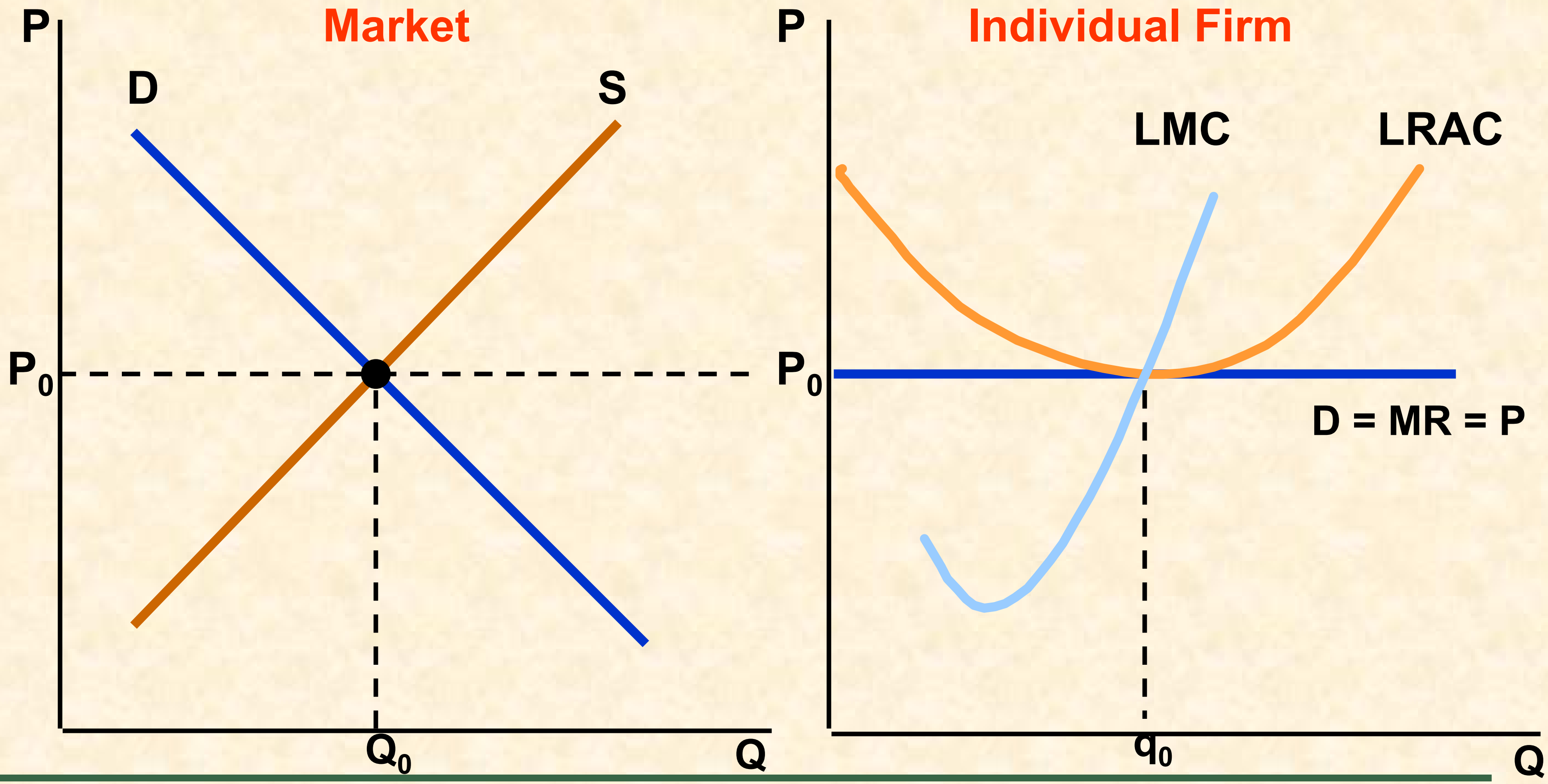
Perfect Competition

- Review of Perfect Competition
  - *P = LMC = LRAC*
  - Normal profits or zero economic profits in the long run
  - Large number of buyers and sellers
  - Homogenous product
  - Perfect information
  - Firm is a price taker

Perfect Competition



Monopoly

- Monopoly

  1) One seller - many buyers

  2) One product (no good substitutes)

  3) Barriers to entry

- The monopolist is the supply-side of the market and has complete control over what is offered for sale.

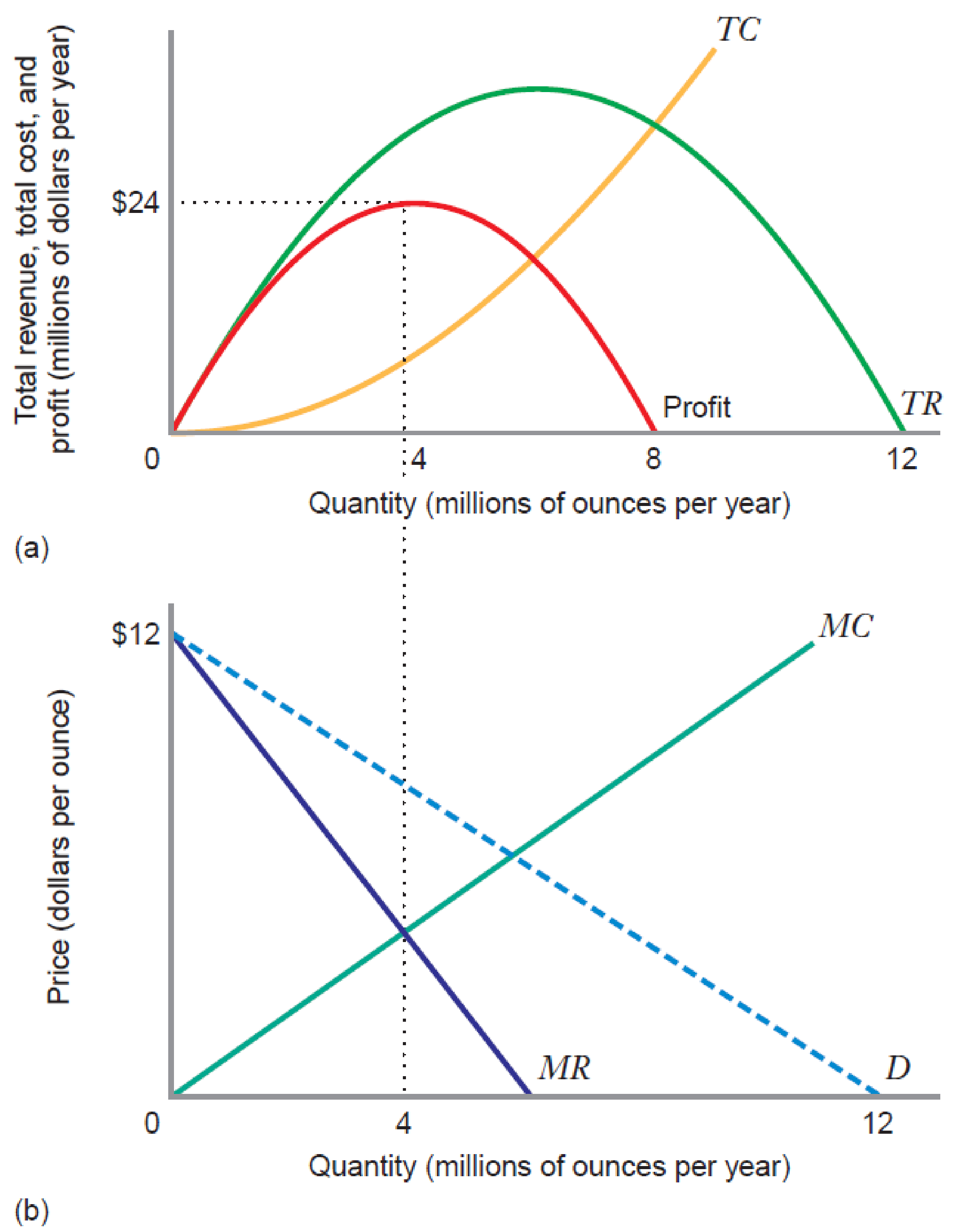
- Profits will be maximized at the level of output where marginal revenue equals marginal cost.

