



# Chapter 12

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## Monopolistic Competition and Oligopoly



# Topics to be Discussed

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- Monopolistic Competition
- Oligopoly
- Price Competition
- Competition Versus Collusion: The Prisoners' Dilemma
- Implications of the Prisoners' Dilemma for Oligopolistic Pricing
- Cartels



# Monopolistic Competition

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- Characteristics
  1. Many firms
  2. Free entry and exit
  3. Differentiated, but highly substitutable product

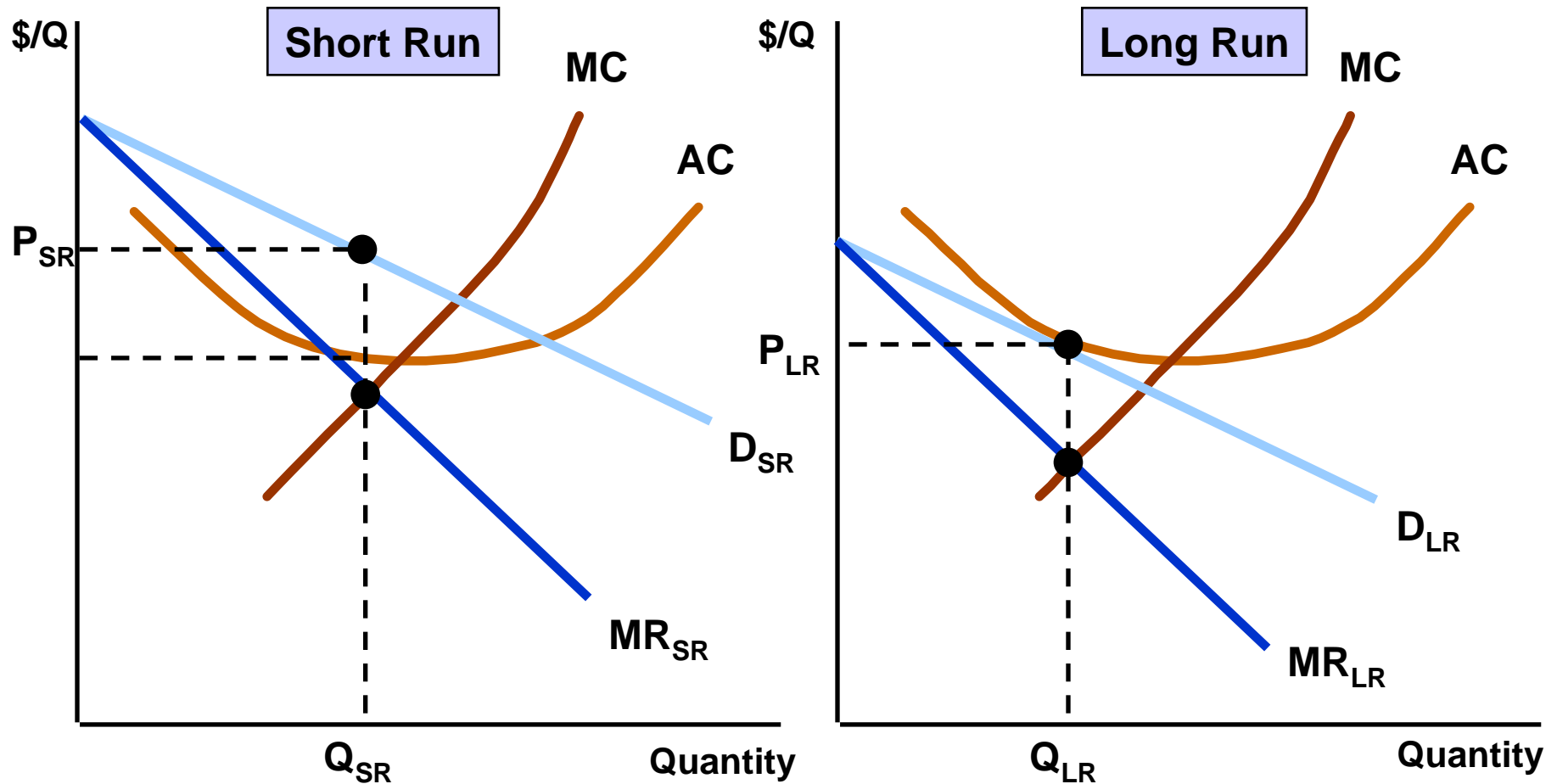


# Monopolistic Competition

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- The amount of monopoly power depends on the degree of differentiation
- Examples of this very common market structure include:
  - Toothpaste
  - Soap
  - Cold remedies

