

INTRODUCTORY ECONOMICS: LECTURE 6

Competitive, Monopolistic, and Monopolistically Competitive Markets



Highlights

- *Perfect competition*
- *Output decision of competitive firm*
- *Shut-down decision*
- *Supply curve of a competitive firm*
- *Long-run equilibrium*
- *Monopoly output and pricing rule*
- *Deadweight loss of monopoly*

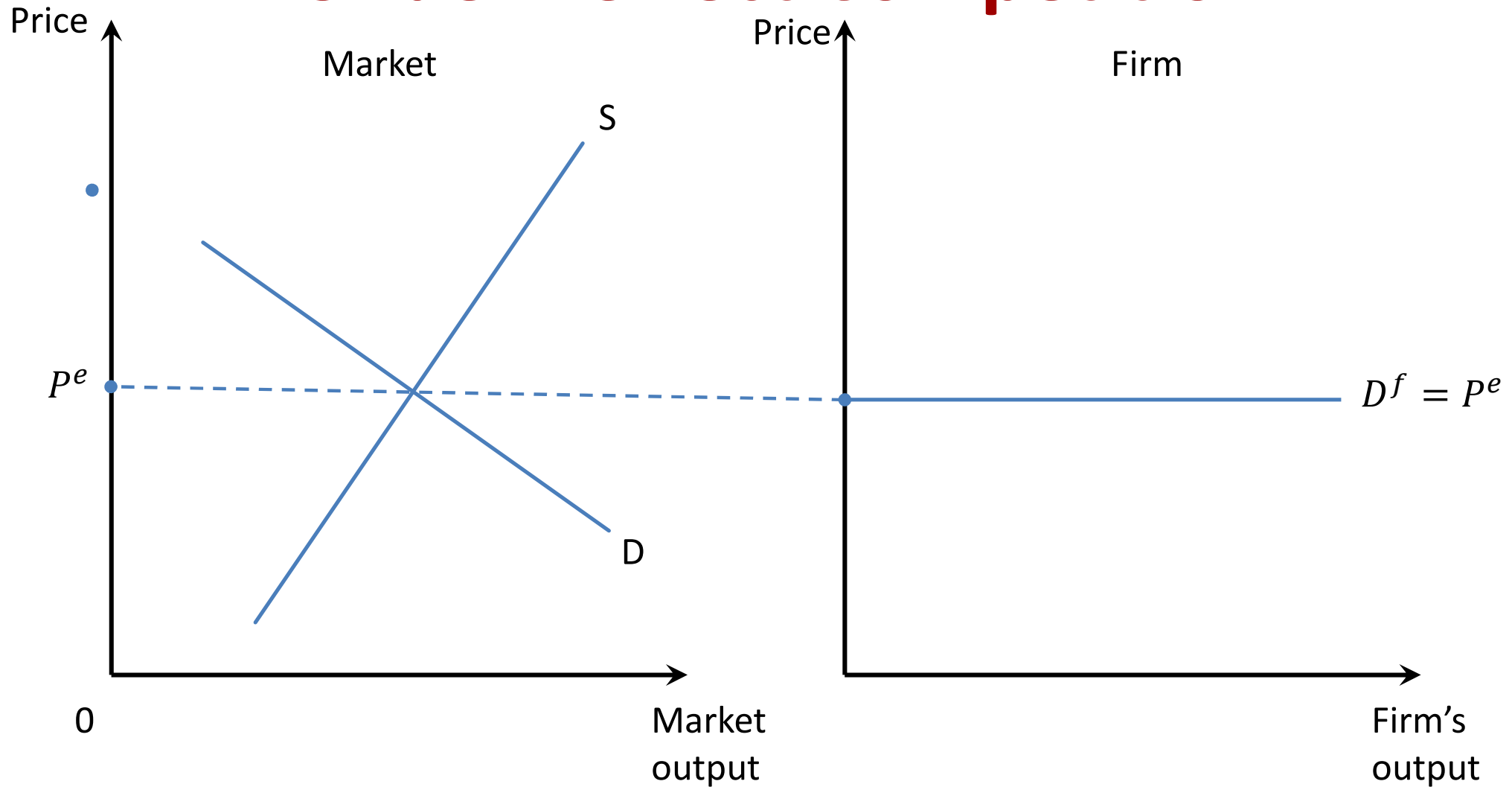
Introduction: A Scenario

- Three years after graduating, you run your own business.
- You must decide how much to produce, what price to charge, how many workers to hire, *etc.*
- What factors should affect these decisions?
 - Your costs (studied in preceding chapter)
 - How much competition you face
- We begin by studying the behavior of firms in perfectly competitive markets.

Perfect Competition

- **Perfectly competitive markets** are characterized by:
 - The interaction between many buyers and sellers that are “small” relative to the market.
 - Each firm in the market produces a homogeneous (identical) product.
 - Buyers and sellers have perfect information.
 - No transaction costs.
 - Free entry into and exit from the market.
- The implications of these conditions are:
 - a single market price is determined by the interaction of demand and supply
 - firms earn zero economic profits in the long run.

Demand at the Market and Firm Levels Under Perfect Competition



Short-Run Output Decisions

- The short run is a period of time over which some factors of production are fixed.
- To maximize short-run profits, managers must take as given the fixed inputs (and fixed costs), and determine how much output to produce by changing the variable inputs.

Revenue of a Competitive Firm

- Total revenue (TR)

$$TR = P \times Q$$

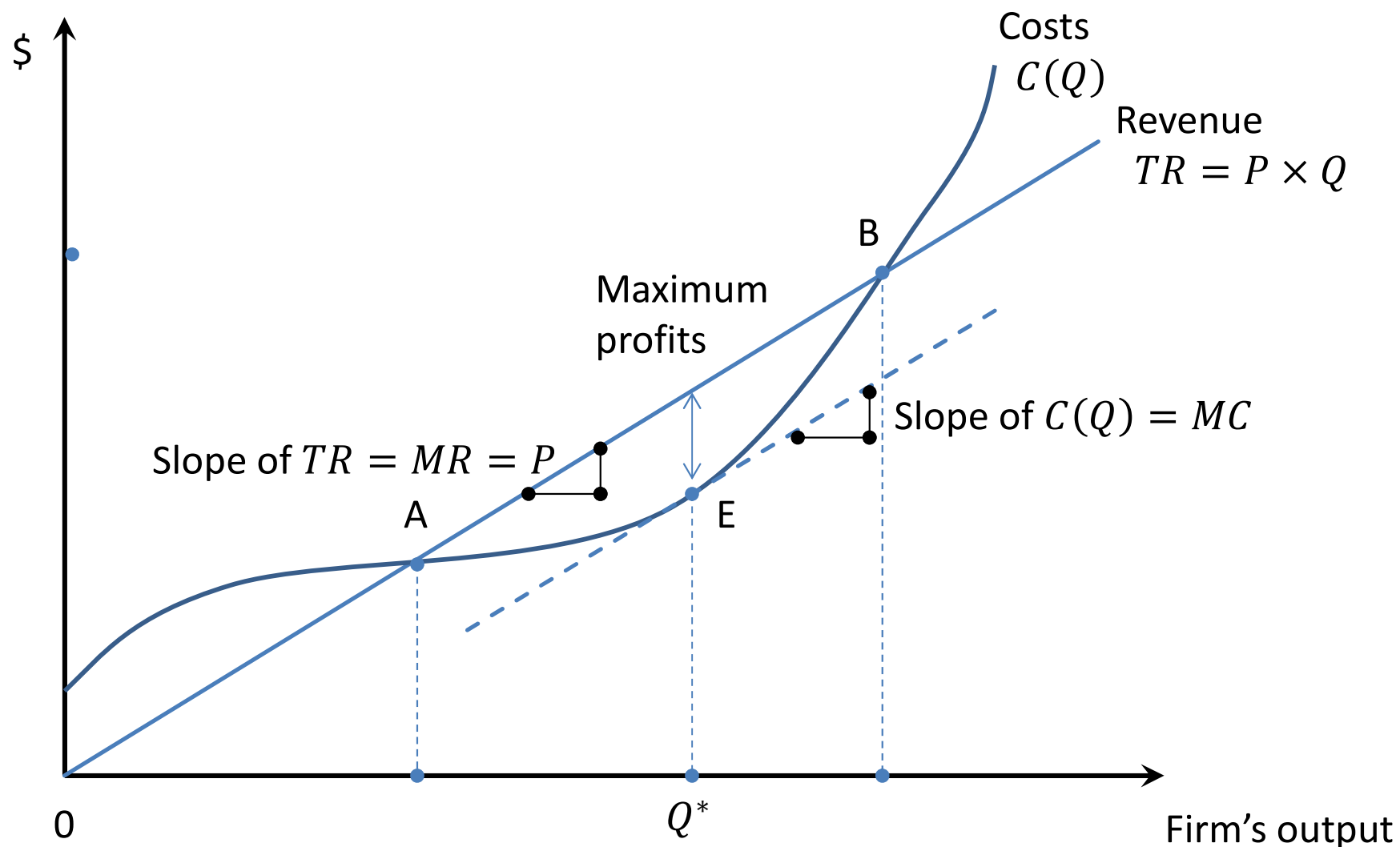
- **Average revenue (AR)**

$$AR = \frac{TR}{Q} = P$$

- **Marginal revenue (MR):**
The change in TR from
selling one more unit.