Monopoly

- If the firm produces a quantity at which **MR** > **MC**, the firm cannot be maximizing its profit because it could increase its output and its profit would go up.
- If the firm produces a quantity at which **MR** < **MC**, the firm cannot be maximizing its profit because it could decrease its output and its profit would go up.
- Thus, the only situation at which the monopolist cannot improve its profit by increasing or decreasing output is where marginal revenue equals marginal cost. That is, if Q* denotes **the profit-maximizing** output, then

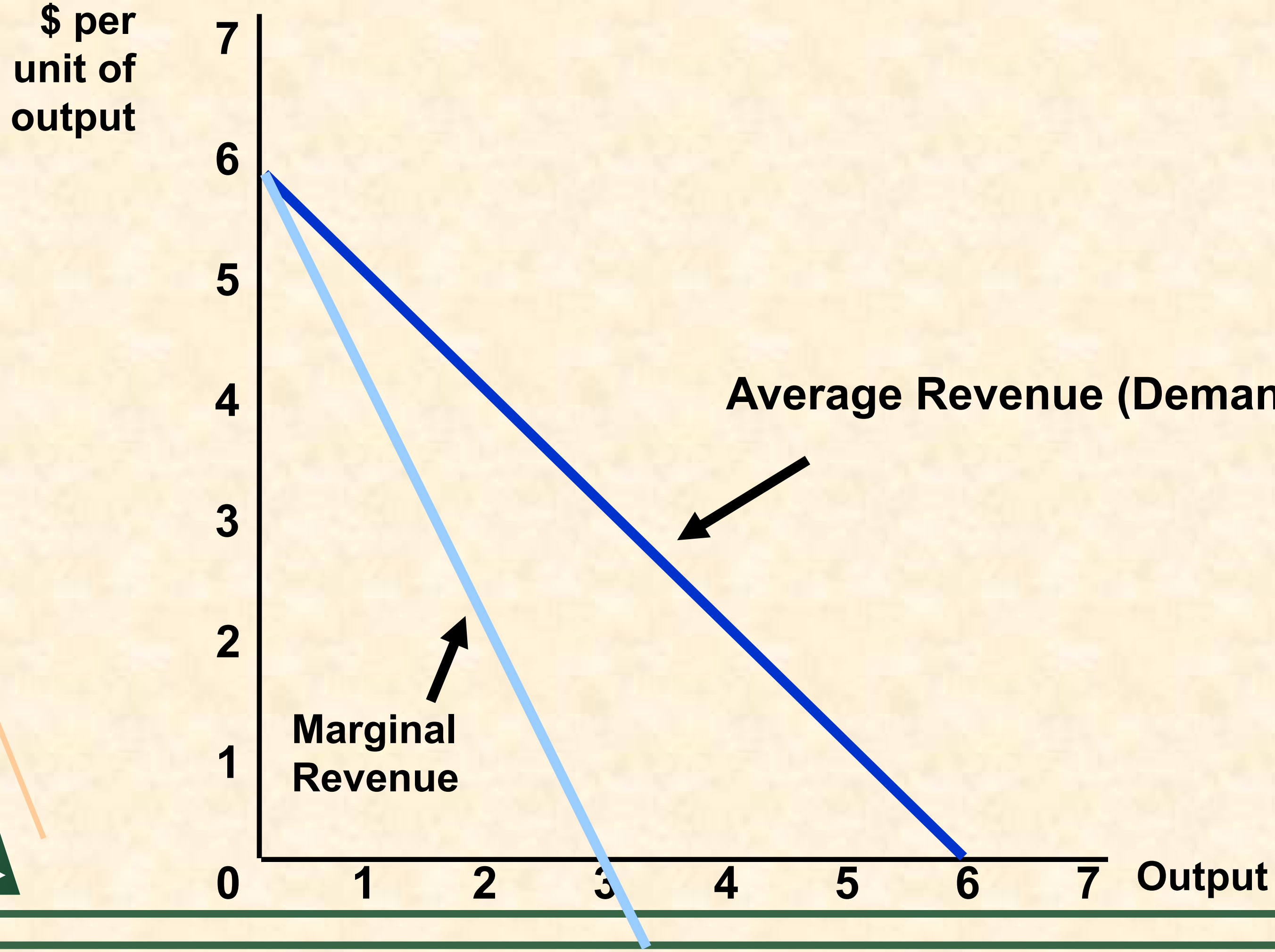
$$\mathbf{MR(Q^*) = MC(Q^*)}$$

$$\mathbf{MR \neq P}$$

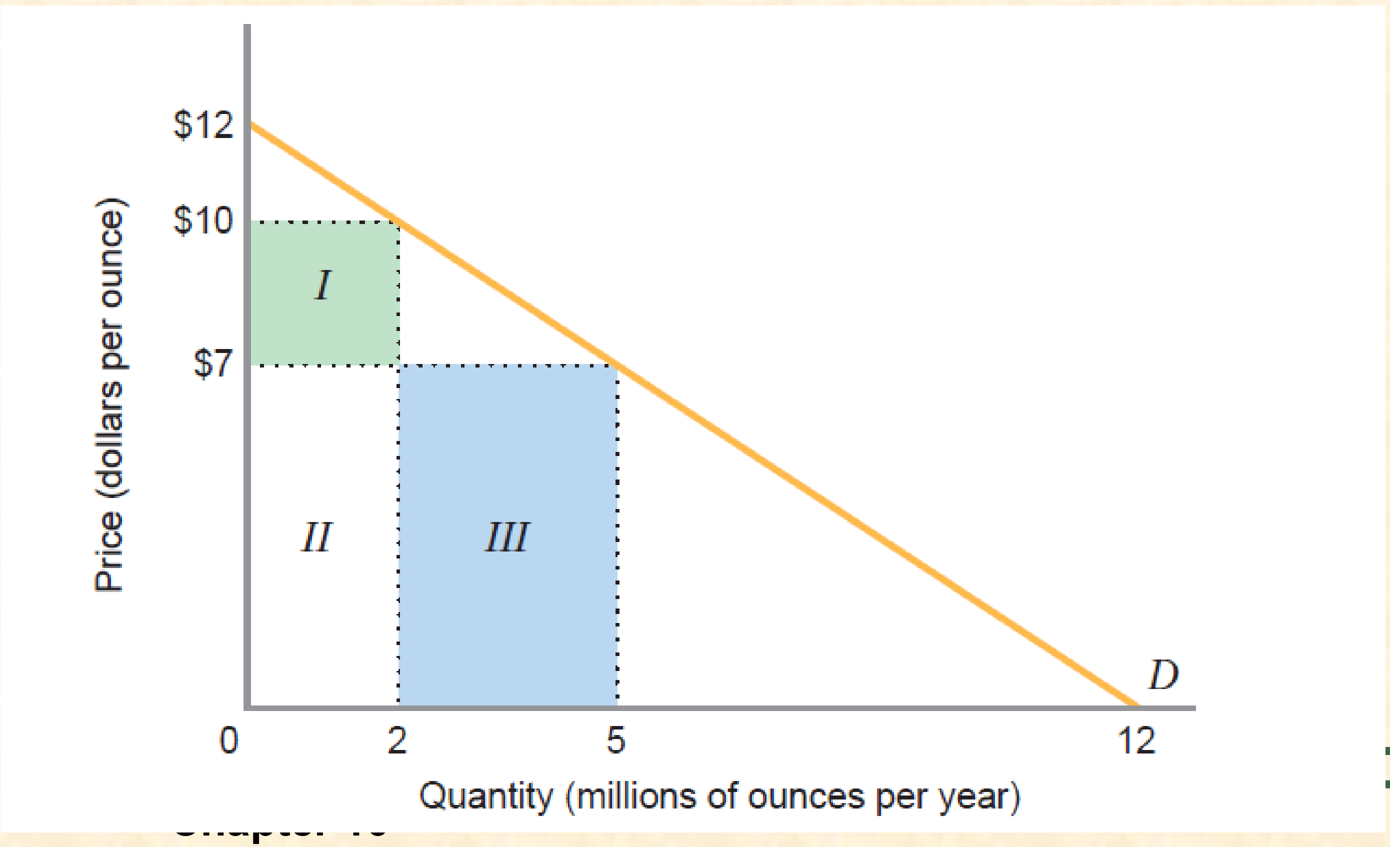


Panel (a): Total cost TC increases as Q increases. Total revenue TR first increases and then decreases,
and so does profit. The monopolist's
profit is maximized at Q = 4 million ounces.
Panel (b): The monopolist's profit-maximization
condition is MR = MC, where the marginal revenue and marginal cost curves intersect.