# A Monopolistically Competitive Firm in the Short and Long Run





# A Monopolistically Competitive Firm in the Short and Long Run

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- Short run
  - Downward sloping demand – differentiated product
  - Demand is relatively elastic – good substitutes
  - $MR < P$
  - Profits are maximized when  $MR = MC$
  - This firm is making economic profits

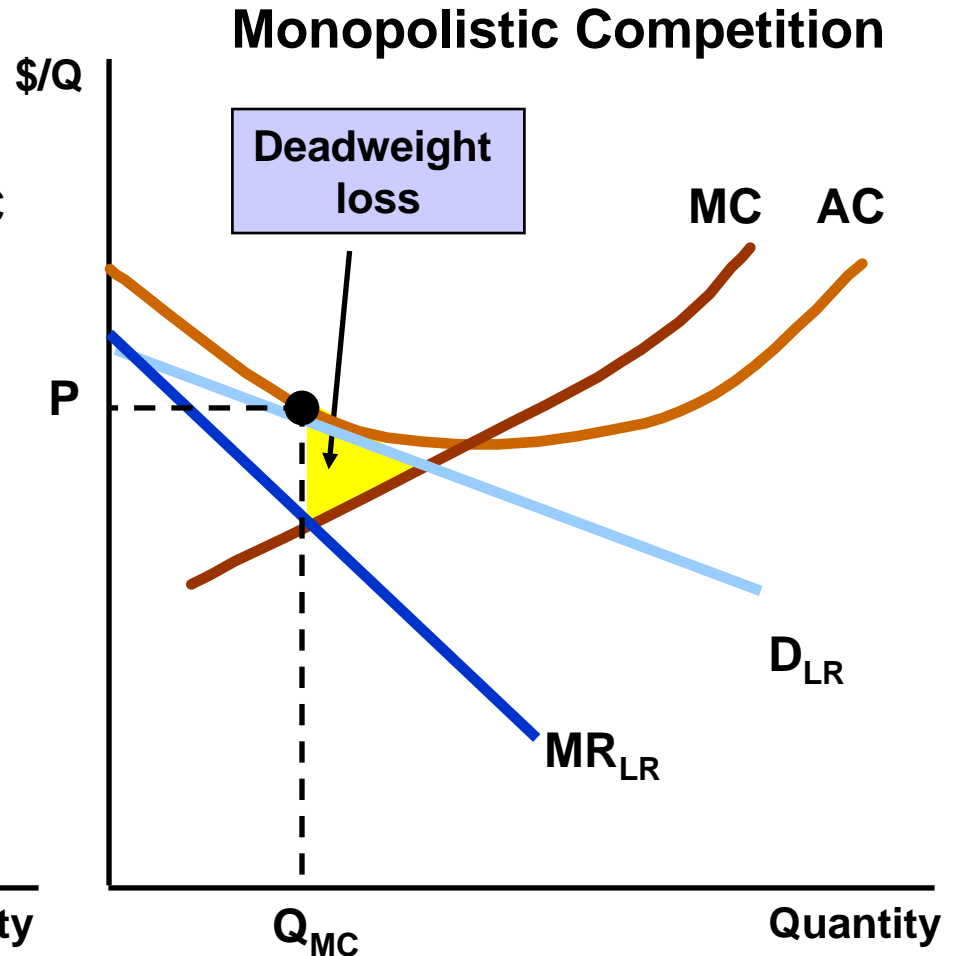
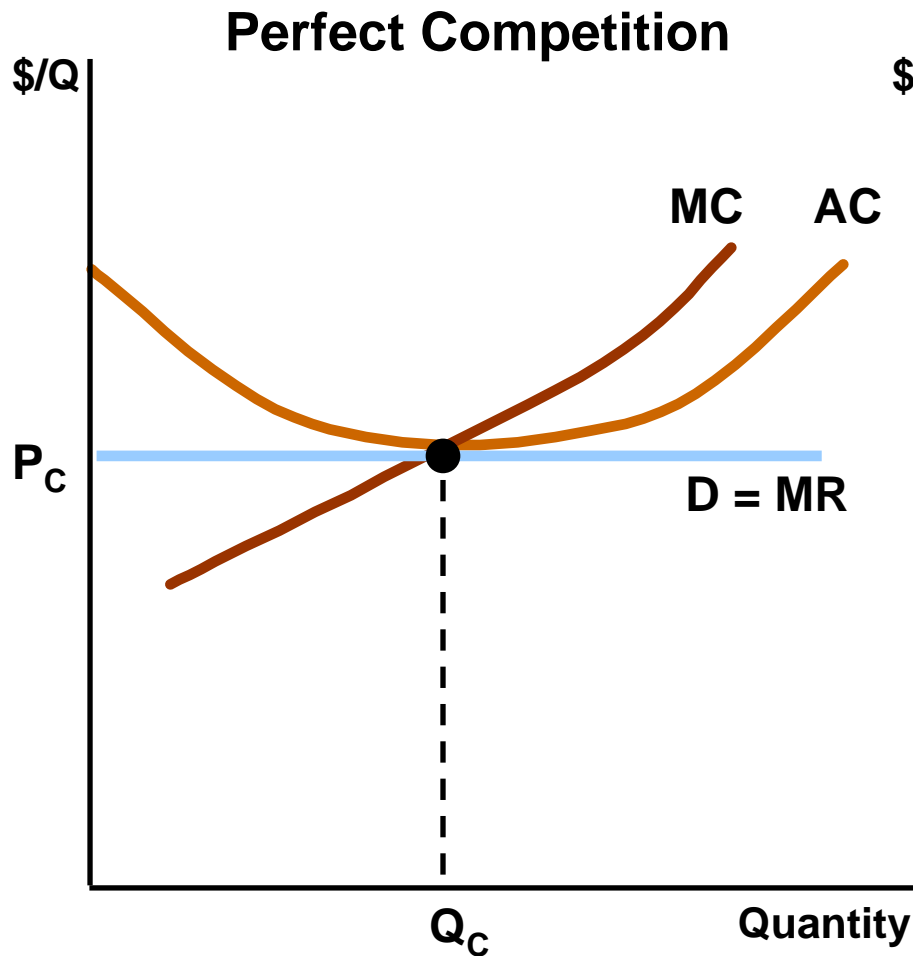