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

Revenue, Costs, and Profits for a Perfectly Competitive Firm



Competitive Firm's Demand

- The demand curve for a competitive firm's product is a horizontal line at the market price. This price is the competitive firm's marginal revenue.

$$D^f = P = MR$$

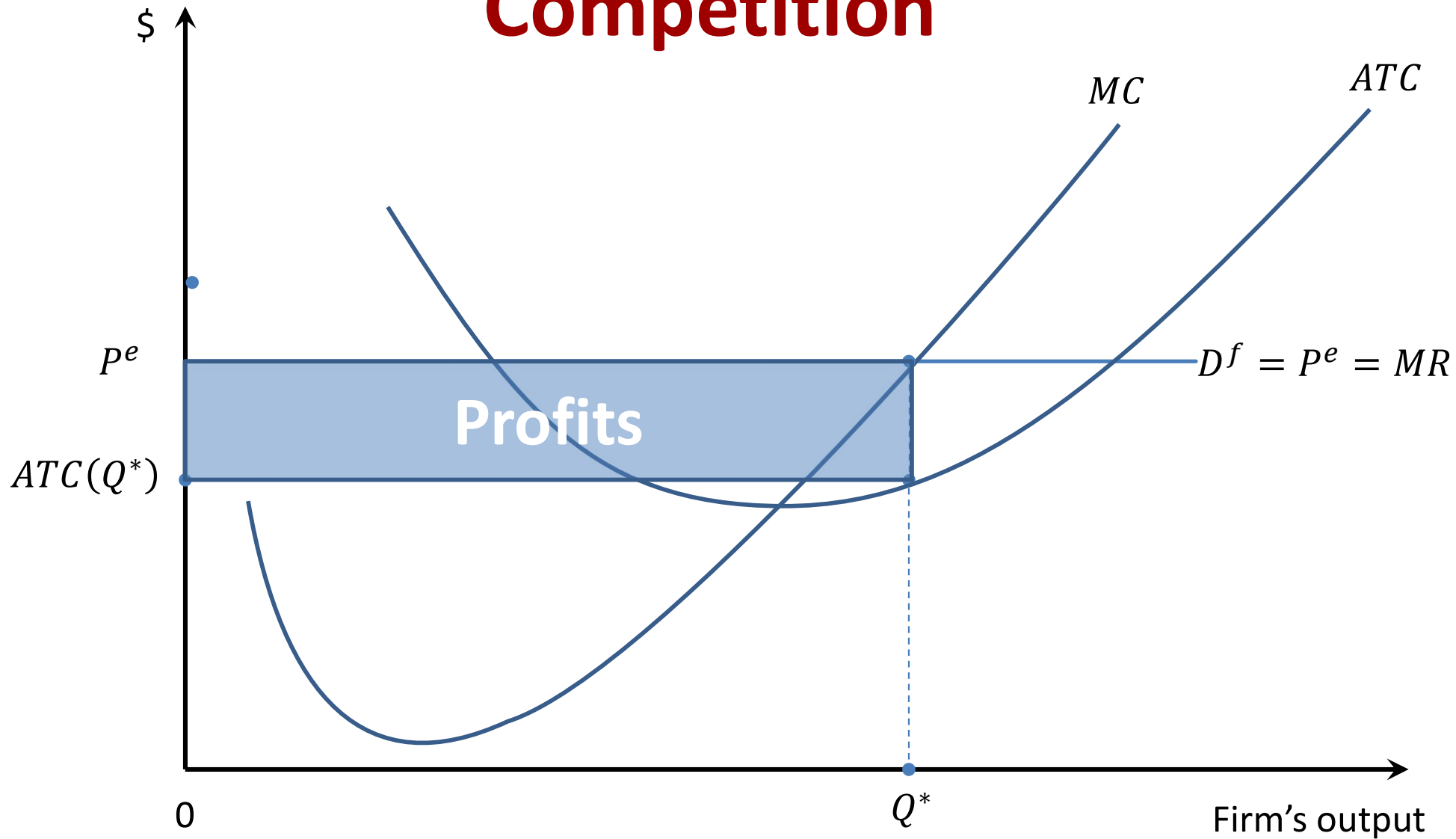
Profit Maximization

- What Q maximizes the firm's profit?
- To find the answer, “*think at the margin.*”

If increase Q by one unit,
revenue rises by MR ,
cost rises by MC .

- If $MR > MC$, then increase Q to raise profit.
- If $MR < MC$, then reduce Q to raise profit.

Profit Maximization under Perfect Competition



Competitive Output Rule

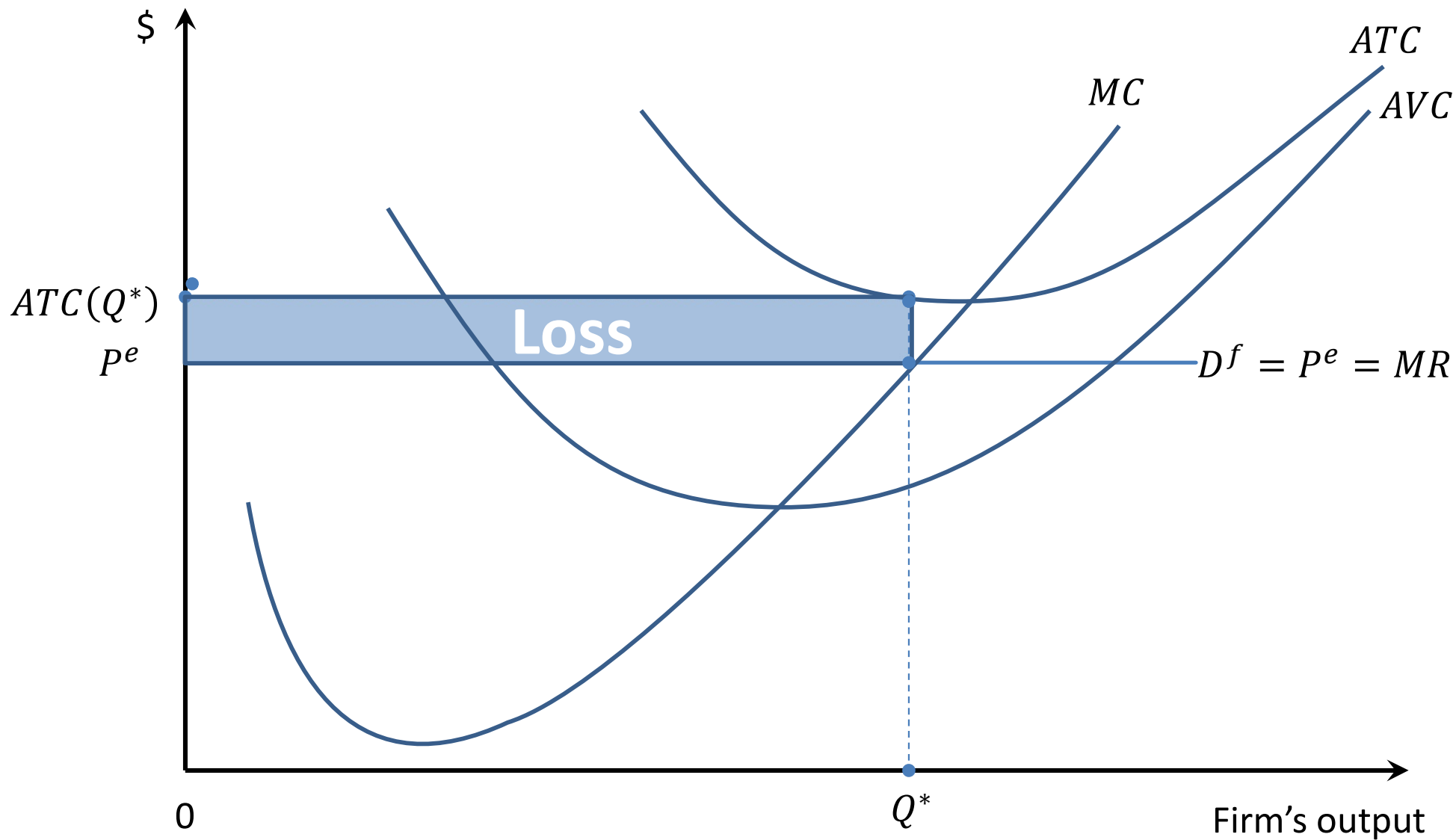
- To maximize profits, a perfectly competitive firm produces the output at which price equals marginal cost in the range over which marginal cost is increasing.

