



Oligopolistic Conduct and Welfare

by

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Aims

- ❖ In this session we will explore the interdependence between firms using the Cournot and (briefly) Bertrand oligopoly models.
- ❖ We will see that interdependence in the market (i.e. actual competition even among a few firms) reduces the welfare losses of market power but does not eradicate them.



Learning Outcomes

- ❖ By the end of this session you will be able to
- ❖ construct a reaction curve diagram and see how this translates into the traditional monopoly diagram.
- ❖ work through a numerical example in this area.
- ❖ More mathematical students will be able to consider the finer aspects of the model.



Welfare and (Tight) Oligopoly

- ❖ To understand the welfare implications of oligopoly we need to examine interdependence between firms in the market.
- ❖ Welfare depends upon the number of firms in the industry and the conduct they adopt.



Augustin Cournot (1838)

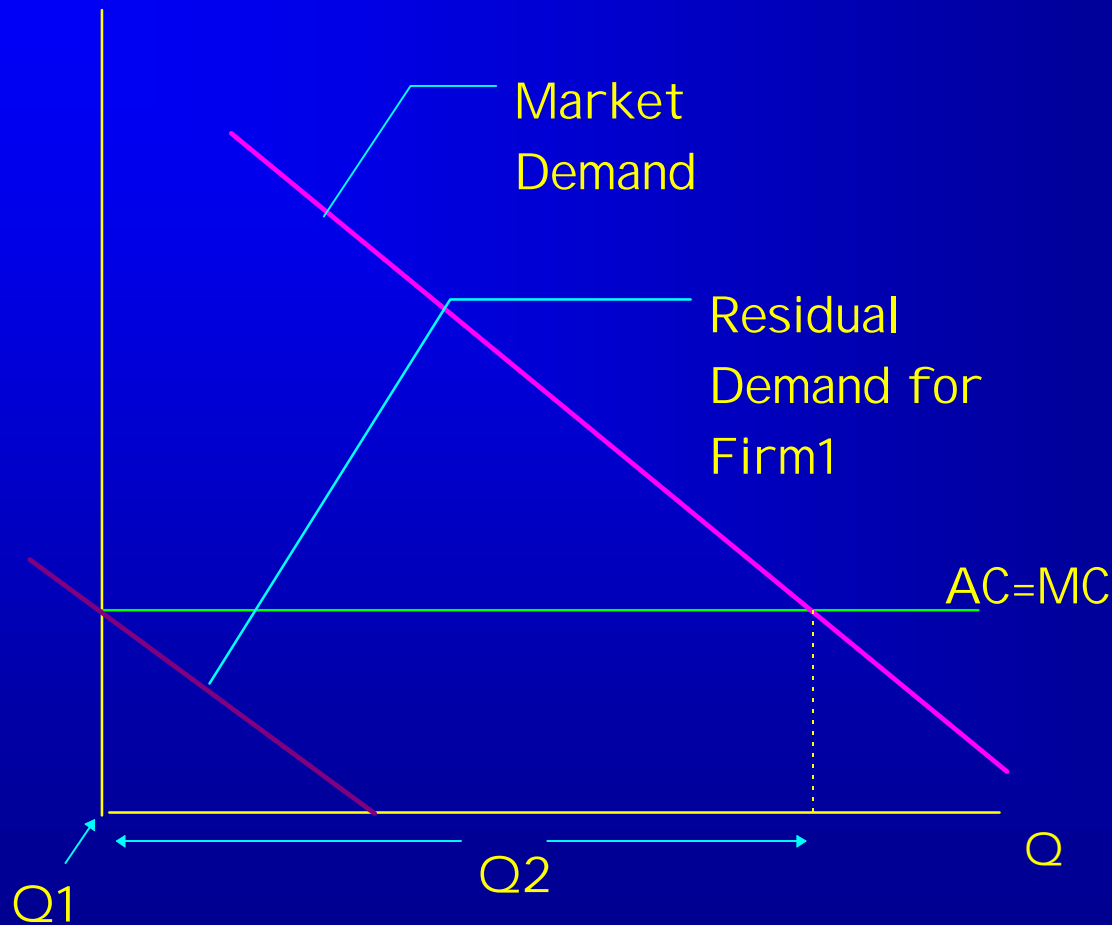
- ❖ Cournot's model involves competition in quantities (sales volume, in modern language) and price is less explicit.
- ❖ The biggest assumption made by Cournot was that a firm will embrace another's output decisions in selecting its profit maximising output but take that decision as fixed, ie. unalterable by the competitor.



If Firm 1 believes that Firm 2 will supply the entire industry output it will supply zero.