Average and Marginal Revenue



To increase output from 2 million to 5 million ounces per year, the monopolist must decrease price from $10 to $7 per ounce. The gain in revenue due to the increased output of 3 million units (**the marginal units**) is equal to area III, while the revenue sacrificed on the 2 million units (**the inframarginal units**) it could have sold at the higher price is equal to area I. Thus, the change in total revenue equals area III – area I.



Marginal revenue (MR)

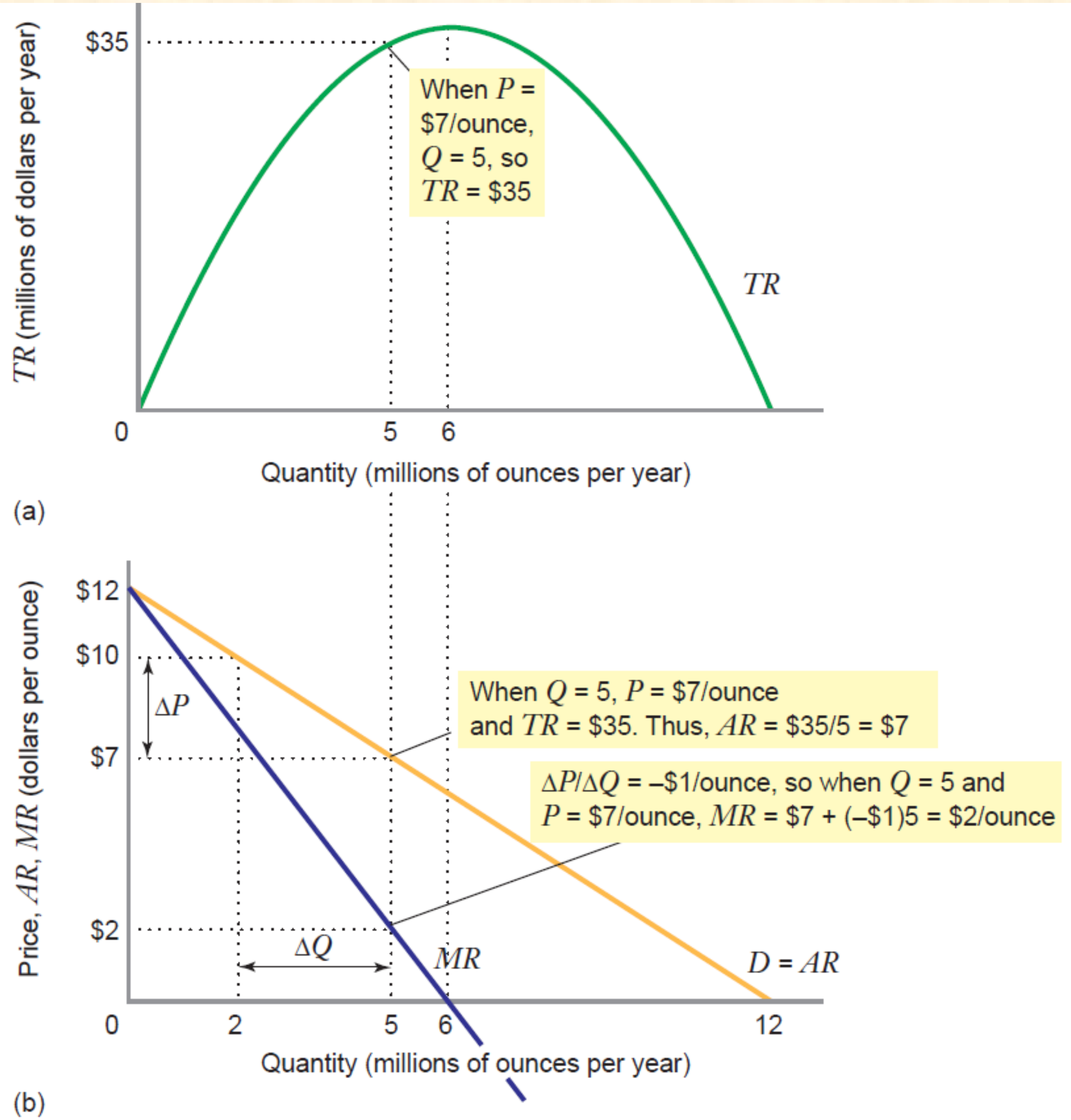
$$MR = \frac{\Delta TR}{\Delta Q} = \frac{P\Delta Q + Q\Delta P}{\Delta Q} = P + Q\frac{\Delta P}{\Delta Q}$$

MR consists of two parts:

- The first part, P, corresponds to the increase in revenue due to higher volume—the **marginal units**
- The second part, which is negative, since ΔP is negative), corresponds to the decrease in revenue due to the reduced price of the **inframarginal** units and than MR < P   => the marginal revenue is less than the price the monopolist can charge to sell that quantity, for any quantity greater than 0

  when Q= 0 than MR = P

Average and marginal revenue



<u>Panel (a):</u> Total revenue $TR = PxQ = 7x5 = \$35$ million per year.

<u>Panel (b):</u> Average revenue $AR = TR/Q = 35/5 = \$7$ per ounce.

Marginal revenue $MR = P + Q(\Delta P/\Delta Q) = 7 + 5(-1) = \$2$ per ounce.

The total revenue curve in panel (a) reaches its maximum when $Q = 6$, the same quantity at which $MR = 0$ in panel (b).

AR=P

- Marginal revenue is less than price ($MR < P$).
- Because average revenue is equal to price, marginal revenue is less than average revenue ($MR < AR$).
- Since the average revenue curve coincides with the demand curve, the marginal revenue curve must lie below the demand curve.

The relationship between average revenue and marginal revenue is consistent with other average–marginal relationship. When the average of something is falling, the marginal of that thing must be below the average. Because market demand slopes downward (i.e., is falling) and the average revenue curve corresponds to the demand curve, the marginal revenue curve must be below the average revenue curve.