# A Monopolistically Competitive Firm in the Short and Long Run

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- Long run
  - Profits will attract new firms to the industry (no barriers to entry)
  - The old firm's demand will decrease to DLR
  - Firm's output and price will fall
  - Industry output will rise
  - No economic profit ( $P = AC$ )
  - $P > MC \rightarrow$  some monopoly power

# Monopolistically and Perfectly Competitive Equilibrium (LR)





# Monopolistic Competition and Economic Efficiency

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- The monopoly power yields a higher price than perfect competition. If price was lowered to the point where  $MC = D$ , consumer surplus would increase by the yellow triangle – deadweight loss.
- With no economic profits in the long run, the firm is still not producing at minimum AC and excess capacity exists.



# Monopolistic Competition

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- If inefficiency is bad for consumers, should monopolistic competition be regulated?
  - Market power is relatively small. Usually there are enough firms to compete with enough substitutability between firms – deadweight loss small.
  - Inefficiency is balanced by benefit of increased product diversity – may easily outweigh deadweight loss.



# Oligopoly – Characteristics

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- Small number of firms
- Product differentiation may or may not exist
- Barriers to entry
  - Scale economies
  - Patents
  - Technology
  - Name recognition
  - Strategic action (interaction between firms)



# Oligopoly – Equilibrium

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- Actions and reactions are dynamic, evolving over time
- Defining Equilibrium
  - Firms are doing the best they can and have no incentive to change their output or price
  - All firms assume competitors are taking rival decisions into account
- Nash Equilibrium
  - Each firm is doing the best it can *given what its competitors are doing*
- We will focus on **duopoly**
  - Markets in which two firms compete