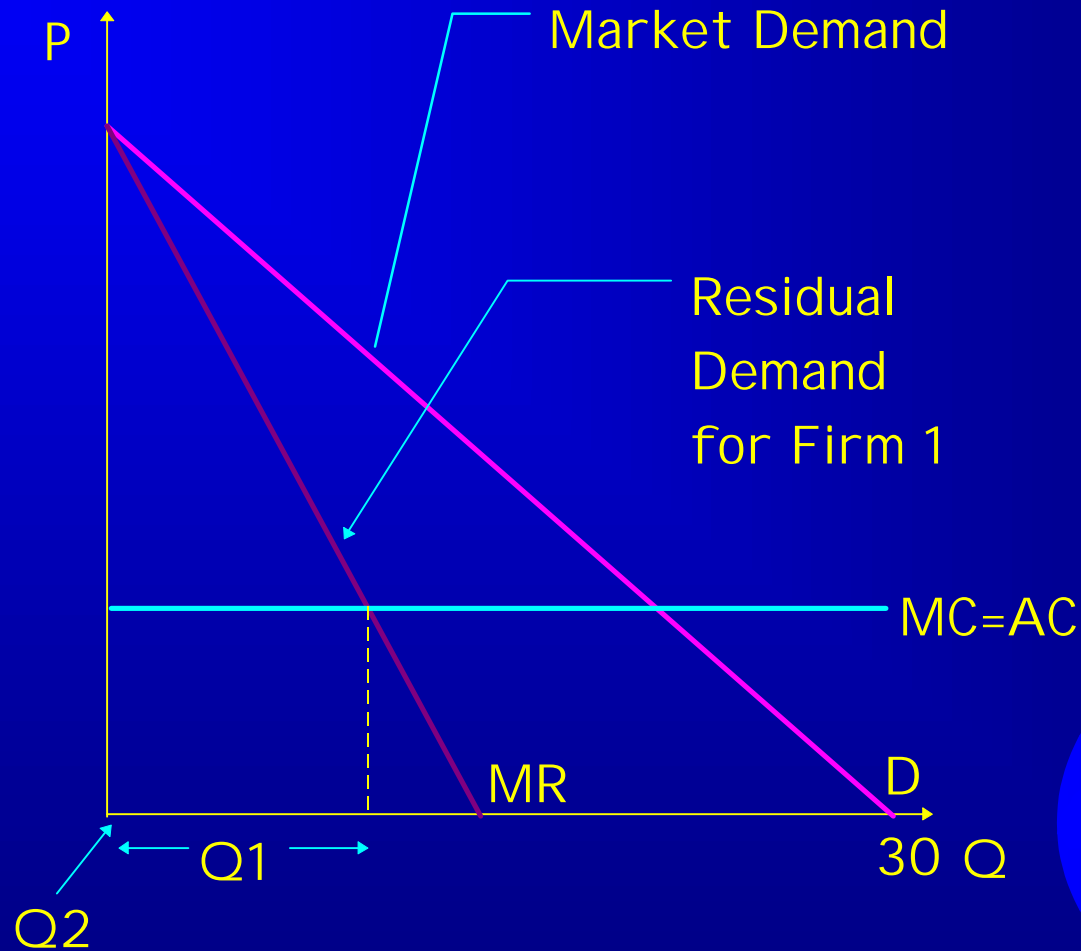
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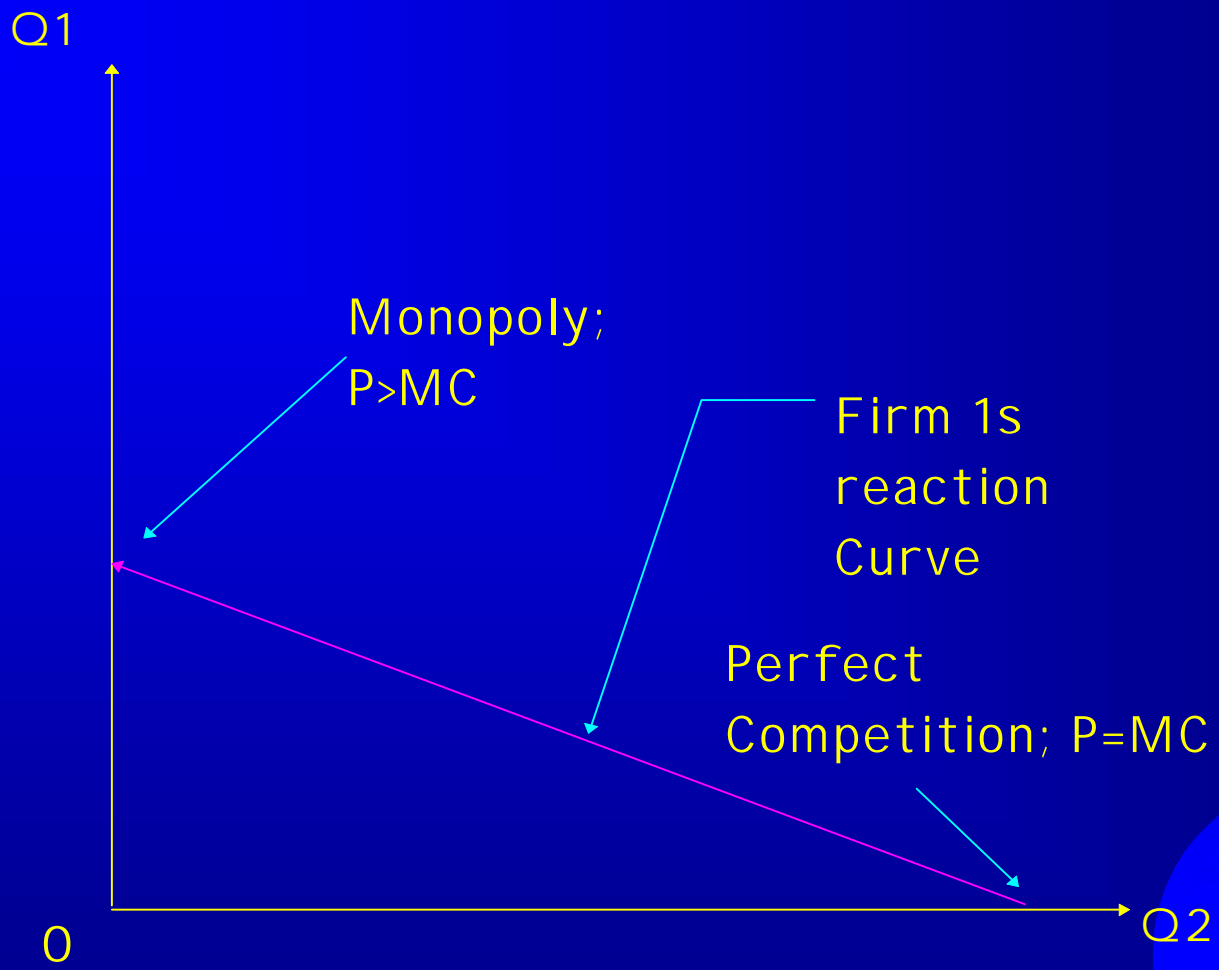


If Firm 1 believes that Firm 2 will supply zero output
it becomes a monopoly supplier.