$$P = MC(Q)$$

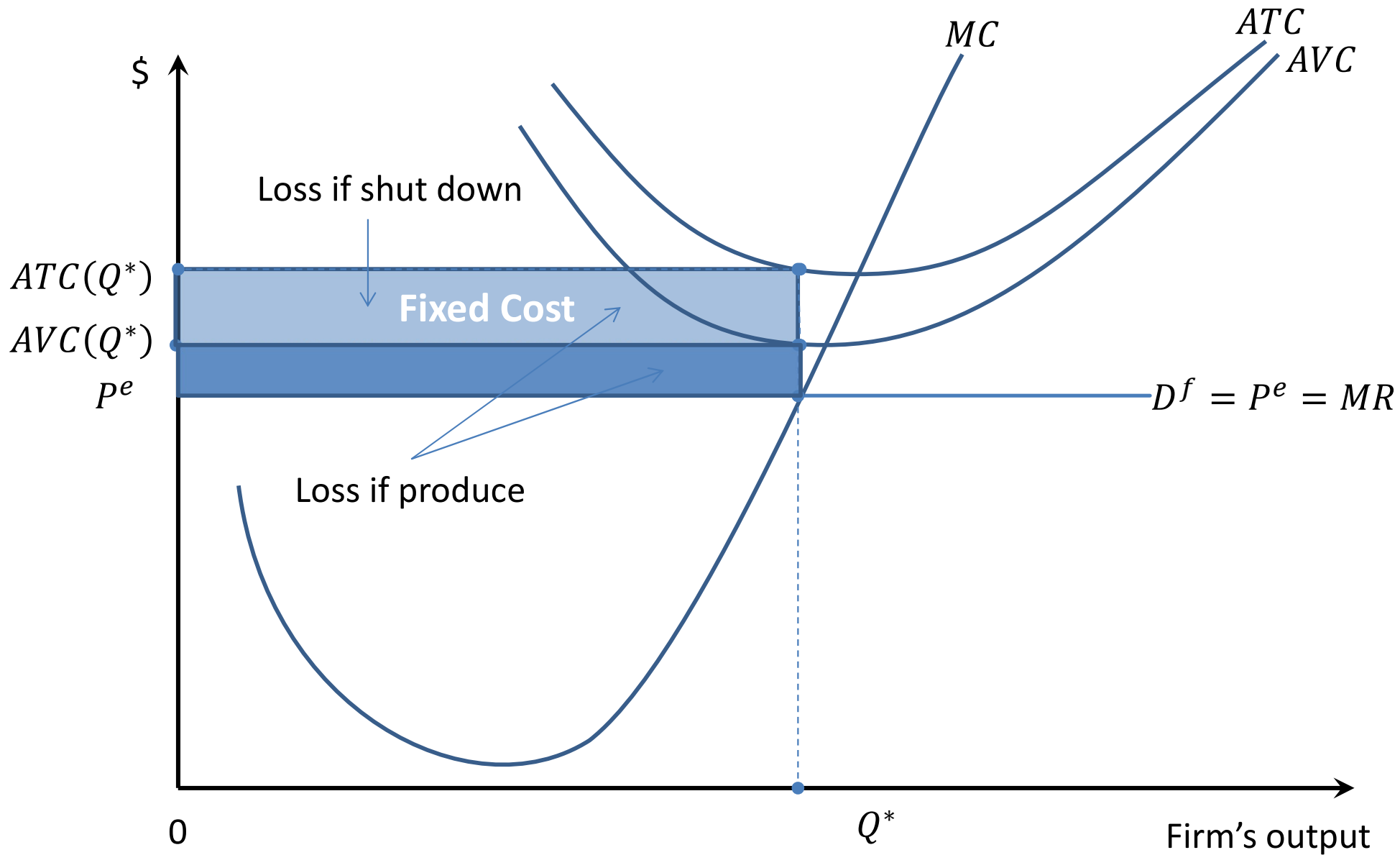
Competitive Output Rule In Action

- The cost function for a firm is $C(Q) = 5 + Q^2$.
- If the firm sells output in a perfectly competitive market and other firms in the industry sell output at a price of \$20, what price should the manager of this firm charge? What level of output should be produced to maximize profits? How much profit will be earned?
- Answer:
 - Charge \$20.
 - Since marginal cost is $2Q$, equating price and marginal cost yields: $\$20 = 2Q \Rightarrow Q = 10$ units.
 - Maximum profits are: $\pi = 20 \times 10 - (5 + 10^2) = \95 .

Short-Run Operating Losses



The Shut-Down Case



Short-run Decision to Shut Down

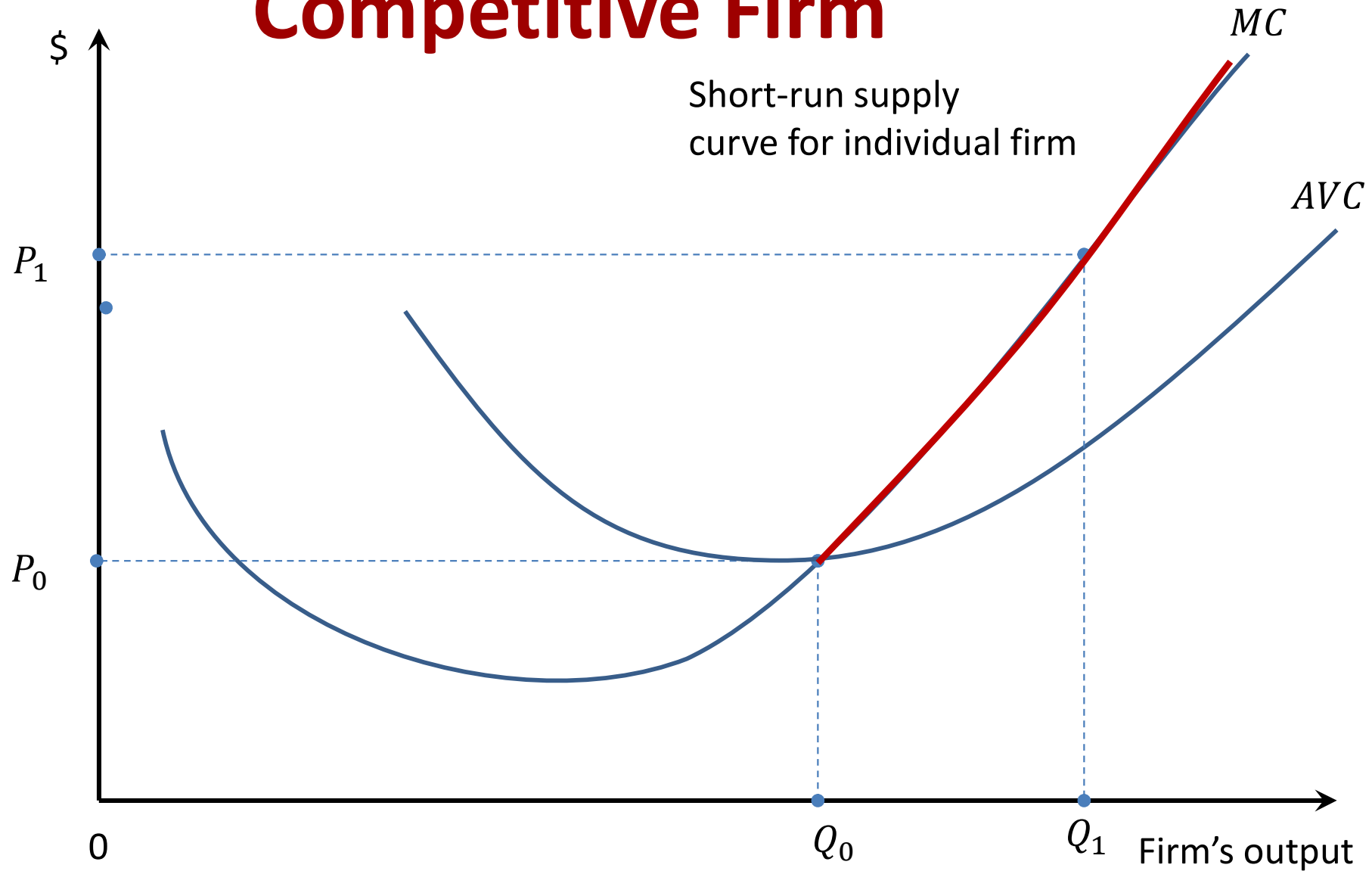
- Loss if shut down: Fixed cost
- Lost if produce: Fixed cost + variable cost - TR
- So, shut down if $TR < VC$
- Divide both sides by Q : $TR/Q < VC/Q$
- So, firm's decision rule is:

Shut down if $P < AVC$

Short-Run Output Decision Under Perfect Competition

- To maximize short-run profits, a perfectly competitive firm should produce in the range of increasing marginal cost where $P = MC$, provided that $P \geq AVC$. If $P < AVC$, the firm should shut down its plant to minimize its losses.