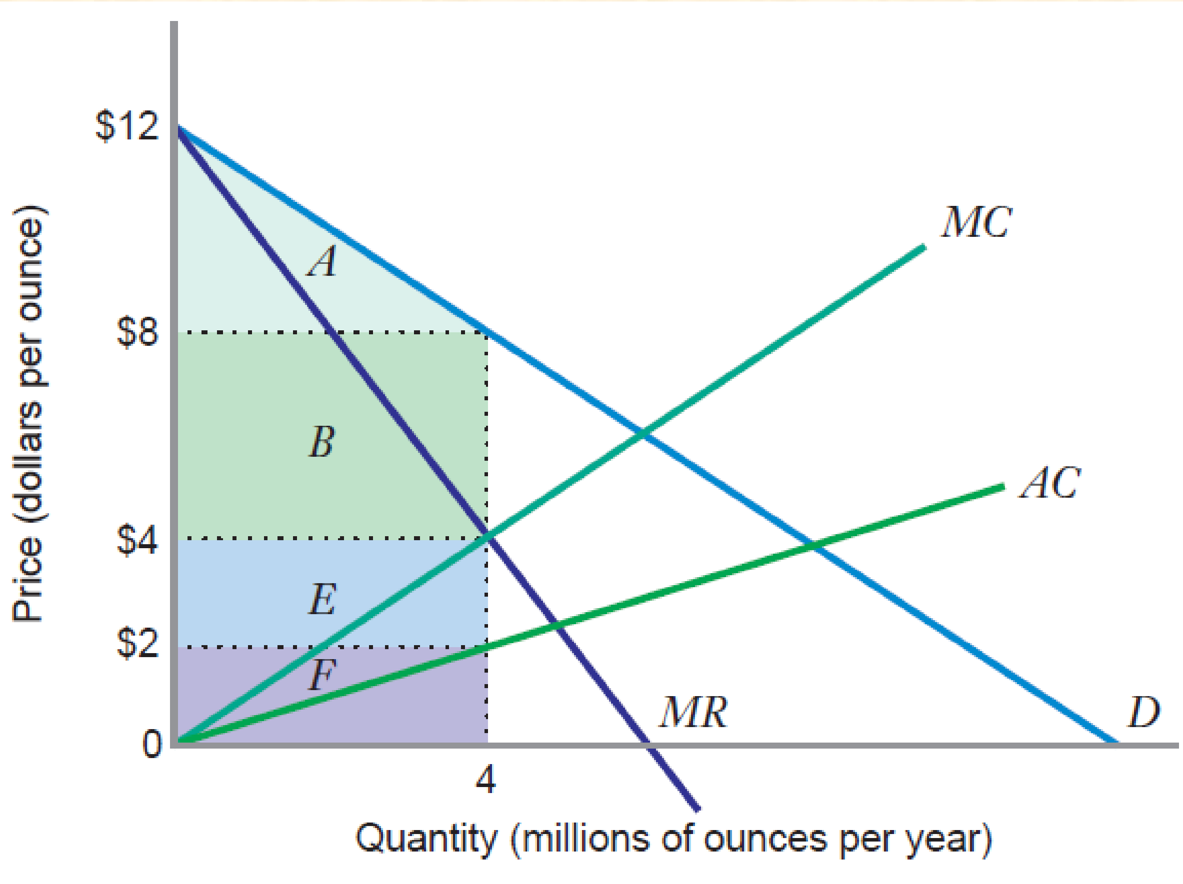
Marginal and Average Revenue for a Linear Demand Curve

- Suppose that the equation of the market demand curve is:

$$P = a - b*Q$$

- What are the expressions for the AR and MR curves?

Profit maximization condition



The profit-maximizing output is 4 million ounces per year, where **MC=MR**. To sell that output, the monopolist will set a price of $8 per ounce (as indicated by the demand curve D). **Total revenue** is areas **B+E+F**. **Total cost** is area **F**. **Profit** (total revenue minus total cost) is areas **B+E**. **Consumer surplus** is area **A**.

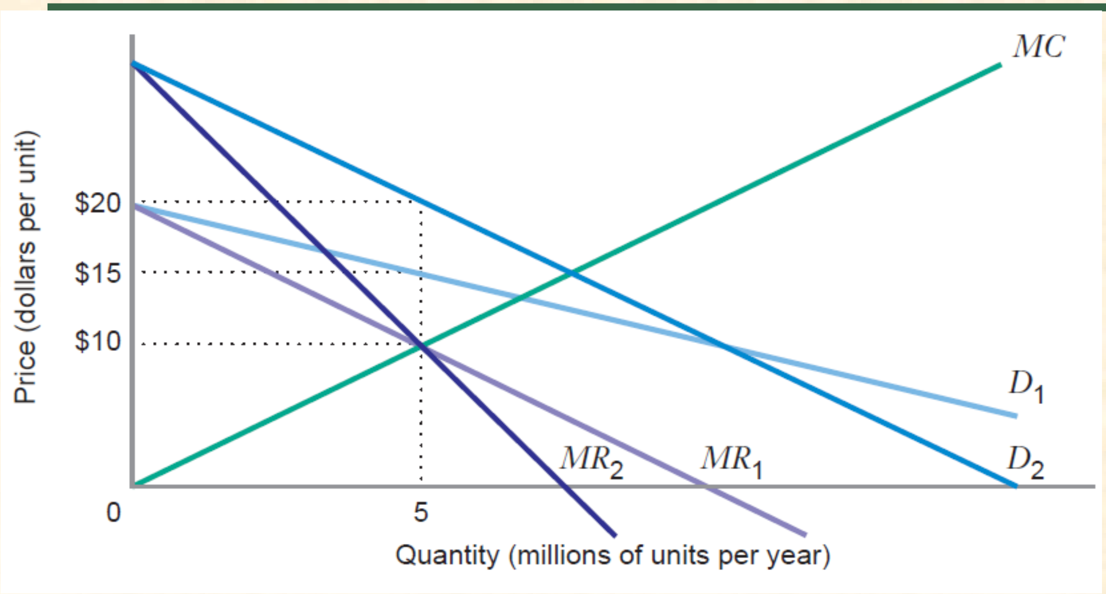
Marginal and Average Revenue for a Linear Demand Curve

- Suppose that the equation of the market demand curve is:

$$P = 12 - Q$$

- if MC=Q What are the profit-maximizing quantity and price for the monopolist?

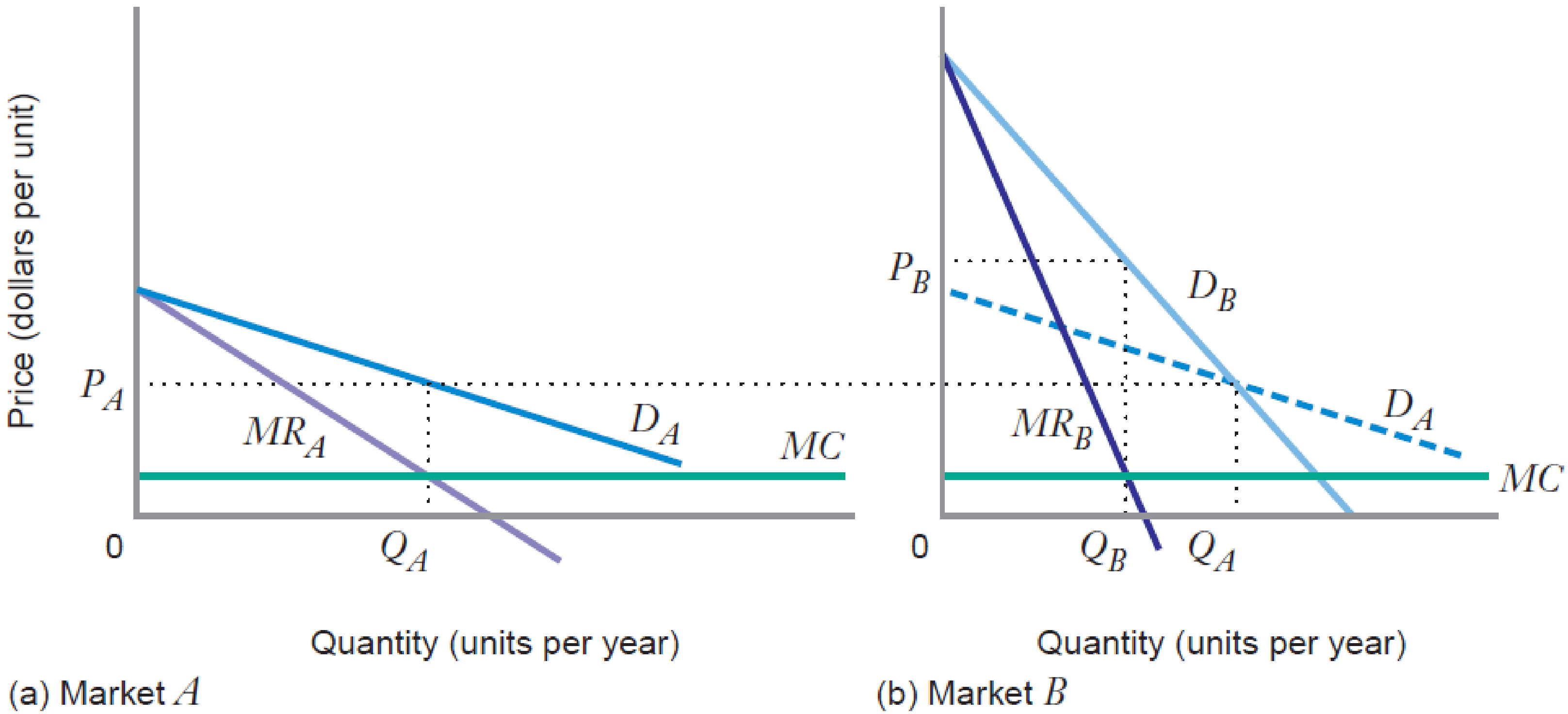
A monopolist does not have a supply curve