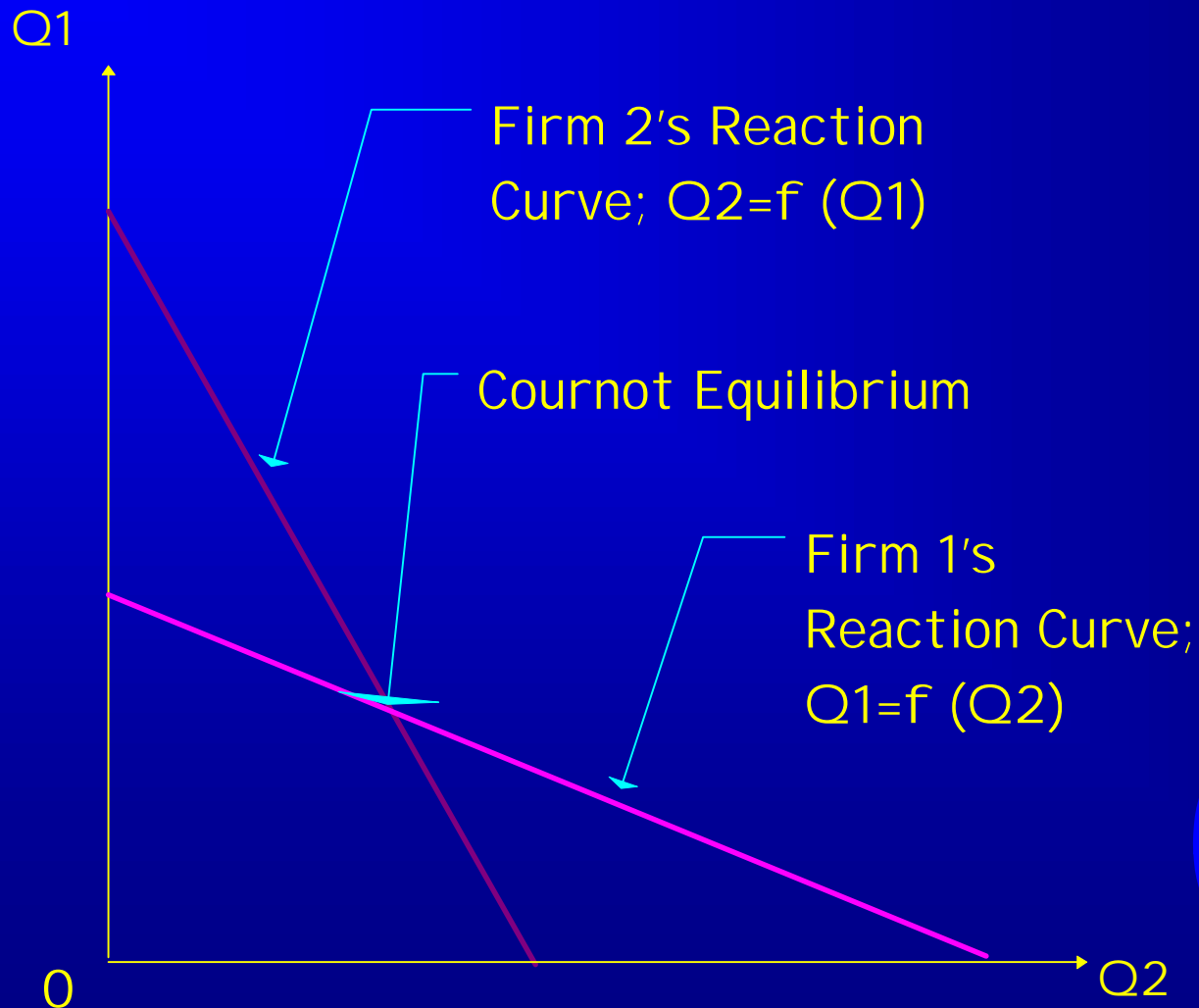


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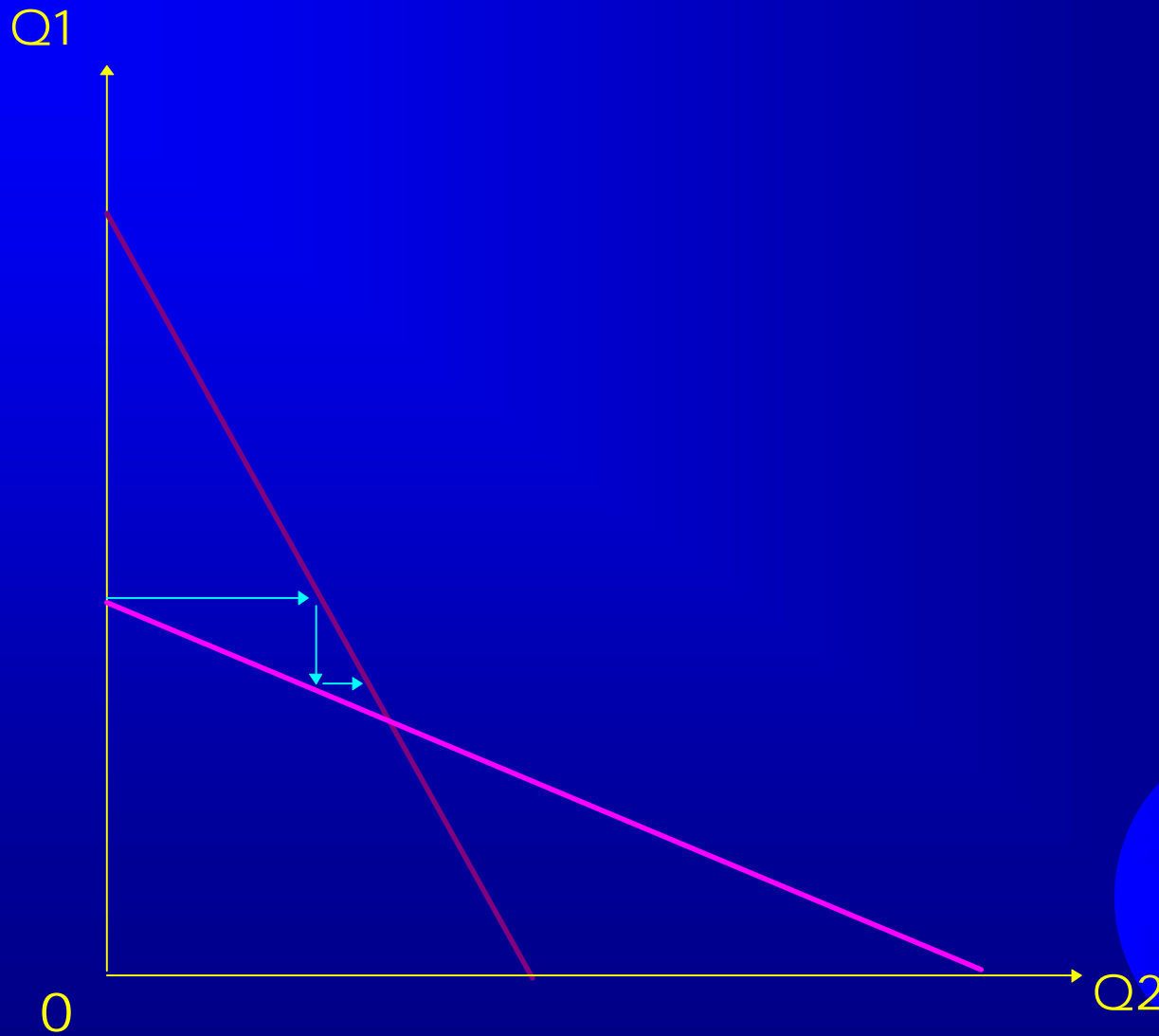
If Firm 2 makes the same conjectures then we get the following:



Convergence to Equilibrium



Convergence to Equilibrium



A numerical example

- ❖ Assume market demand to be

$$P = 30 - Q$$

where $Q = Q_1 + Q_2$

ie industry output constitutes firm 1 and firm 2's output respectively

- ❖ Further, assume $Q_1 = Q_2$

- ❖ and average (AC) and marginal cost (MC)

$$AC = MC = 12$$



❖ To find the profit maximising output of Firm 1 given Firm 2's output we need to find Firm 1's marginal revenue (MR) and set it equal to MC. So,

❖ Firm 1's Total Revenue is

$$R1 = (30 - Q) Q1$$

$$\begin{aligned} R1 &= [30 - (Q1 + Q2)] Q1 \\ &= 30Q1 - Q1^2 - Q1Q2 \end{aligned}$$

❖ Firm 1's MR is thus

$$MR1 = 30 - 2Q1 - Q2$$



- ❖ If $MC=12$ then

$$Q_1 = 9 - \frac{1}{2} Q_2$$

This is Firm 1's Reaction Curve.

- ❖ If we had begun by examining **Firm 2's** profit maximising output we would find its **reaction curve**, i.e.

$$Q_2 = 9 - \frac{1}{2} Q_1$$



❖ We can solve these 2 equations and find equilibrium quantity and price.