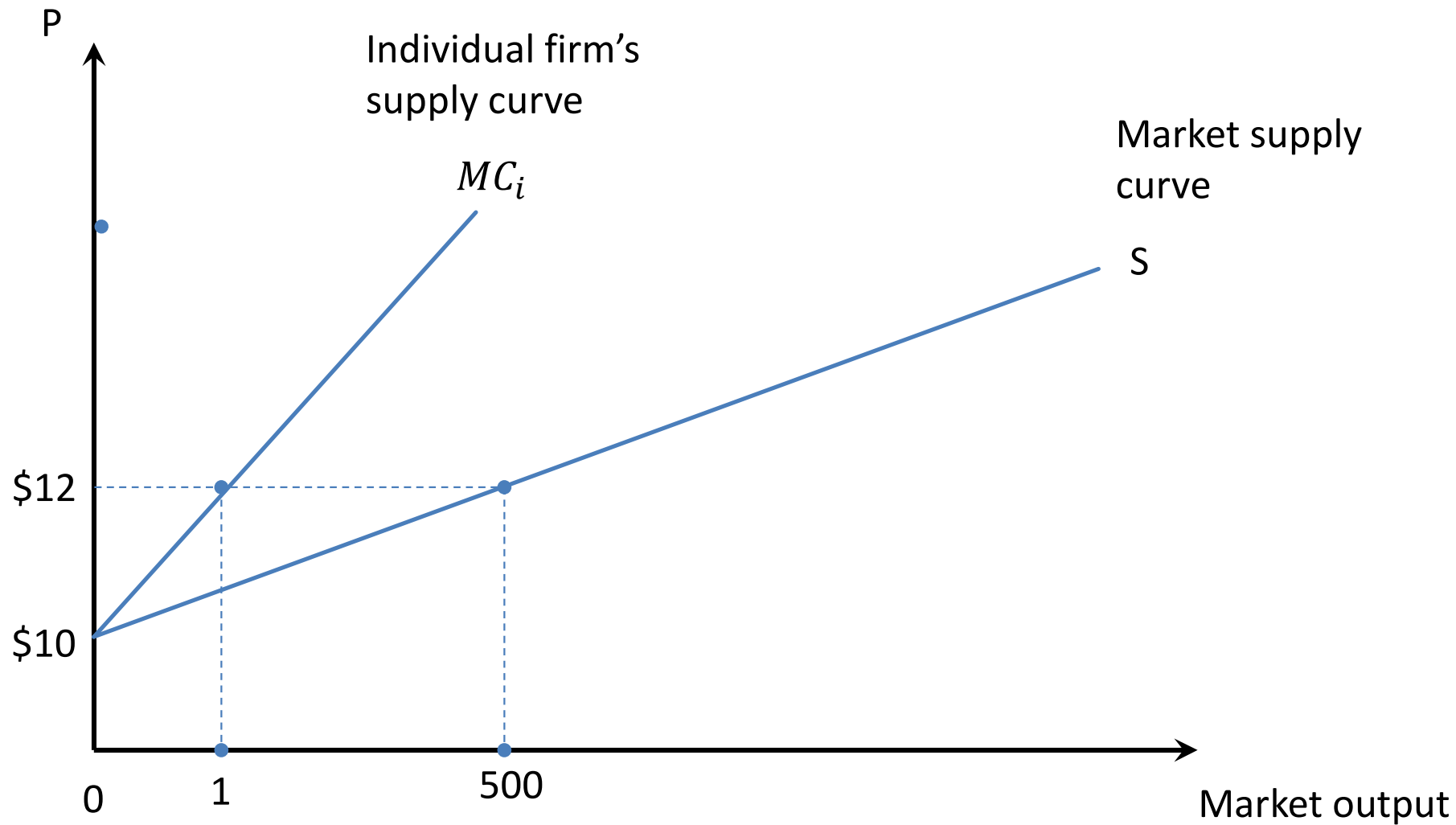
Short-Run Firm Supply Curve for a Competitive Firm



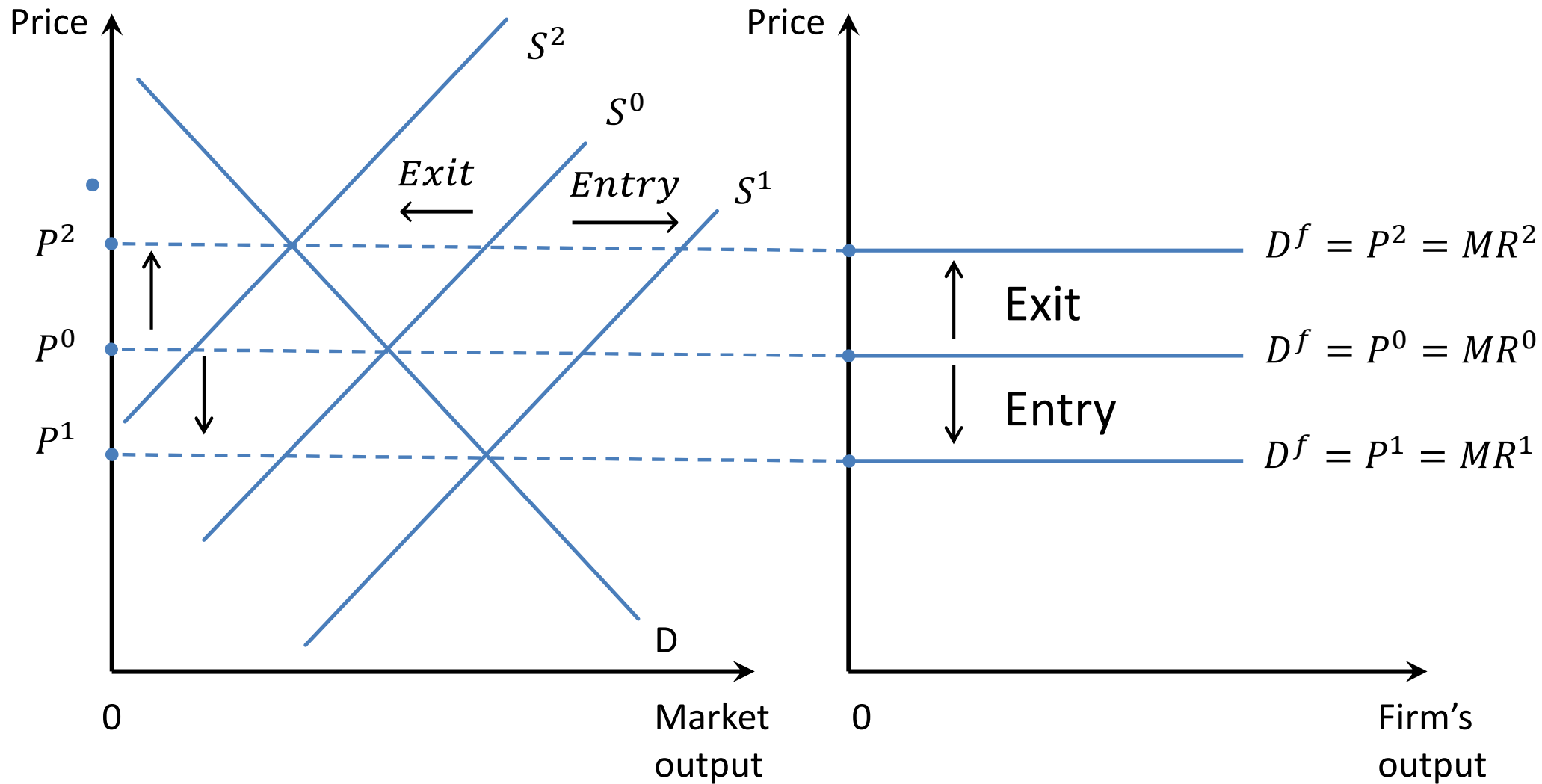
The Short-Run Firm and Industry Supply Curves

- The short-run supply curve for a perfectly competitive firm is its marginal cost curve above the minimum point on the AVC curve.