When the demand curve is D_1, the monopolist's profit-maximizing quantity is 5 and the profit-maximizing price is $15.
When the demand curve is D_2, the profit-maximizing quantity is also 5, but the profit-maximizing price is $20. ***Thus, the monopolist might sell the same quantity at different prices, depending on demand.***

- For the monopolist, however, price is **endogenous**, not exogenous

Price elasticity of demand and profit-maximazing price

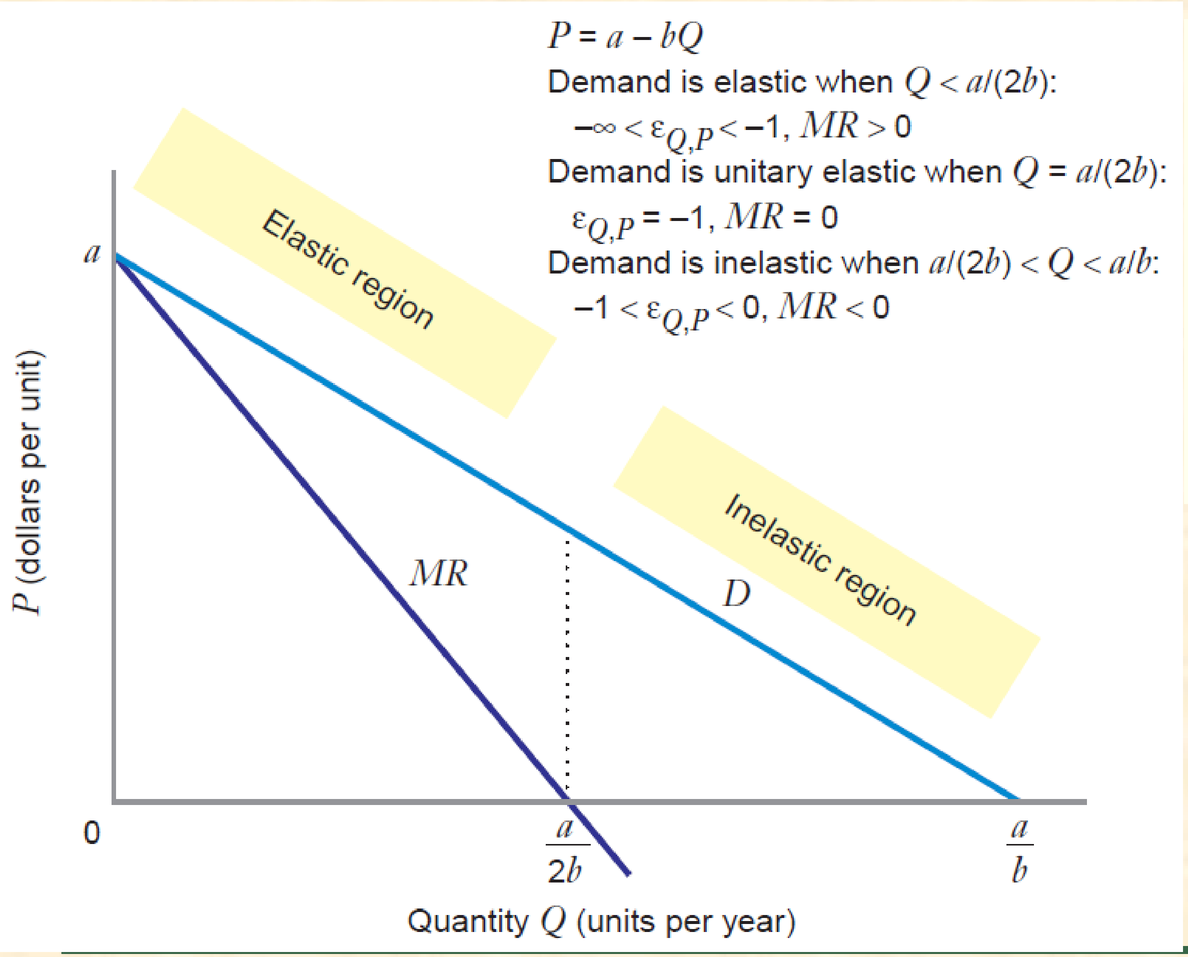


In market A, the profit-maximizing price is P_A. In market B, where demand is less price elastic at the price P_A, the profit-maximizing monopoly price is P_B. The difference between the profit-maximizing price and the marginal cost MC is smaller when demand is more price elastic.

Price elasticity of demand and profit-maximazing price

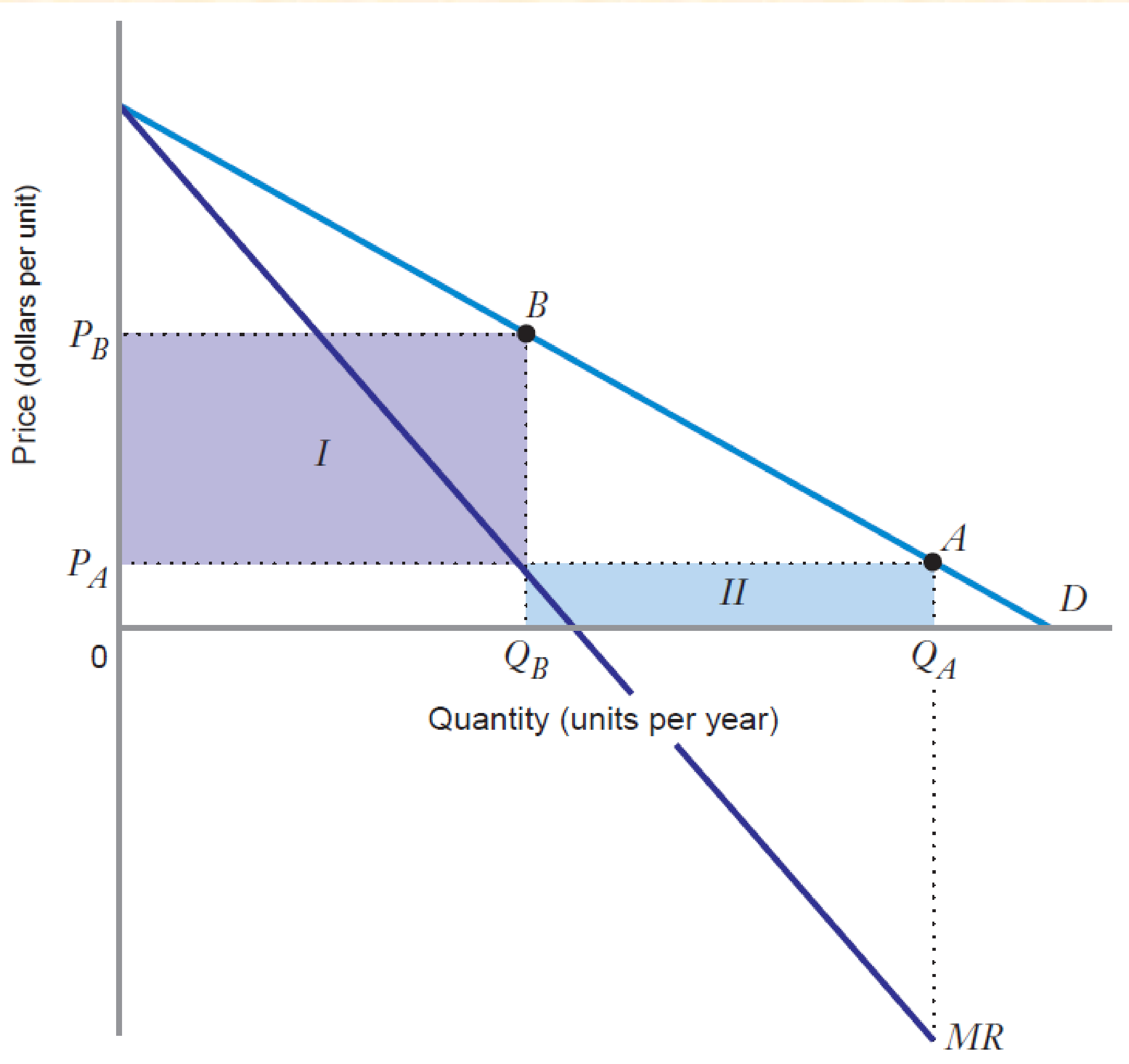
Region of Demand Curve	Relationship between: Marginal Revenue and $\epsilon_{Q,P}$	Relationship between: Total Revenue and Price
Elastic ($-\infty < \epsilon_{Q,P} < -1$)	$MR > 0$ [because $1 + (1/\epsilon_{Q,P}) > 0$]	The monopolist can increase total revenue by decreasing price (and thereby increasing quantity) by a small amount.
Unitary elastic ($\epsilon_{Q,P} = -1$)	$MR = 0$ [because $1 + (1/\epsilon_{Q,P}) = 0$]	The monopolist's total revenue will not change when price (or quantity) is changed by a small amount.
Inelastic ($-1 < \epsilon_{Q,P} < 0$)	$MR < 0$ [because $1 + (1/\epsilon_{Q,P}) < 0$]	The monopolist can increase total revenue by increasing price (and thereby decreasing quantity) by a small amount.