❖ Solving for Q1 we find

$$Q1 = 9 - \frac{1}{2} (9 - \frac{1}{2} Q1)$$

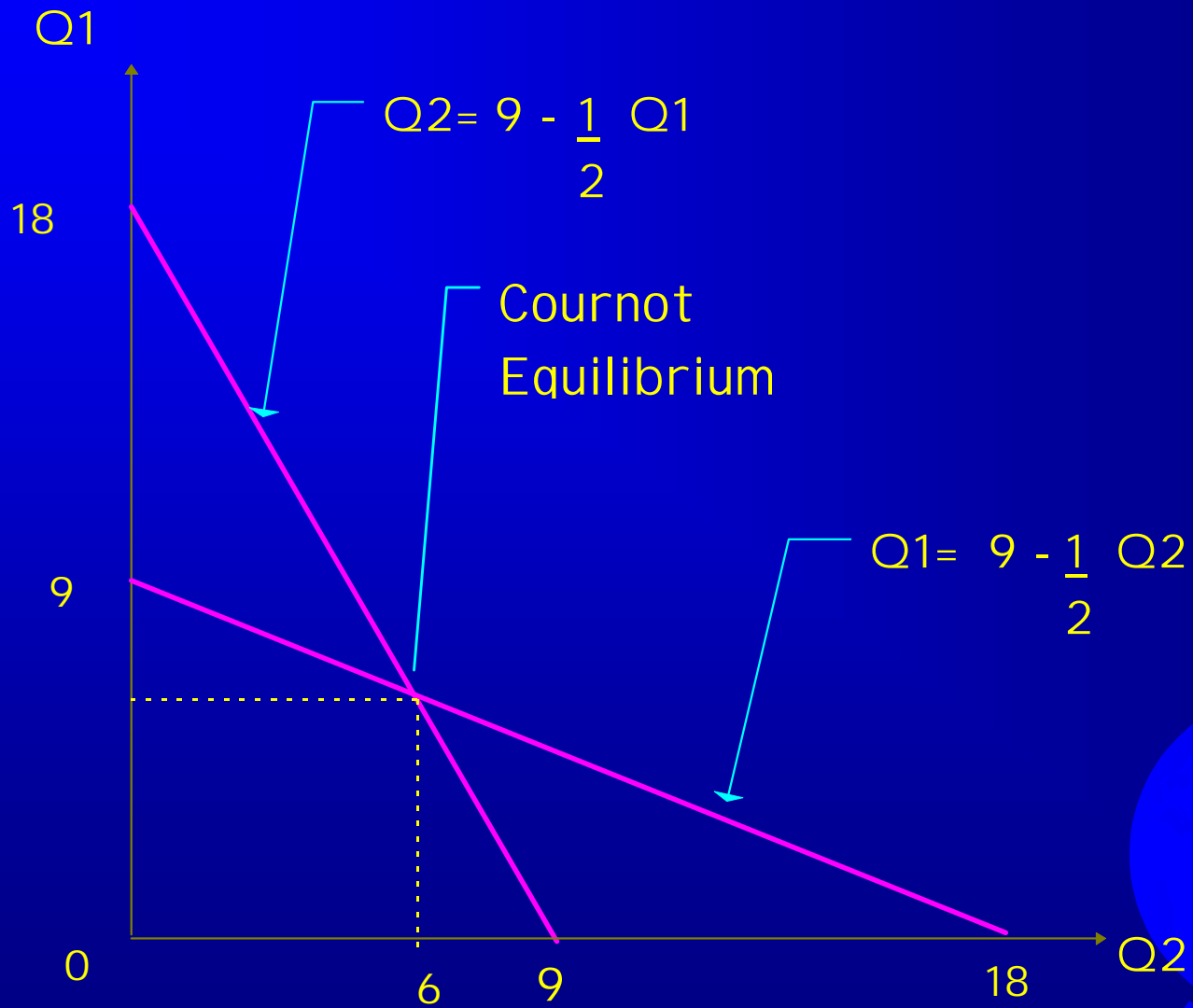
$$Q1 = 6$$

❖ Similarly,

$$Q2 = 6$$

and P = 18





Perfect Competition

- ❖ Under perfect competition firms set prices equal to MC. So,

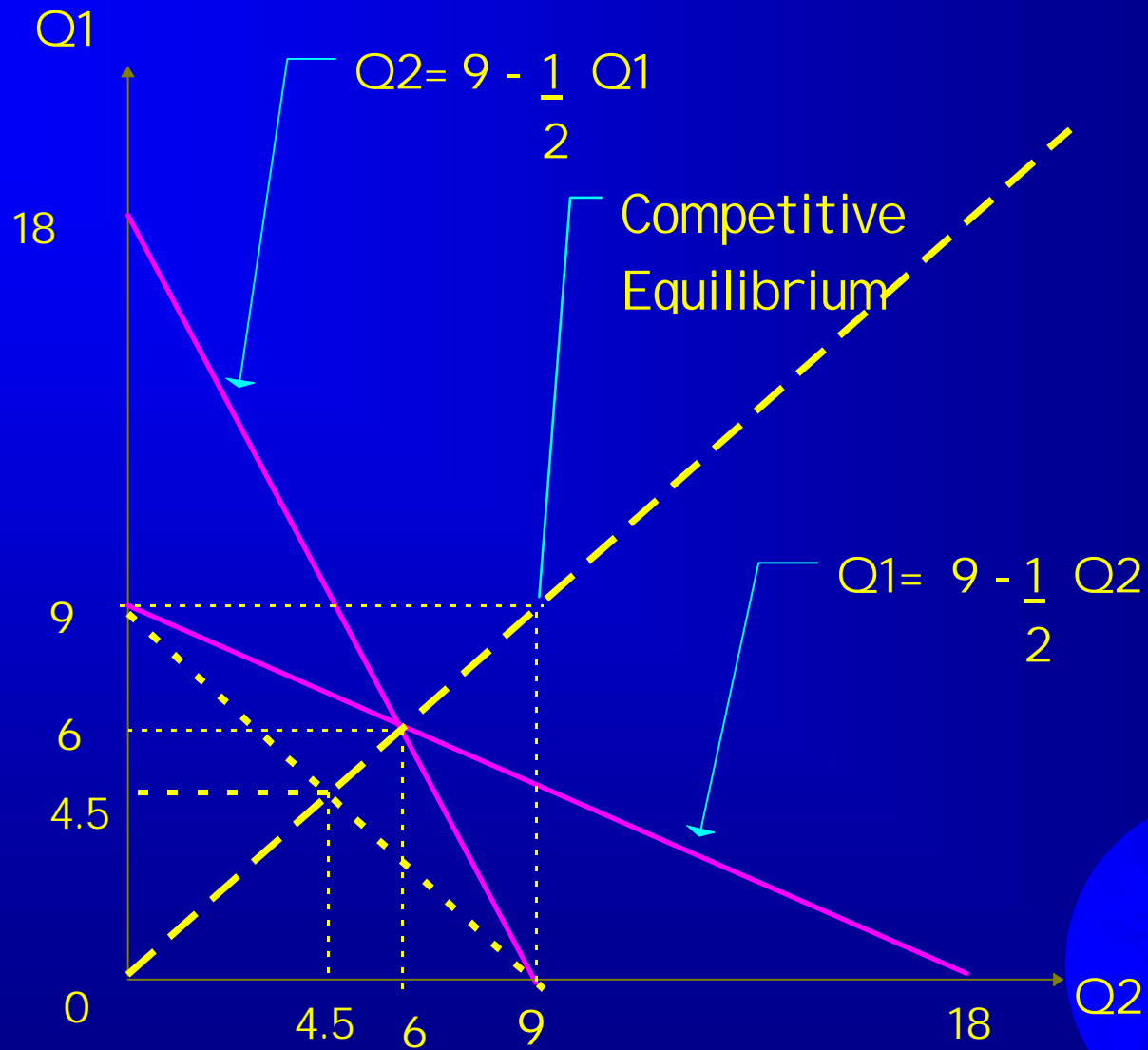
$$P = 12$$

- ❖ and equilibrium quantity

$$Q = 18$$

- ❖ Assuming both supply equal amounts, Firm 1 supplies 9 and so does Firm 2.





Monopoly

- ❖ They would then maximise **industry** profits and share the spoils.