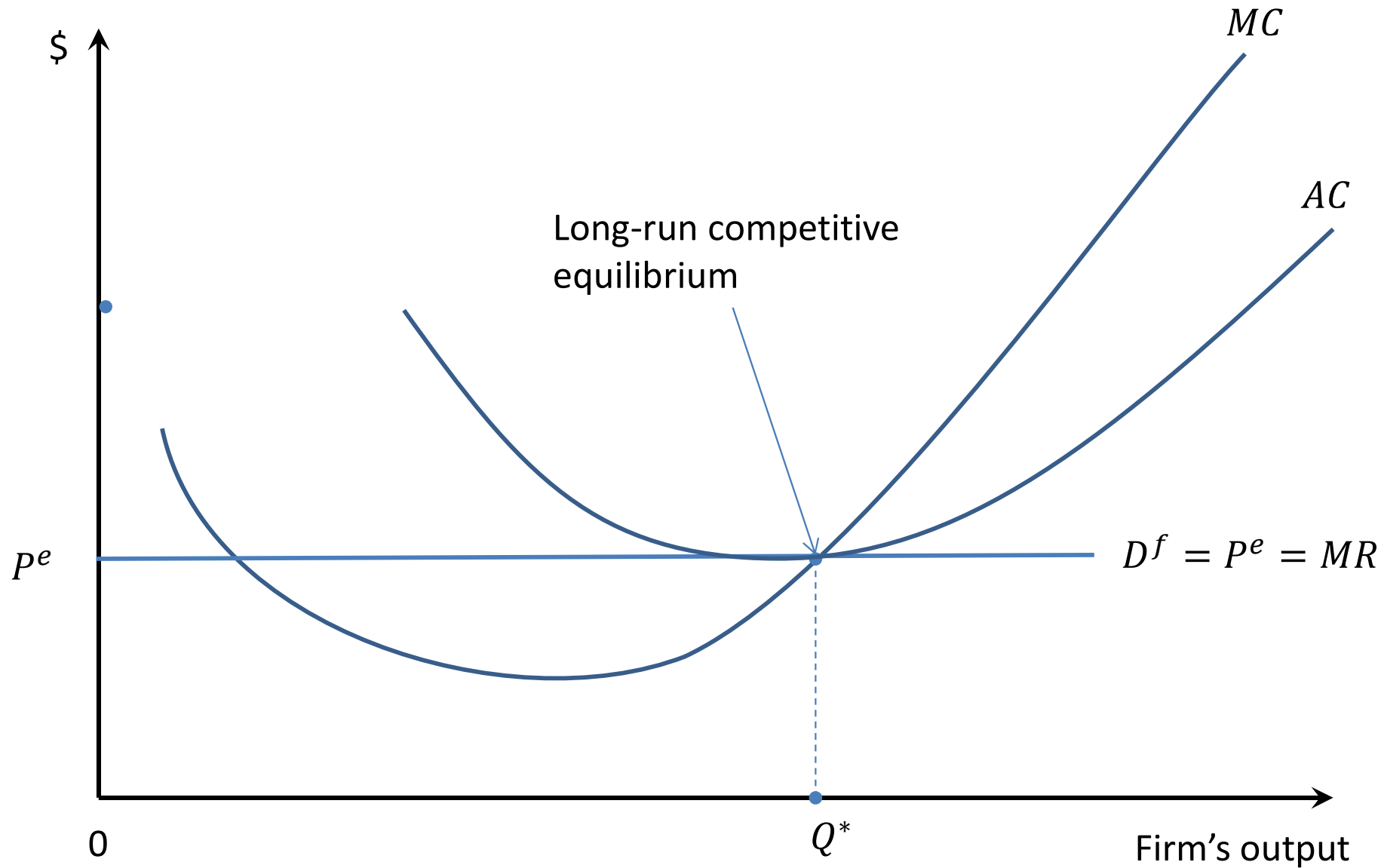
The Market Supply Curve



Long-Run Decisions: Entry and Exit The Market and Firm's Demand



Long-Run Competitive Equilibrium



Long-Run Competitive Equilibrium

- In the long run, perfectly competitive firms produce a level of output such that

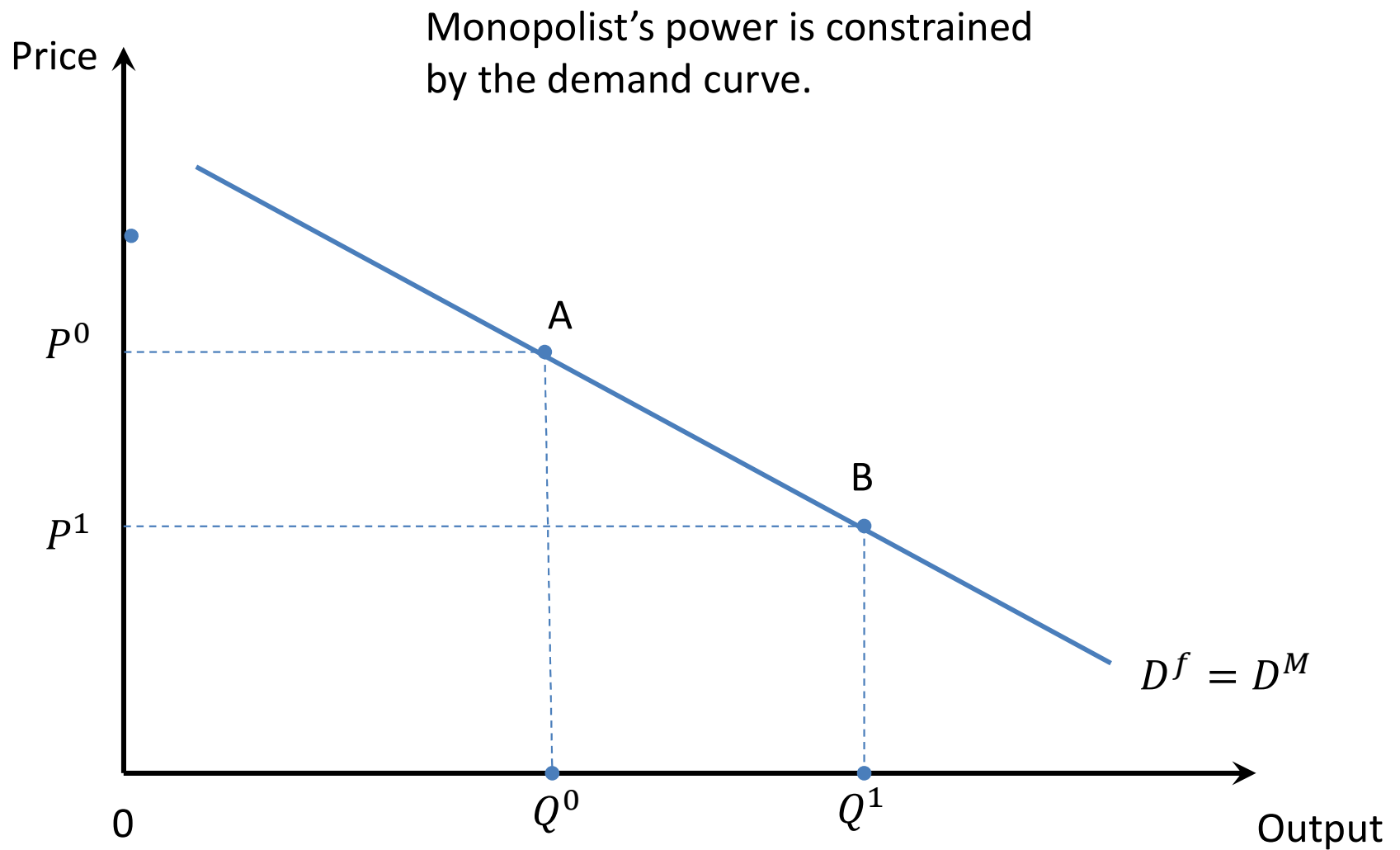
1. $P = MC$

2. $P = \text{minimum of } AC$ (zero economic profits)

Monopoly and Monopoly Power

- **Monopoly:** A market structure in which a single firm serves an entire market for a good that has no close substitutes.
- Sole seller of a good in a market gives that firm greater market power than if it competed against other firms.
 - Implication:
 - market demand curve is the monopolist's demand curve.
 - However, a monopolist does not have unlimited market power.