Marginal Revenue and Price Elasticity of Demand for a Linear Demand Curve



Where demand is elastic, marginal revenue is positive. Where demand is unitary elastic, marginal revenue is zero (i.e., MR crosses the horizontal axis). Where demand is inelastic, marginal revenue is negative.

Monopolist produces on the elastic region of the market demand curve



At point A, on the inelastic region of the demand curve D, the monopolist is charging price P_A, and selling quantity Q_A. If the monopolist raises price to P_B and decreases quantity to Q_B, thereby moving to point B on the elastic region of the demand curve, total revenue increases by area I - area II, and total costs go down because the monopolist is producing less. Thus, the monopolist's profits must go up.

Monopoly

- Observations
  - Shifts in demand usually cause a change in both price and quantity.
  - A monopolistic market has no supply curve.
  - Monopolist may supply many different quantities at the same price.
  - Monopolist may supply the same quantity at different prices.

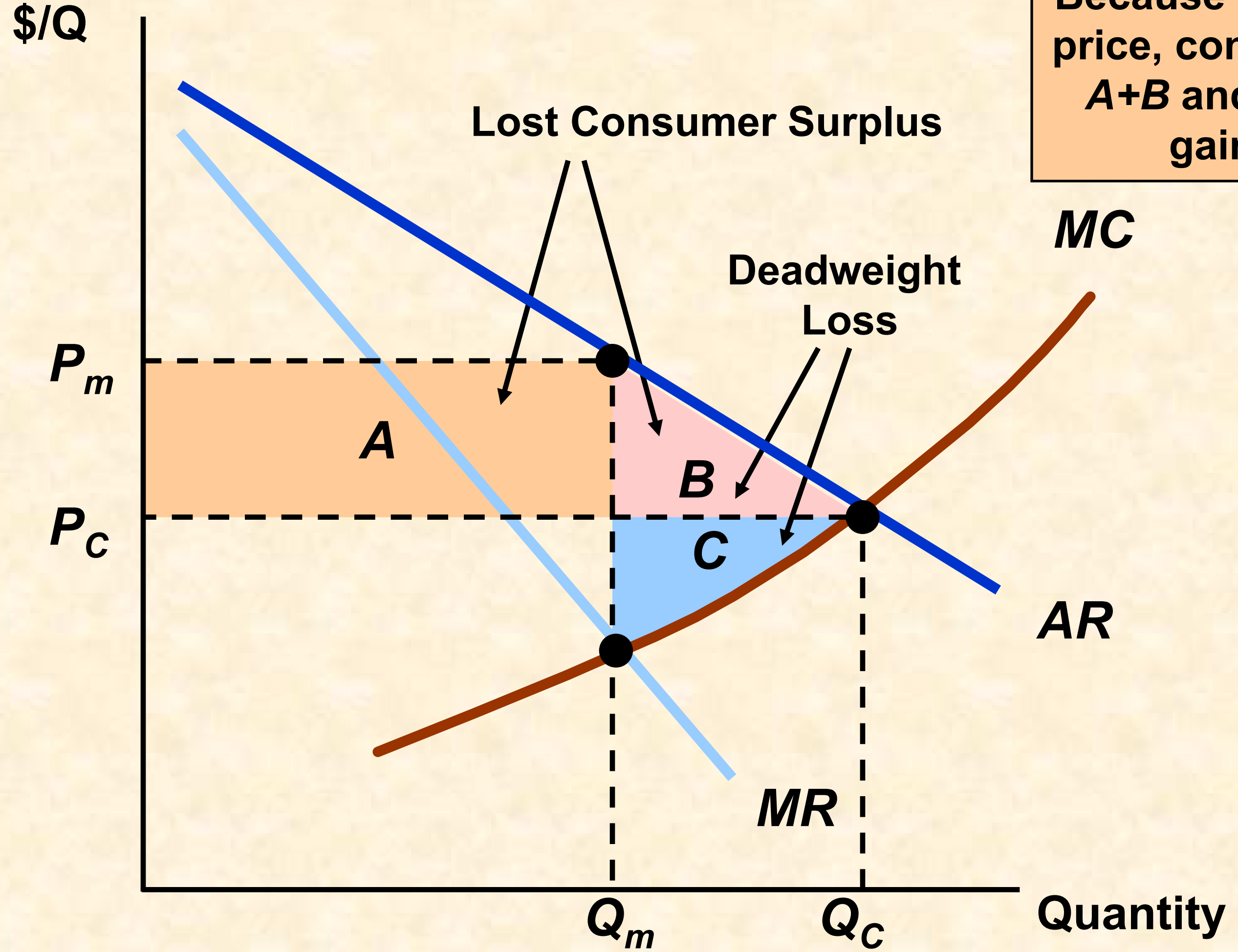
Measuring Monopoly Power

- Monopoly is rare. However, a market with several firms, each facing a downward sloping demand curve will produce so that price exceeds marginal cost.
- In perfect competition: $P = MR = MC$
- Monopoly power: $P > MC$