$$TR = PQ = (30 - Q)Q = 30Q - Q^2$$

$$MR = 30 - 2Q$$

- ❖ As MC equals 12 industry profits are maximised where

$$30 - 2Q = 12$$

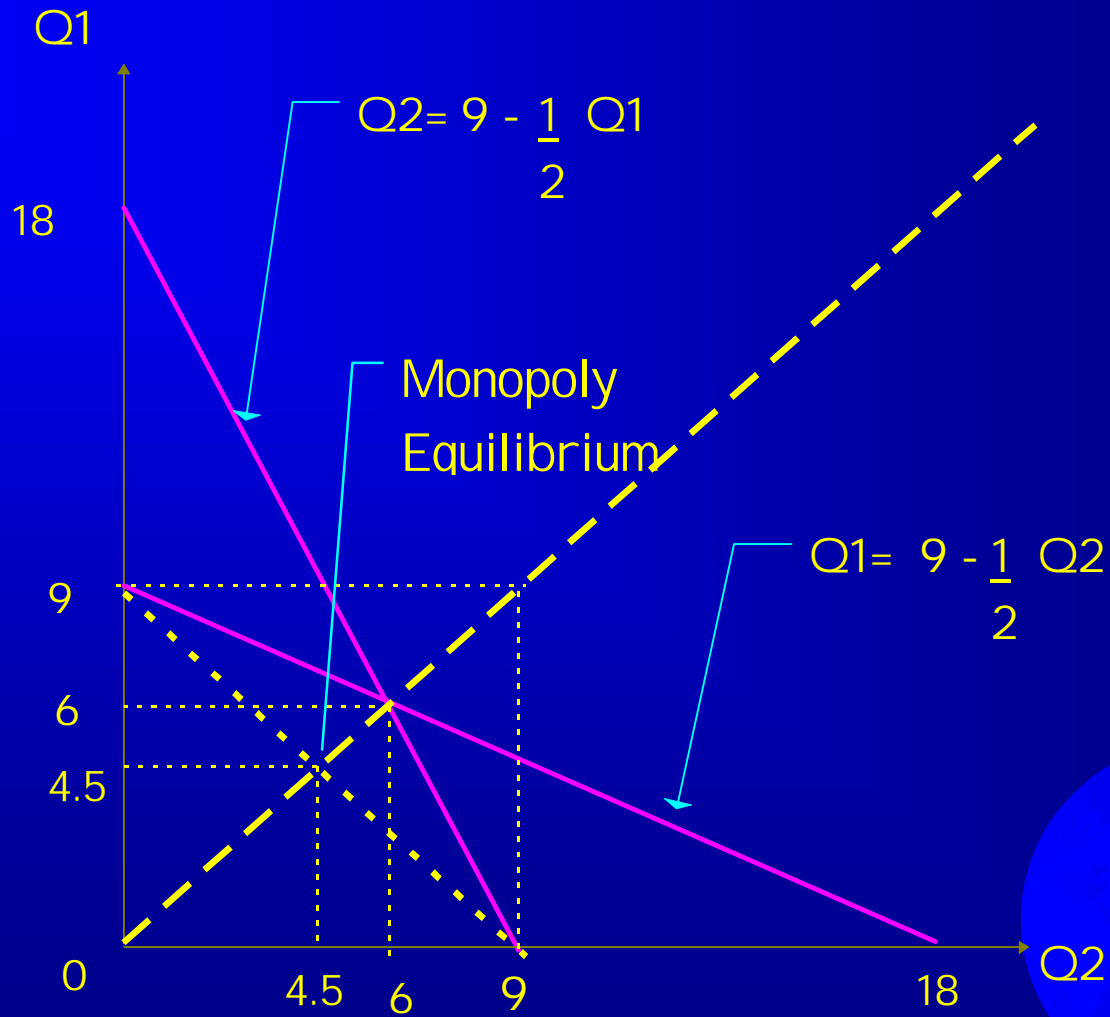
$$Q = 9$$

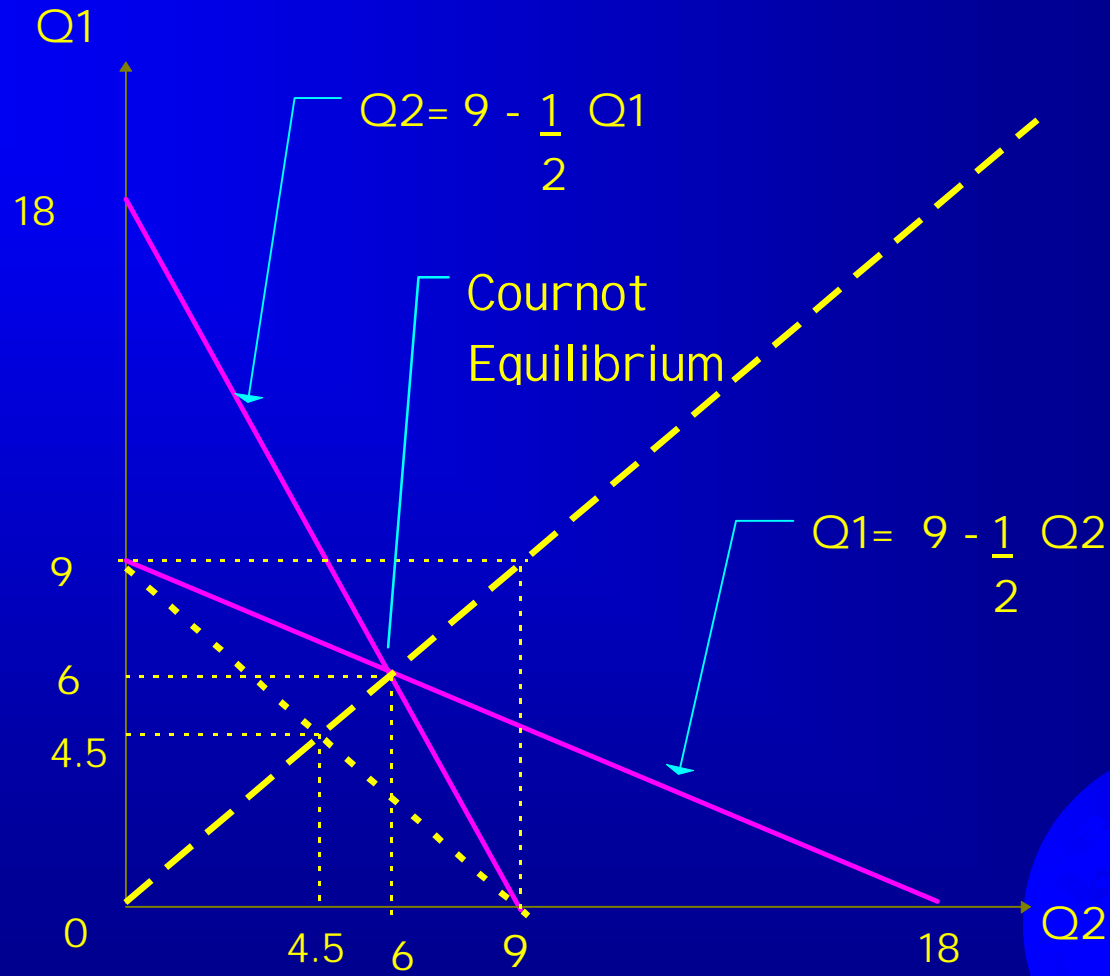