# Oligopoly

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- The Cournot Model

- Oligopoly model in which firms produce a homogeneous good, each firm treats the output of its competitors as fixed, and all firms decide simultaneously how much to produce
- Firm will adjust its output based on what it thinks the other firm will produce

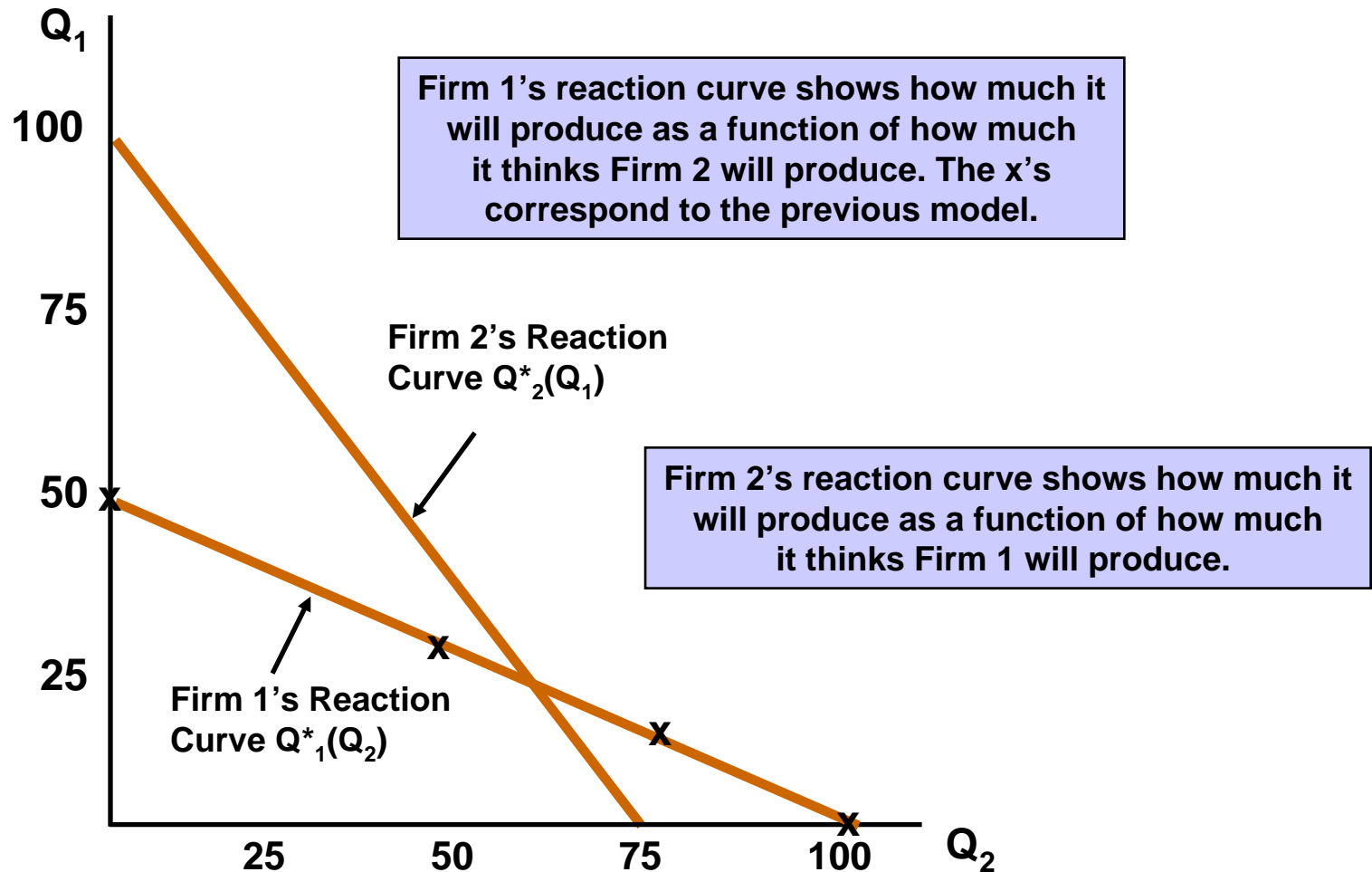


# Oligopoly

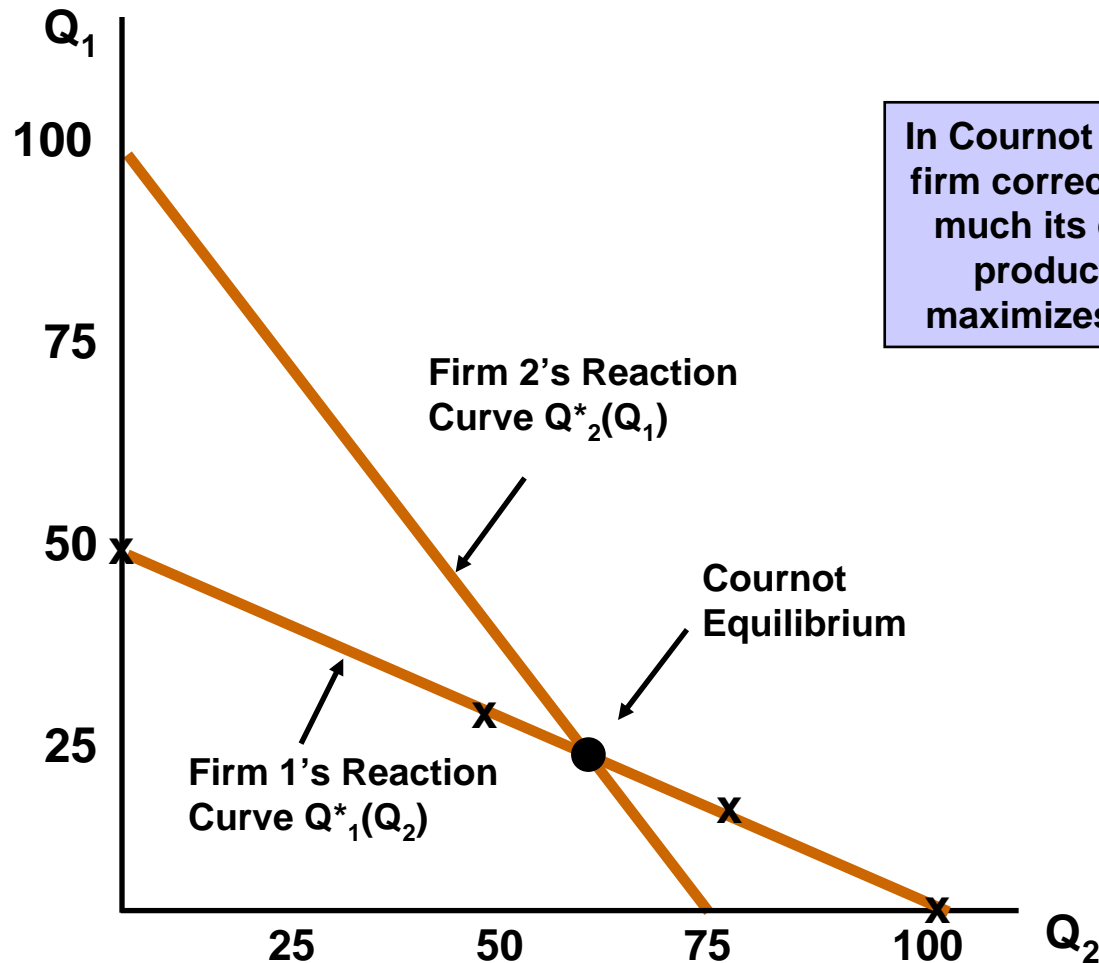
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- The Reaction Curve
  - The relationship between a firm's profit-maximizing output and the amount it thinks its competitor will produce
  - A firm's profit-maximizing output is a decreasing schedule of the expected output of Firm 2

# Reaction Curves and Cournot Equilibrium



# Reaction Curves and Cournot Equilibrium



In Cournot equilibrium, each firm correctly assumes how much its competitors will produce and thereby maximizes its own profits.



