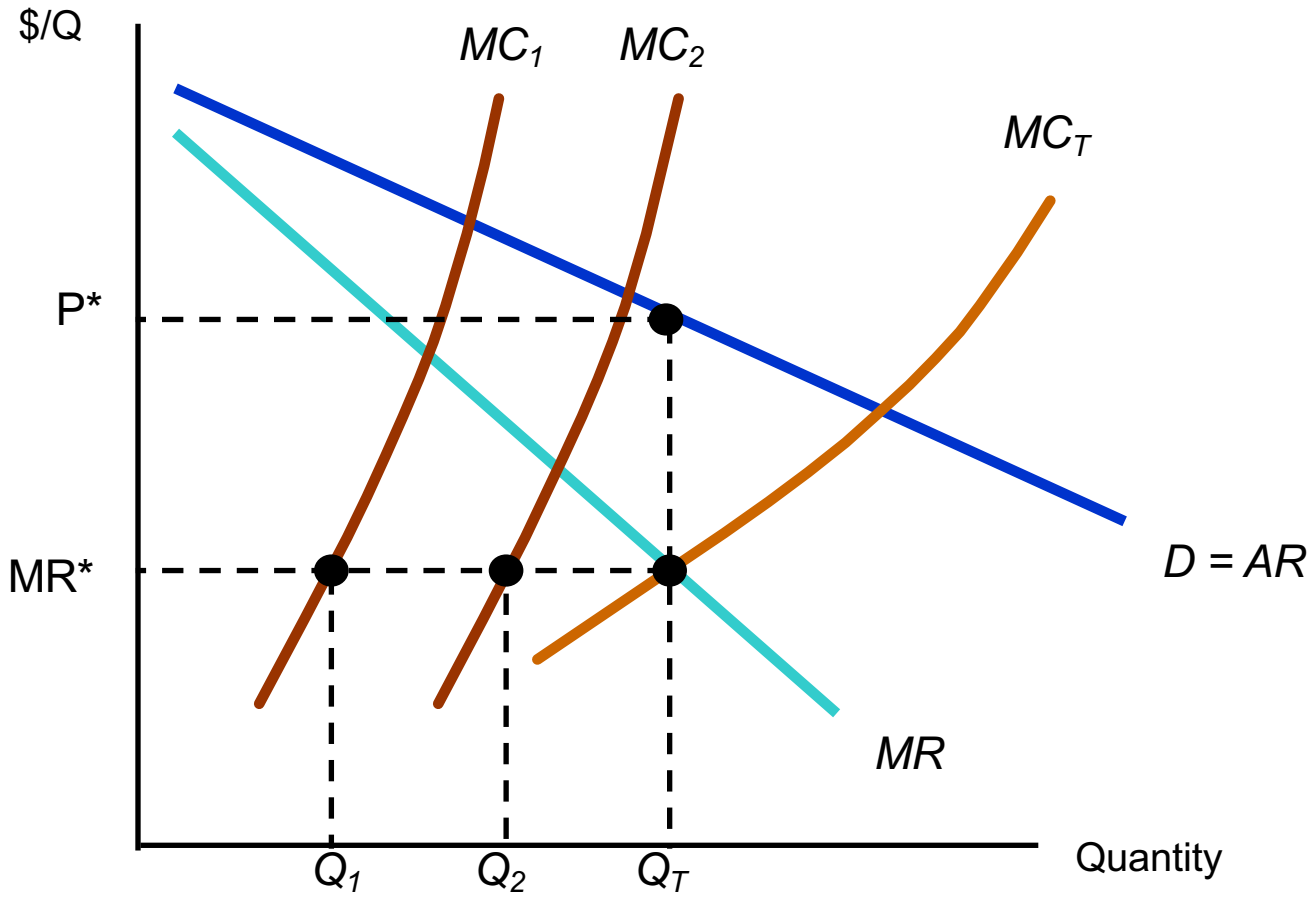
$$MR - MC_1 = 0$$

$$MR = MC_1$$

The Multi-plant Firm

- We can show the same for Plant 2.
- Therefore we can see that the firm should choose to produce where $MR = MC_1 = MC_2$
- We can show this graphically
  - $MR = MC_T$ gives total output
  - This point shows the MR for each firm
  - Where MR crosses MC_1 and MC_2 shows the output for each firm

Production with Two Plants



Profit Maximisation by a Cartel

What is cartel?

A group of producers that collusively determines the price and output in a market. One of the history's most famous (or *notorious*) cartels is the OPEC, whose members include the world's largest oil producers.

How does a cartel work?

A cartel works as a single monopoly firm that maximises total industry profit.

A cartel allocates output level across individual producers (like multiplant monopolist)

Profit Maximisation by a Cartel: A Graphical Illustration