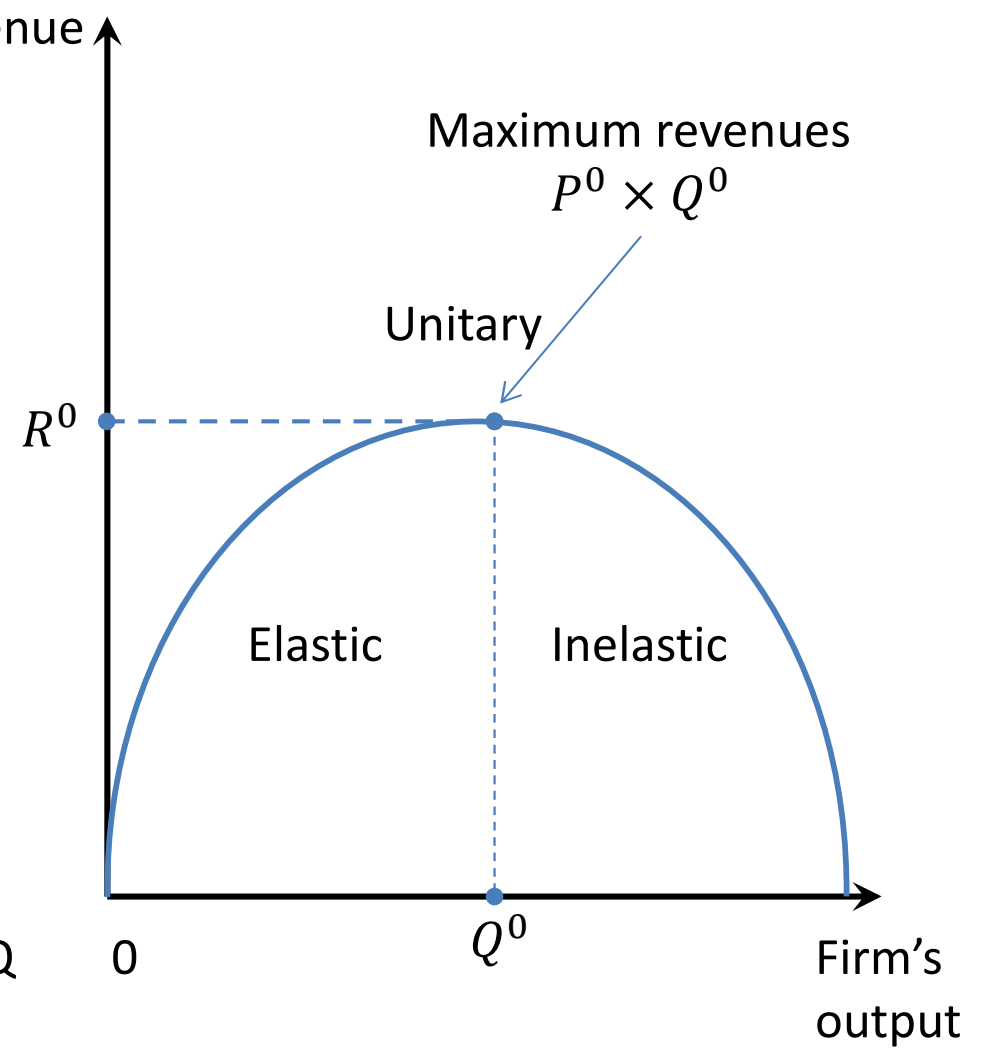
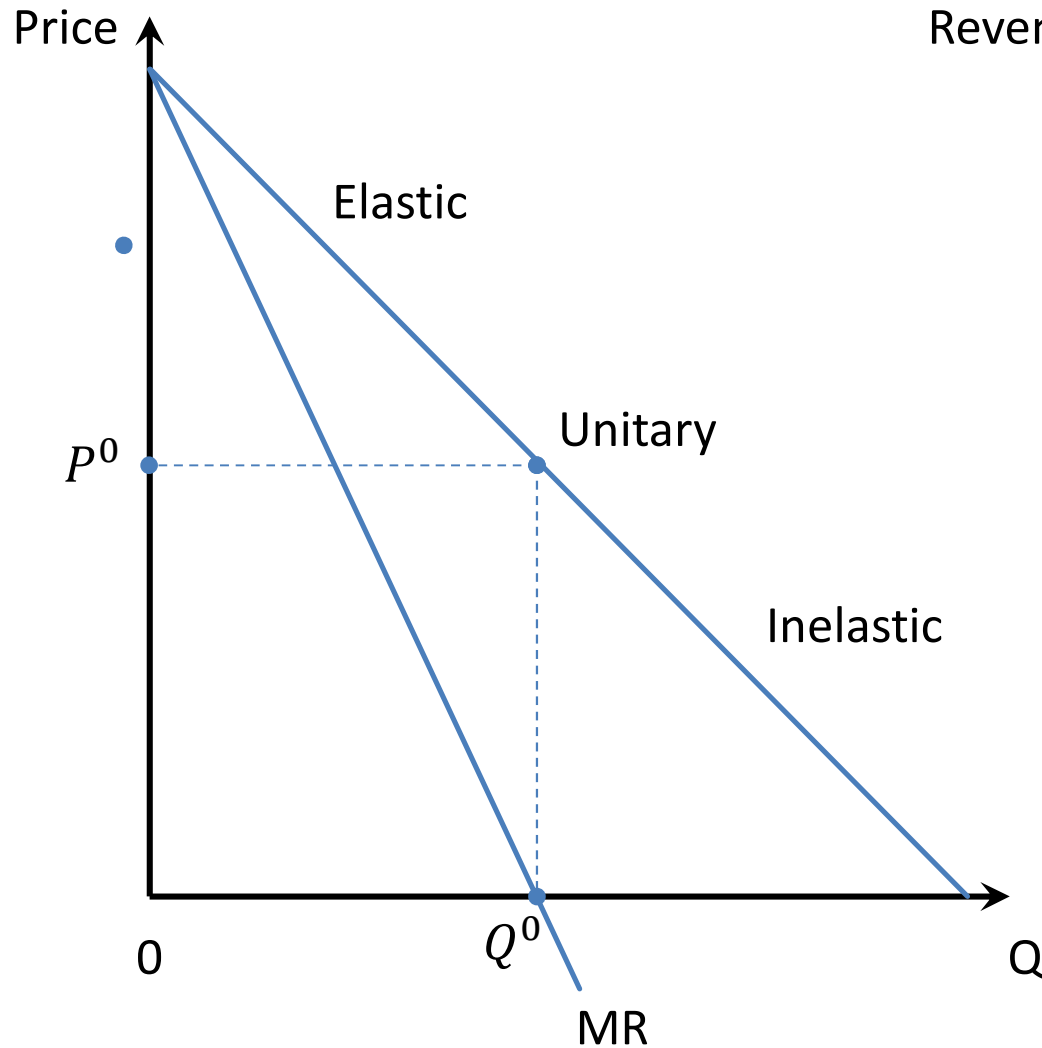
The Monopolist's Demand



Sources of Monopoly Power

- **Economies of scale:** exist whenever long-run average costs decline as output increases.
 - **Diseconomies of scale:** exist whenever long-run average costs increase as output increases.
- **Economies of scope:** exist when the total cost of producing two products within the same firm is lower than when the products are produced by separate firms.
- **Cost complementarity:** exist when the marginal cost of producing one output is reduced when the output of another product is increased.
- **Patents and other legal barriers**

Elasticity of Demand and Total Revenues



Marginal Revenue and Elasticity

- The monopolist's marginal revenue function is

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

, where E is the elasticity of demand for the monopolist's product and P is the price charged.

– For $P > 0$

- $MR > 0$ when $E < -1$.
- $MR = 0$ when $E = -1$.
- $MR < 0$ when $-1 < E < 0$.