- ❖ So $Q_1 = Q_2 = 4.5$

- ❖ Equilibrium price

- ❖ $P = 21$



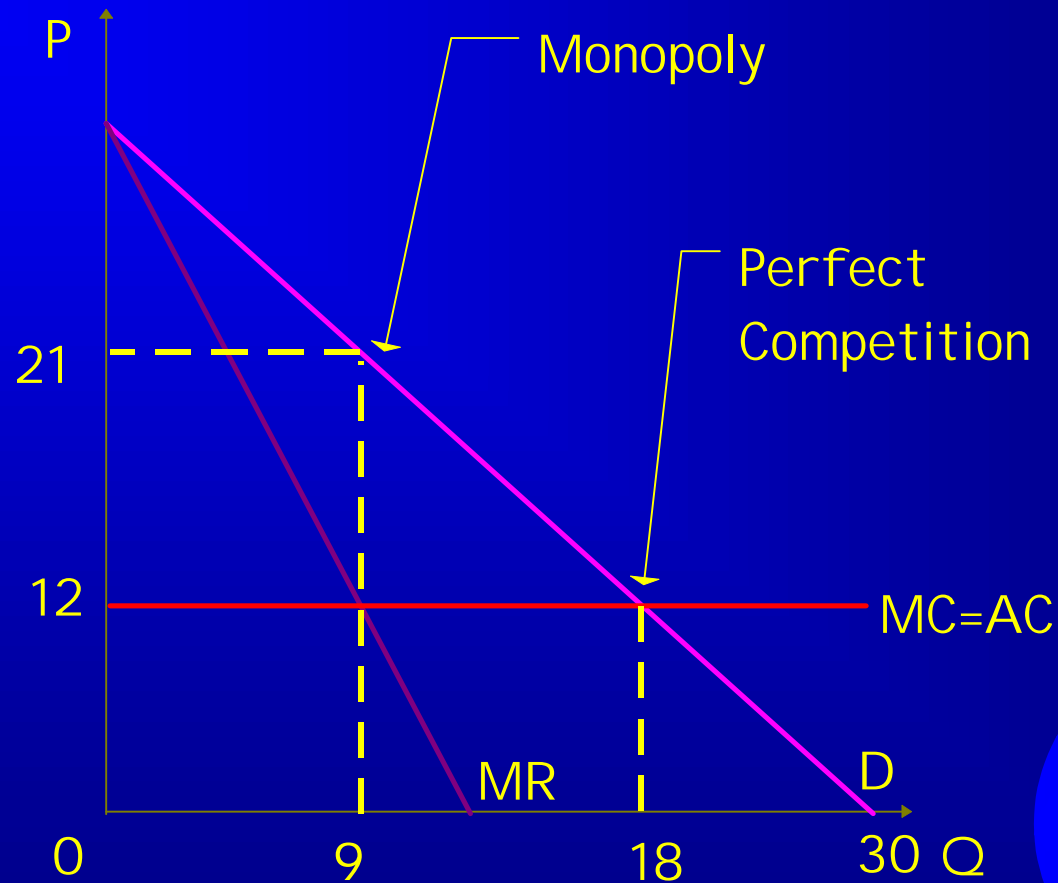




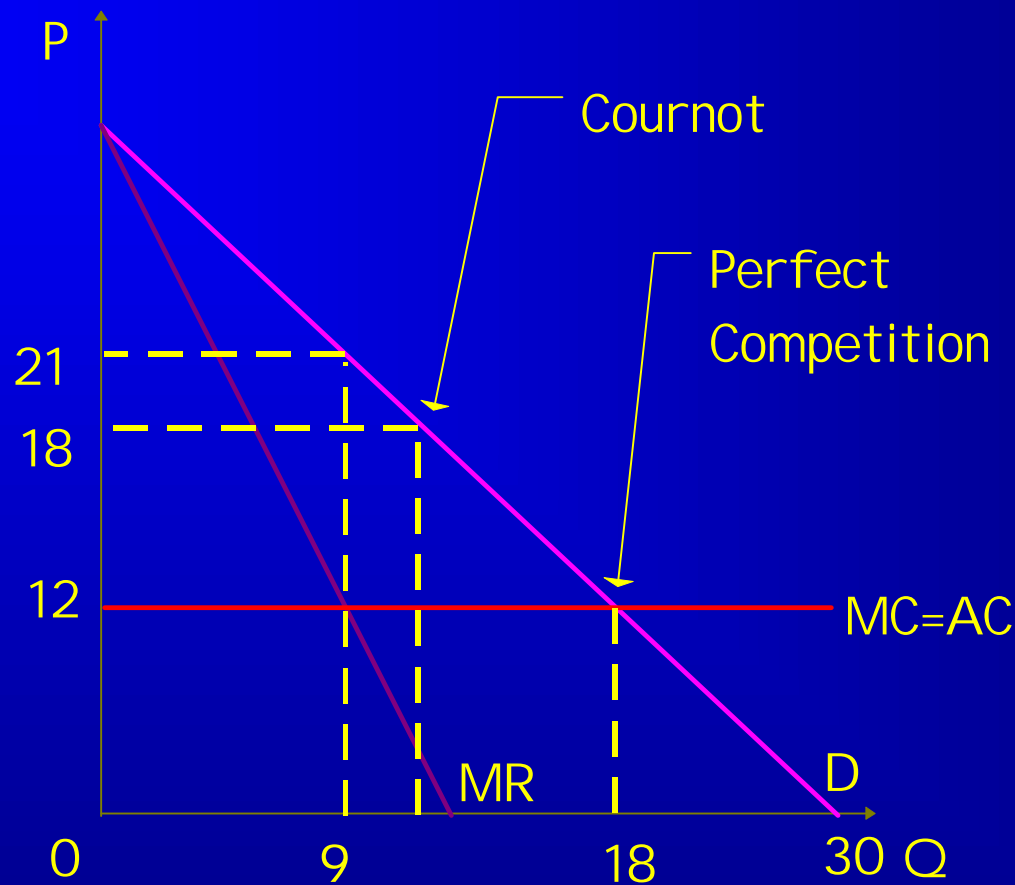
Cournot Equilibrium compared using a traditional Monopoly diagram