Measuring Monopoly Power

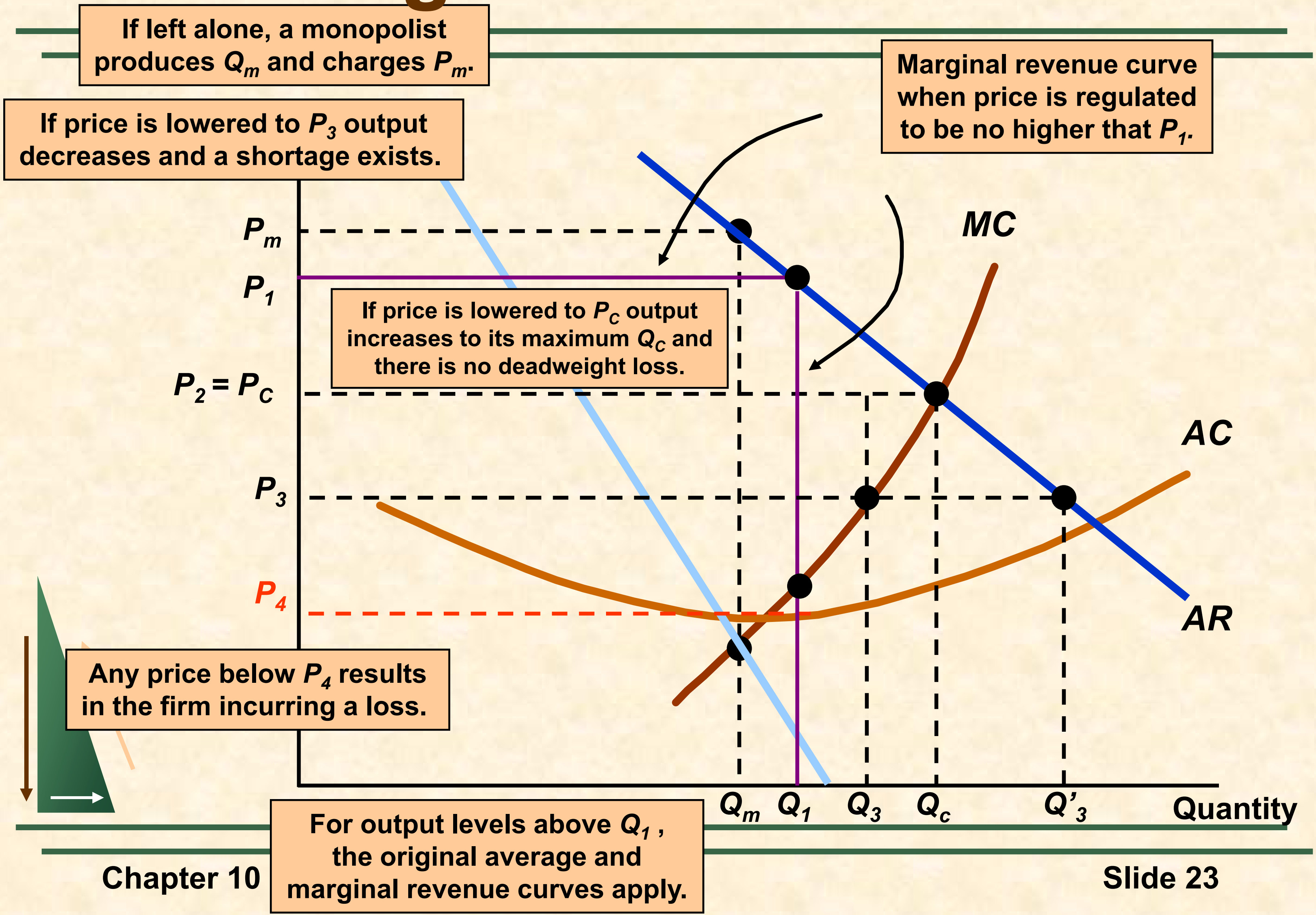
- Lerner's Index of Monopoly Power
  - $L = (P - MC)/P$, where the larger the value of L (between 0 and 1) the greater the degree of monopoly power.
  - $L = (P - MC)/P = -1/E_d$, where E_d is elasticity of demand for a firm
- Monopoly power does not guarantee profits. Profit depends on average cost relative to price.

Social Cost of Monopoly: DWL

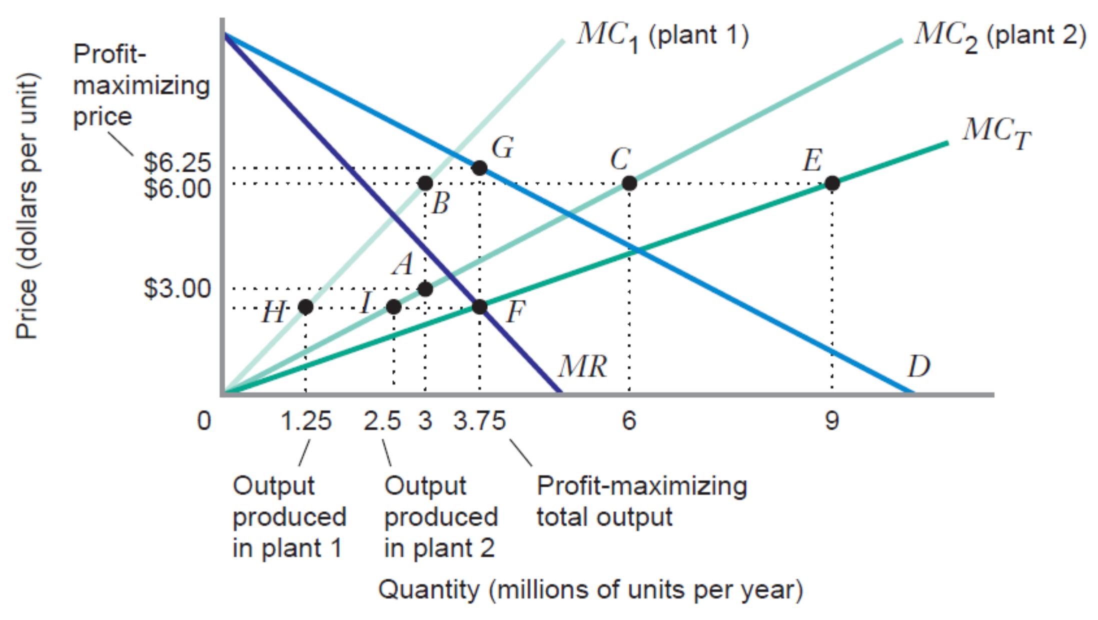


Because of the higher price, consumers lose *A+B* and producer gains *A-C.*

Price Regulation



OUTPUT CHOICE WITH TWO PLANTS



The monopolist's multiplant marginal cost curve MCT is the horizontal sum of the individual plant's marginal cost curves MC_1 and MC_2. The monopolist's optimal total output of 3.75 million units per year occurs at MR =MCT, where the optimal price is $6.25 per unit. Plant 1 produces 1.25 million units of the total output, and plant 2 produces 2.5 million units.

Multiplant Monopolist

- **Suppose a monopolist faces a demand curve given by $P = 120 - 3Q$. The monopolist has two plants. The first has a marginal cost curve given by $MC_1 = 10 + 20Q1$, and the second plant's marginal cost curve is given by $MC_2 = 60 + 5Q2$**

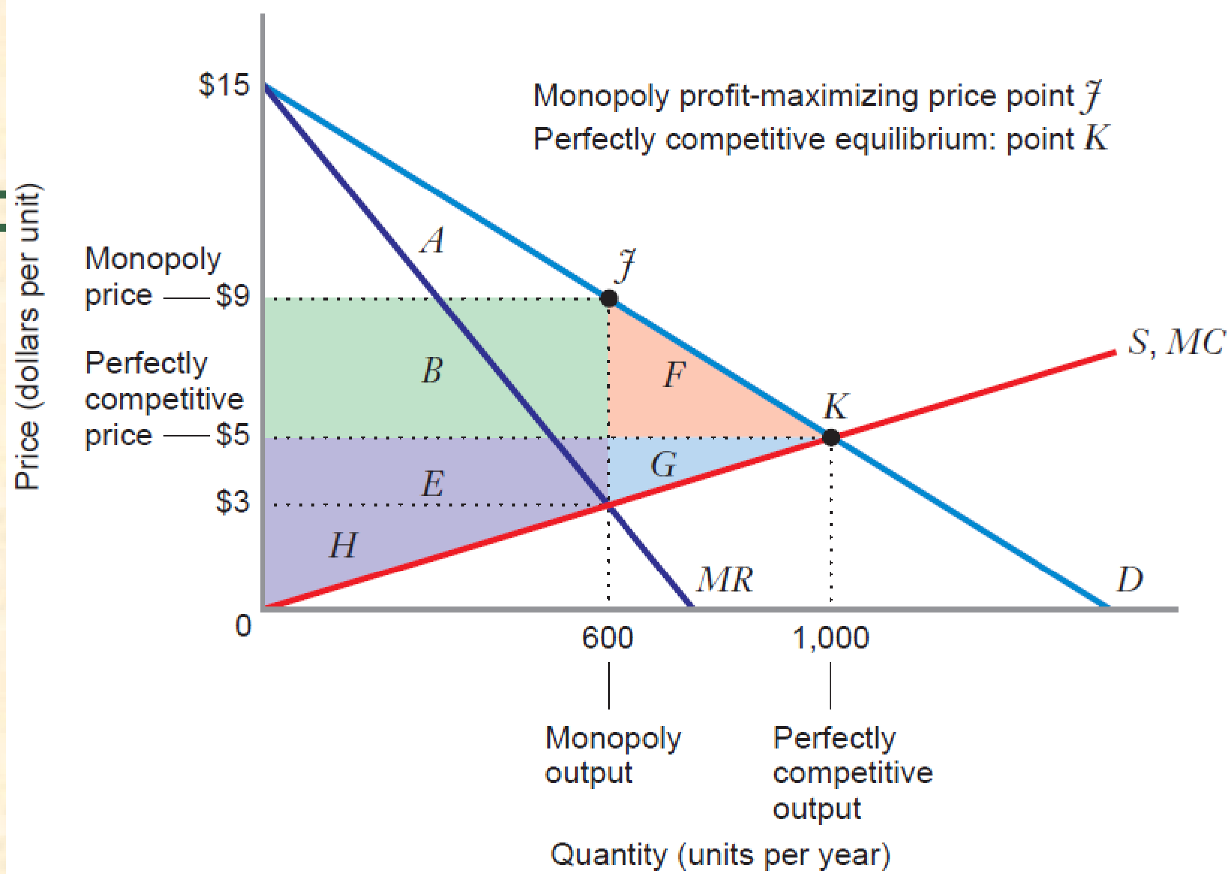
(a) Find the monopolist's optimal total quantity and price.