Marginal Revenue and Linear Demand

- Given an linear inverse demand function

$$P(Q) = a + bQ$$

, where $a > 0$ and $b < 0$, the associated marginal revenue is

$$MR(Q) = a + 2bQ$$

Marginal Revenue In Action

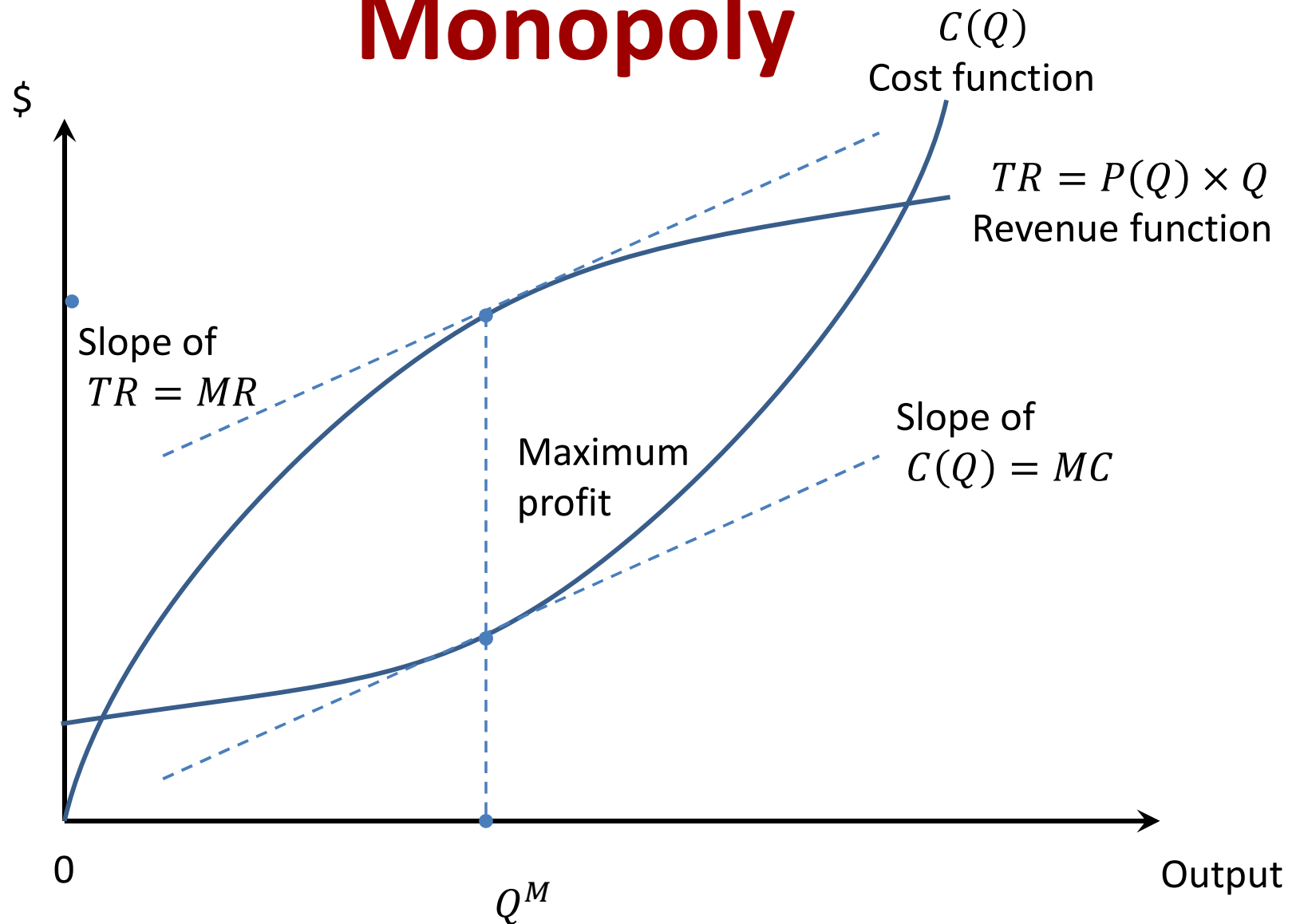
- Suppose the inverse demand function for a monopolist's product is given by $P = 10 - 2Q$. What is the maximum price per unit a monopolist can charge to be able to sell 3 units? What is marginal revenue when $Q = 3$?
- Answer:
 - The maximum price the monopolist can charge for 3 units is: $P = 10 - 2(3) = \$4$.
 - The marginal revenue at 3 units for this inverse linear demand is: $MR = 10 - 2(2)(3) = -\$2$.

Monopoly Output Rule

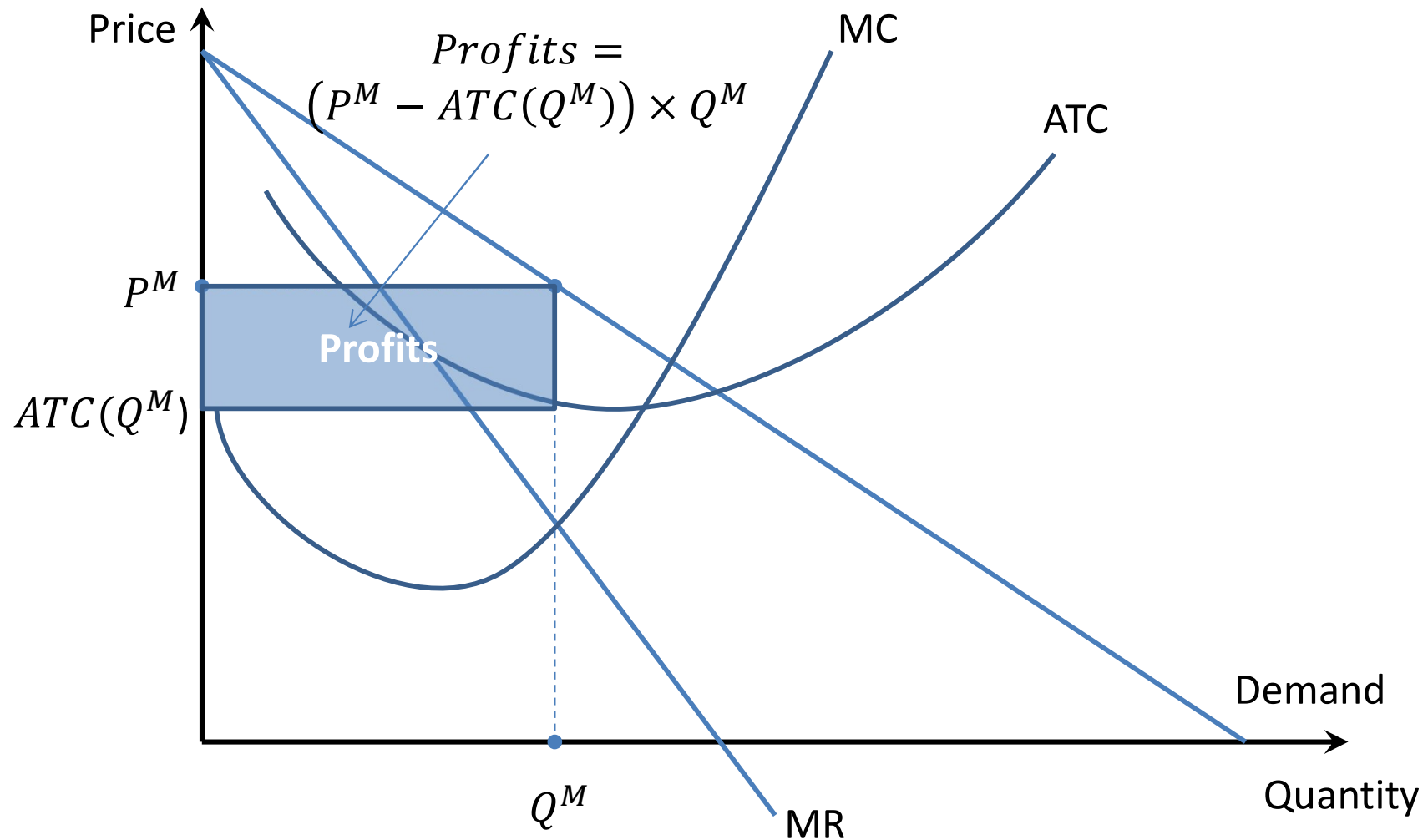
- A profit-maximizing monopolist should produce the output, Q^M , such that marginal revenue equals marginal cost:

$$MR(Q^M) = MC(Q^M)$$

Costs, Revenues, and Profits Under Monopoly



Profit Maximization Under Monopoly



Monopoly Pricing Rule

- Given the level of output, Q^M , that maximizes profits, the monopoly price is the price on the demand curve corresponding to the Q^M units produced:

$$P^M = P(Q^M)$$

Monopoly In Action

- Suppose the inverse demand function for a monopolist's product is given by $P = 100 - 2Q$ and the cost function is $C(Q) = 10 + 2Q$. Determine the profit-maximizing price, quantity and maximum profits.
- Answer:
 - Profit-maximizing output is found by solving: $100 - 4Q = 2 \Rightarrow Q^M = 24.5$.
 - The profit-maximizing price is: $P^M = 100 - 2(24.5) = \$51$.
 - Maximum profits are: $\pi = \$51 \times 24.5 - (10 + 2 \times 24.5) = \$1,190.50$.