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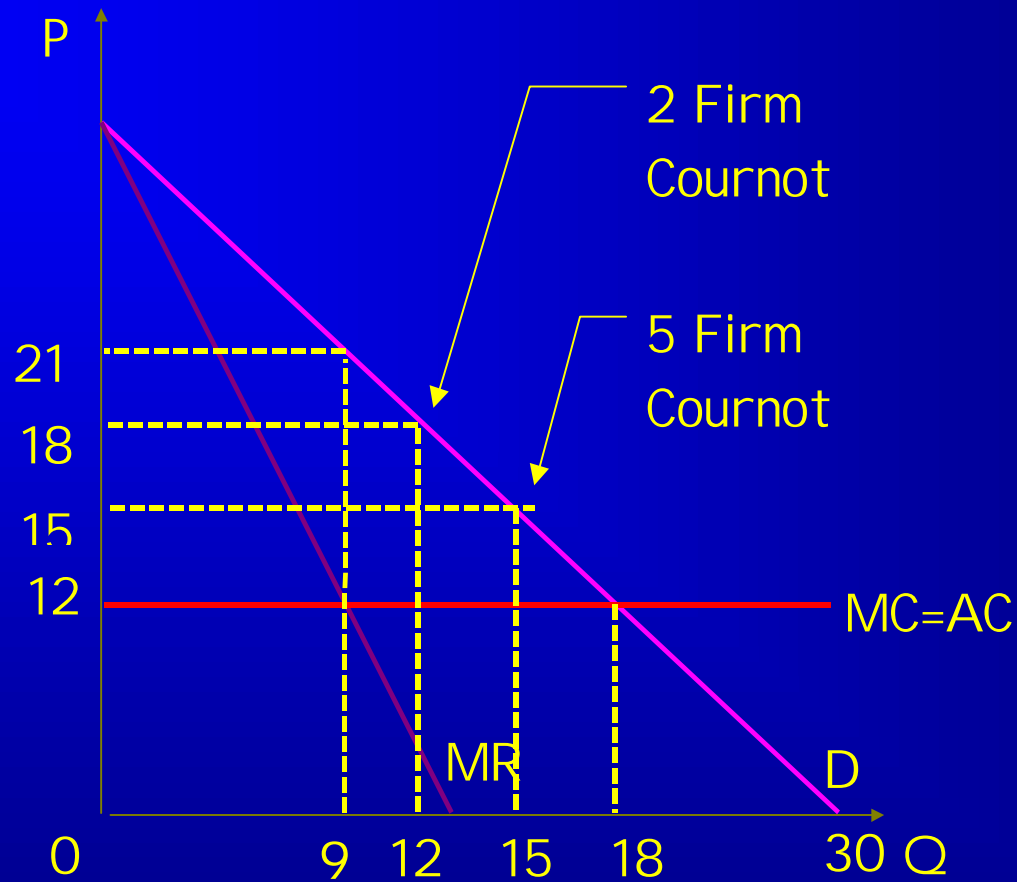
- ❖ A further point that must be considered is that if the number of firms increases then the Cournot equilibrium approaches the competitive equilibrium.
- ❖ In our example the Cournot equilibrium output was $2/3$ s that of the perfectly competitive output.
- ❖ It can be shown that if there were 3 firms acting under Cournot assumption then they would produce $3/4$ s of the perfectly competitive output level.



Firm numbers matter



Firm numbers matter

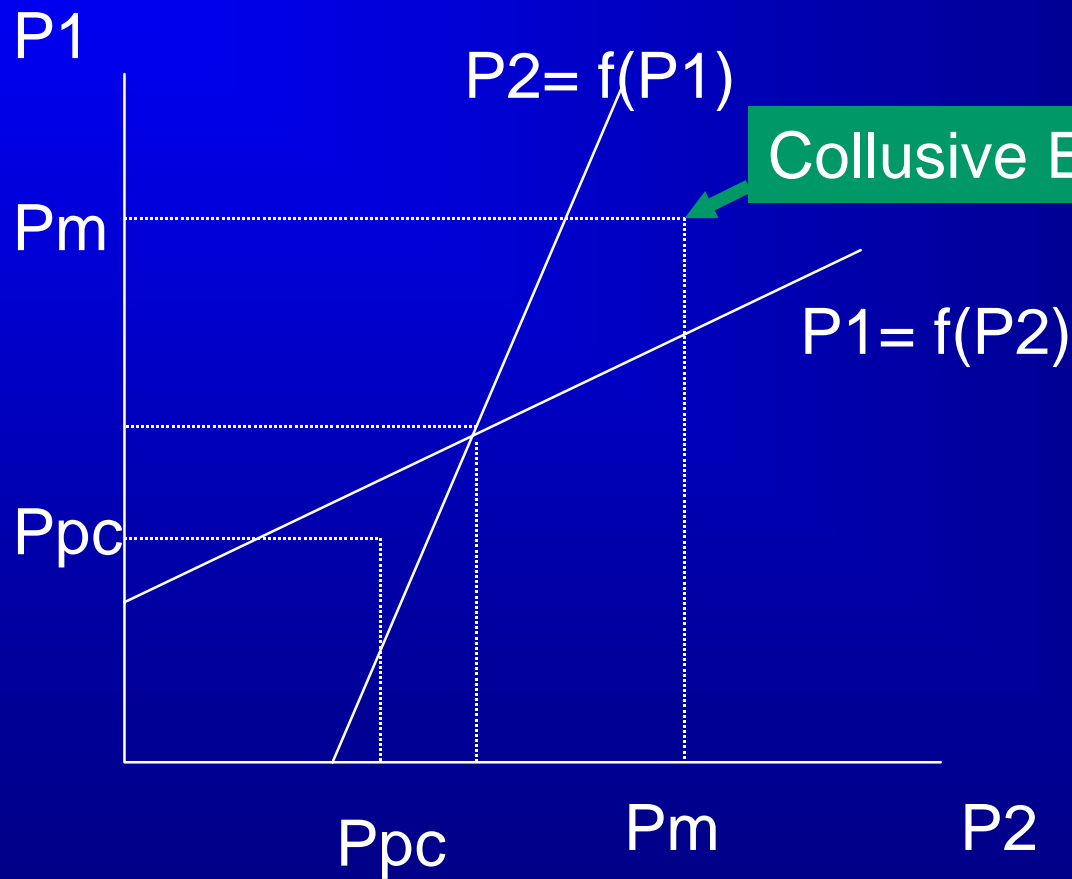


Joseph Bertrand (1883)

- ❖ Bertrand argued that a major problem with the Cournot model is that it failed to make price explicit.
- ❖ He showed that if firms compete on price when goods are homogenous, at least in consumer's eyes, then a price war will develop such that price approaches marginal cost.
- ❖ However, the introduction of differentiation leads to equilibrium closer in spirit to Cournot.



Product Differentiation



And Finally...

- ❖ A summary
- ❖ Have you covered the learning outcomes?
- ❖ Any questions?