(b) Find the optimal division of the monopolist's quantity between its two plants.

OUTPUT CHOICE WITH TWO MARKETS

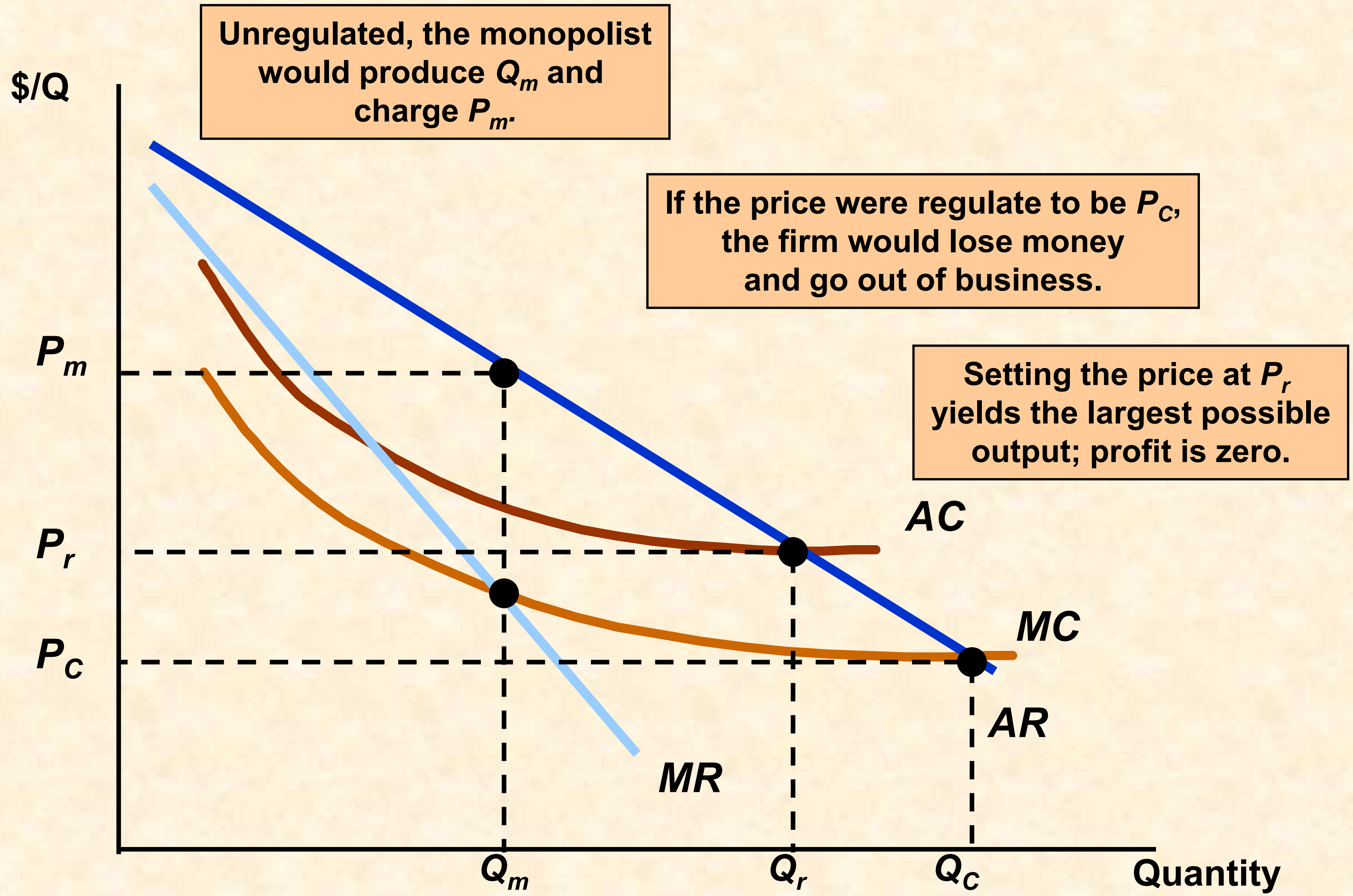
- **Sky Tour is the only firm allowed to provide parasailing service on an island in the Caribbean. The firm knows that there are two types of customers: those visiting the island on business and those on vacation. The firm can charge whatever price it wishes for a parasailing trip, but it is required to charge the same price P to all customers. The demand for a parasailing trip by business customers is Q1(P) = 180 - P. The demand by customers on vacation is Q2(P) = 120 - P. The firm's marginal cost of providing a parasailing trip is MC(Q) = 30.**

(a) How many trips will the firm provide, and what price will the firm charge if it wishes to maximize profits?



	Perfect Competition	Monopoly	Impact of Monopoly
Consumer surplus	$A + B + F$	A	$-B - F$
Producer surplus	$E + G + H$	$B + E + H$	$B - G$
Net economic benefit	$A + B + E + F + G + H$	$A + B + E + H$	$-F - G$

Natural Monopoly: Price Regulation



Natural Monopoly: Regulation in Practice

- Regulation in Practice
  - It is very difficult to estimate the firm's cost and demand functions because they change with evolving market conditions
  - An alternative pricing technique = *rate-of-return regulation* allows the firms to set a maximum price based on the expected rate or return that the firm will earn.
  - Using this technique requires hearings to arrive at the respective figures.

Limiting Market Power: Antitrust Laws

- Sherman Act (1890)
  - Section 1 prohibits contracts, combinations or conspiracies in restraint of trade
    - Explicit agreement to restrict output or fix prices
    - Implicit collusion through parallel conduct
  - Section 2 makes it illegal to monopolize or attempt to monopolize a market and prohibits conspiracies that result in monopolization.

Limiting Market Power: Antitrust Laws

Examples of Illegal Combinations

- 1983: Six companies and six executives indicted for price of copper tubing
- 1996: Archer Daniels Midland (ADM) pleaded guilty to price fixing for lysine - three sentenced to prison in 1999
- 1999: Roche A.G., BASF A.G., Rhone-Poulenc and Takeda pleaded guilty to price fixing of vitamins - fined more than $1 billion.

Limiting Market Power: Antitrust Laws

- Clayton Act (1914)

  1) Makes it unlawful to require a buyer or lessor not to buy from a competitor

  2) Prohibits predatory pricing

  3) Prohibits mergers and acquisitions if they "substantially lessen competition" or "tend to create a monopoly"

- Robinson-Patman Act (1936): Prohibits price discrimination if it is likely to injure the competition

Limiting Market Power: Antitrust Laws

- Federal Trade Commission Act (1914, amended 1938, 1973, 1975)
  1) Created the Federal Trade Commission (FTC)
  2) Prohibitions against deceptive advertising, labeling, agreements with retailer to exclude competing brands

Limiting Market Power: Antitrust Laws

- Antitrust laws are enforced three ways:

1) Antitrust Division of the DOJ: a part of the executive branch (the administration can influence enforcement). Fines levied on businesses; fines and imprisonment levied on individuals.

2) FTC: enforces through voluntary understanding or formal commission order.

3) Private Proceedings: Lawsuits for damages. Plaintiff can receive *treble* damages.