# Oligopoly

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- Cournot equilibrium is an example of a Nash equilibrium (Cournot-Nash Equilibrium)
- The Cournot equilibrium says nothing about the dynamics of the adjustment process
  - Since both firms adjust their output, neither output would be fixed

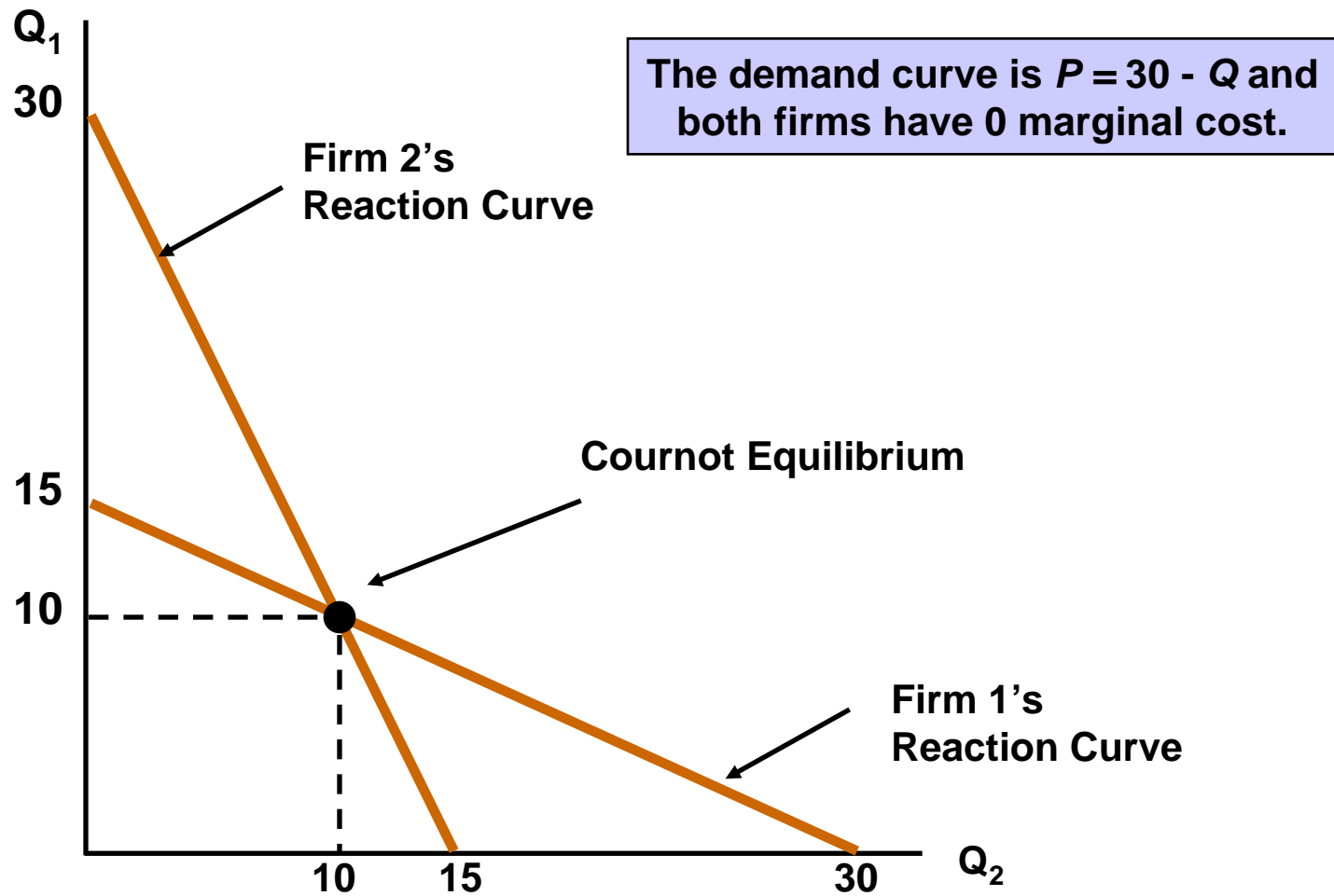


# The Linear Demand Curve

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- An Example of the Cournot Equilibrium
  - Two firms face linear market demand curve
  - We can compare competitive equilibrium and the equilibrium resulting from collusion
  - Market demand is  $P = 30 - Q$
  - $Q$  is total production of both firms:
$$Q = Q_1 + Q_2$$
  - Both firms have  $MC_1 = MC_2 = 0$

# Duopoly Example





## Oligopoly Example

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- Firm 1's Reaction Curve  $\rightarrow$  MR = MC

$$\text{Total Revenue: } R_1 = PQ_1 = (30 - Q)Q_1$$

$$= 30Q_1 - (Q_1 + Q_2)Q_1$$

$$= 30Q_1 - Q_1^2 - Q_2Q_1$$



# Oligopoly Example

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- An Example of the Cournot Equilibrium

$$MR_1 = \Delta R_1 / \Delta Q_1 = 30 - 2Q_1 - Q_2$$

$$MR_1 = 0 = MC_1$$

Firm 1's Reaction Curve

$$Q_1 = 15 - 1/2 Q_2$$

Firm 2's Reaction Curve

$$Q_2 = 15 - 1/2 Q_1$$



# Oligopoly Example

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- An Example of the Cournot Equilibrium

Cournot Equilibrium:  $Q_1 = Q_2$

$$15 - 1/2(15 - 1/2Q_1) = 10$$

$$Q = Q_1 + Q_2 = 20$$

$$P = 30 - Q = 10$$



## Oligopoly Example

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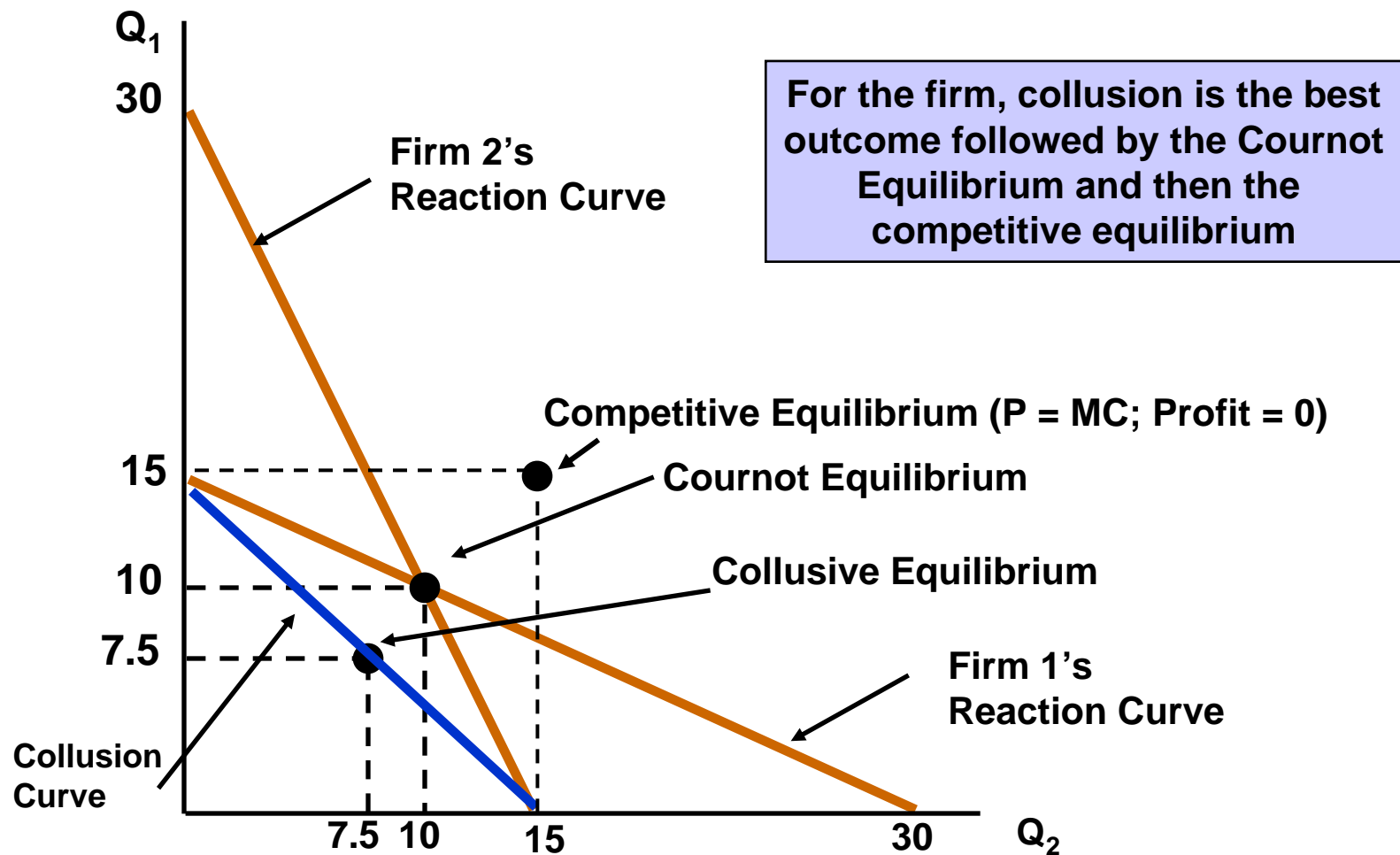
- Profit Maximization with Collusion

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

$$MR = \Delta R / \Delta Q = 30 - 2Q$$

$$MR = 0 \text{ when } Q = 15 \text{ and } MR = MC$$

# Duopoly Example





# First Mover Advantage – The Stackelberg Model

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- Oligopoly model in which one firm sets its output before other firms do
  - Firm 1 sets output first and Firm 2 then makes an output decision seeing Firm 1's output
- Conclusion
  - Going first gives Firm 1 the advantage
  - Firm 1's output is twice as large as Firm 2's
  - Firm 1's profit is twice as large as Firm 2's
- Going first allows Firm 1 to produce a large quantity. Firm 2 must take that into account and produce less unless it wants to reduce profits for everyone.



# Price Competition

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- Competition in an oligopolistic industry may occur with price instead of output
- The **Bertrand Model** is used
  - Oligopoly model in which firms produce a homogeneous good, each firm treats the price of its competitors as fixed, and all firms decide simultaneously what price to charge



# Competition Versus Collusion: The Prisoners' Dilemma

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- Nash equilibrium is a *noncooperative* equilibrium: each firm makes decision that gives greatest profit, given actions of competitors
- Although collusion is illegal, why don't firms cooperate without explicitly colluding?
  - Why not set profit maximizing collusion price and hope others follow?



# Competition Versus Collusion: The Prisoners' Dilemma

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- Competitor is not likely to follow
- Competitor can do better by choosing a lower price, even if they know you will set the collusive level price
- We can use example from before to better understand the firms' choices



# Competition Versus Collusion: The Prisoners' Dilemma

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- An example in game theory, called the Prisoners' Dilemma, illustrates the problem oligopolistic firms face
  - Two prisoners have been accused of collaborating in a crime
  - They are in separate jail cells and cannot communicate
  - Each has been asked to confess to the crime

# Payoff Matrix for Prisoners' Dilemma

		<i>Prisoner B</i>	
		Confess	Don't confess
<i>Prisoner A</i>	Confess	-5, -5	-1, -10
	Don't confess	-10, -1	-2, -2

Would you choose to confess?



# Oligopolistic Markets

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## Conclusions

1. Collusion will lead to greater profits
2. Explicit and implicit collusion is possible
3. Once collusion exists, the profit motive to break and lower price is significant

# Payoff Matrix for the P&G Pricing Problem

*Unilever and Kao*

Charge \$1.40

Charge \$1.50

Charge  
\$1.40

**\$12, \$12**

**\$29, \$11**

*P&G*

**What price should P & G choose?**

Charge  
\$1.50

**\$3, \$21**

**\$20, \$20**



# Observations of Oligopoly Behavior

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1. In some oligopoly markets, pricing behavior in time can create a predictable pricing environment and implied collusion may occur
2. In other oligopoly markets, the firms are very aggressive and collusion is not possible—can lead to price rigidity.



# Cartels

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- Producers in a cartel explicitly agree to cooperate in setting prices and output
- Typically only a subset of producers are part of the cartel and others benefit from the choices of the cartel
- If demand is sufficiently inelastic and cartel is enforceable, prices may be well above competitive levels



# Cartels

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- Examples of successful cartels

- OPEC
- International Bauxite Association
- Mercurio Europeo

- Examples of unsuccessful cartels

- Copper
- Tin
- Coffee
- Tea
- Cocoa



# Cartels

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- To be successful:
  - Total demand must not be very price elastic
  - Either the cartel must control nearly all of the world's supply or the supply of noncartel producers must not be price elastic