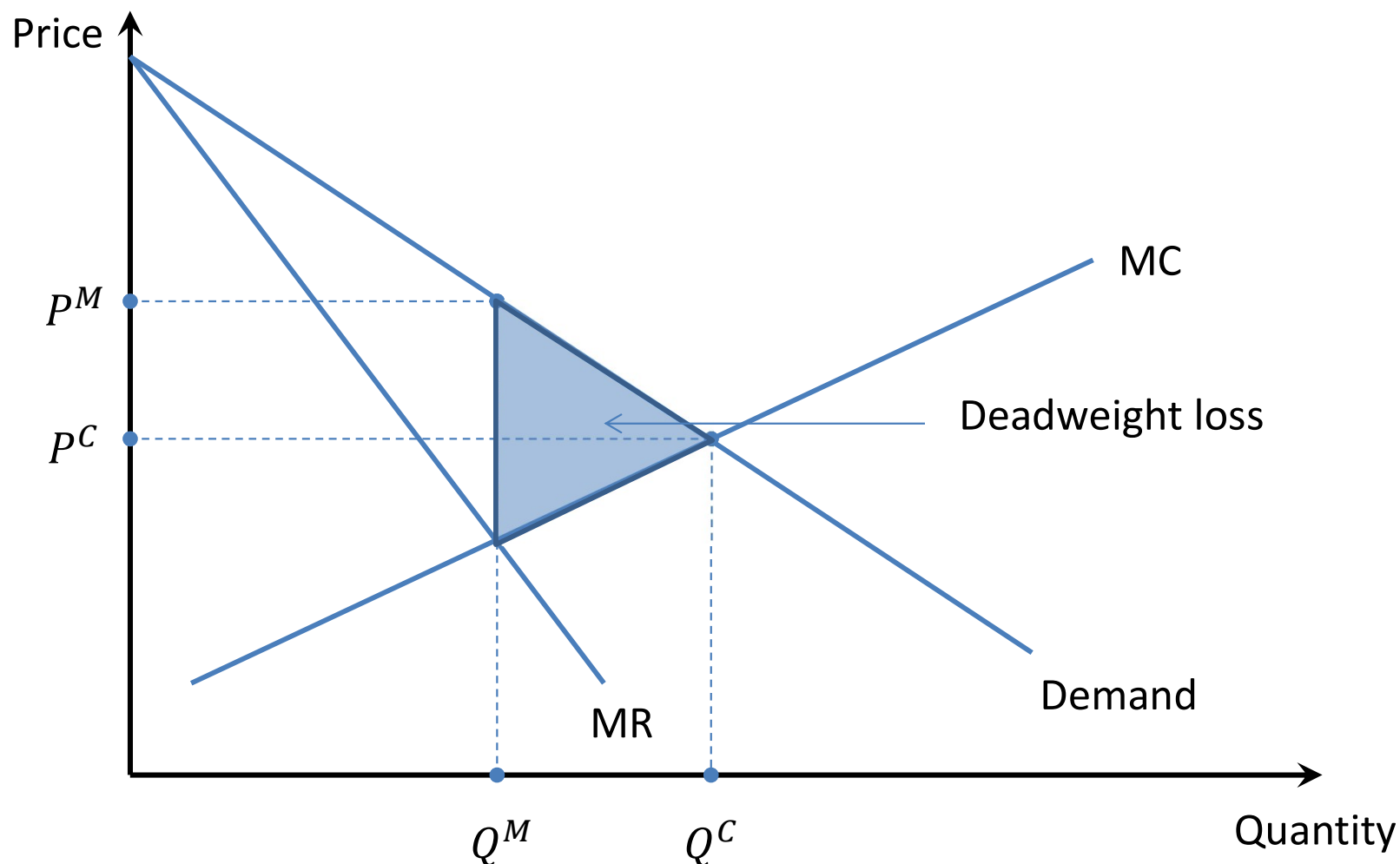
The Absence of a Supply Curve

- Recall, firms operating in perfectly competitive markets determine how much output to produce based on price ($P = MC$).
 - Thus, a supply curve exists in perfectly competitive markets.
- A monopolist's market power implies $P > MR = MC$.
 - Thus, there is no supply curve for a monopolist, or in markets served by firms with market power.

Deadweight Loss of Monopoly

- The consumer and producer surplus that is lost due to the monopolist charging a price in excess of marginal cost.

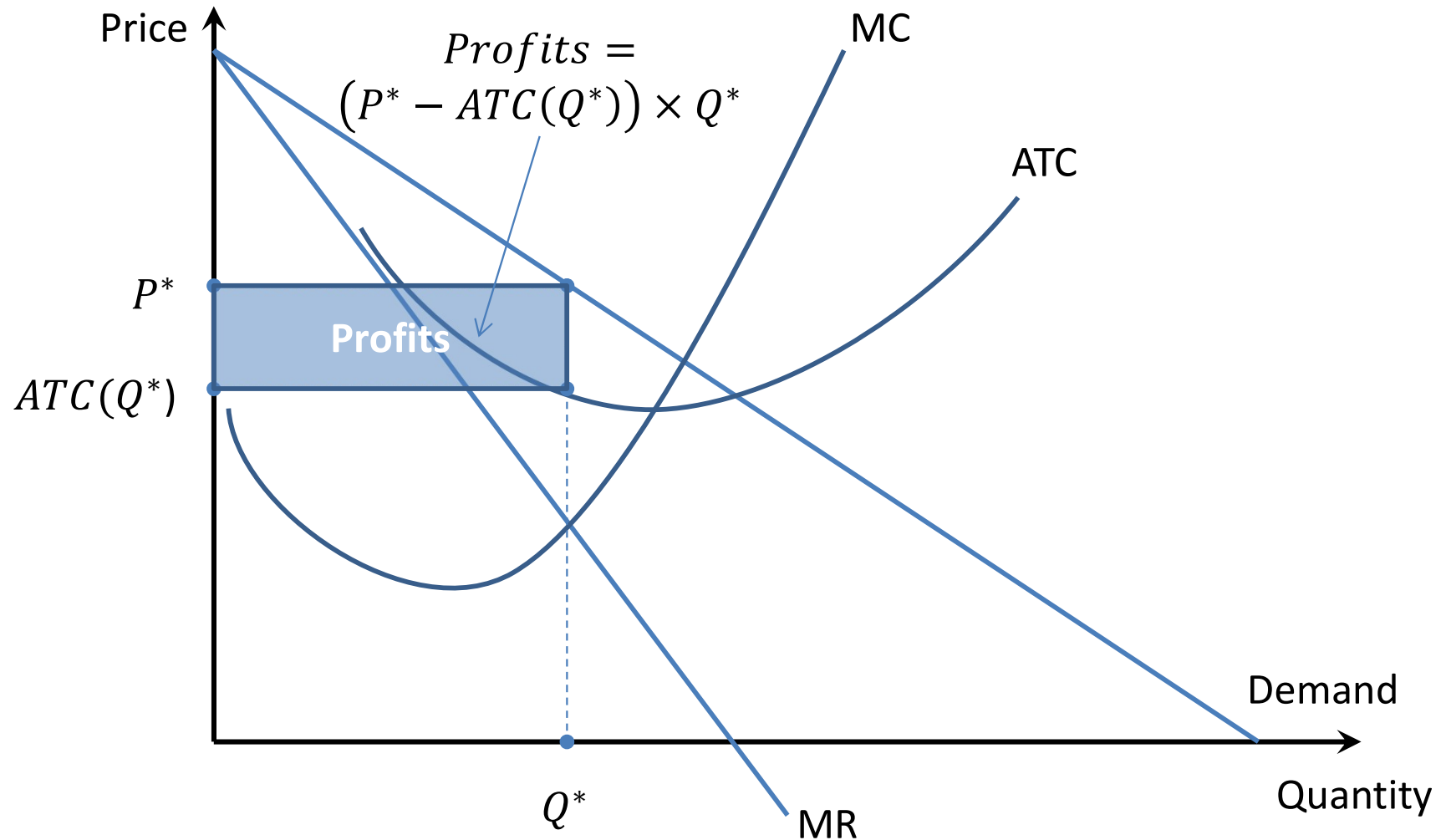
Deadweight Loss of Monopoly



Monopolistic Competition

- An industry is **monopolistically competitive** if:
 - There are many buyers and sellers.
 - Each firm in the industry produces a differentiated product.
 - There is free entry into and exit from the industry.
- A key difference between monopolistically competitive and perfectly competitive markets is that each firm produces a slightly differentiated product.
 - Implication: products are close, but not perfect, substitutes; therefore, firm's demand curve is downward sloping under monopolistic competition.

Profit-Maximization under Monopolistic Competition



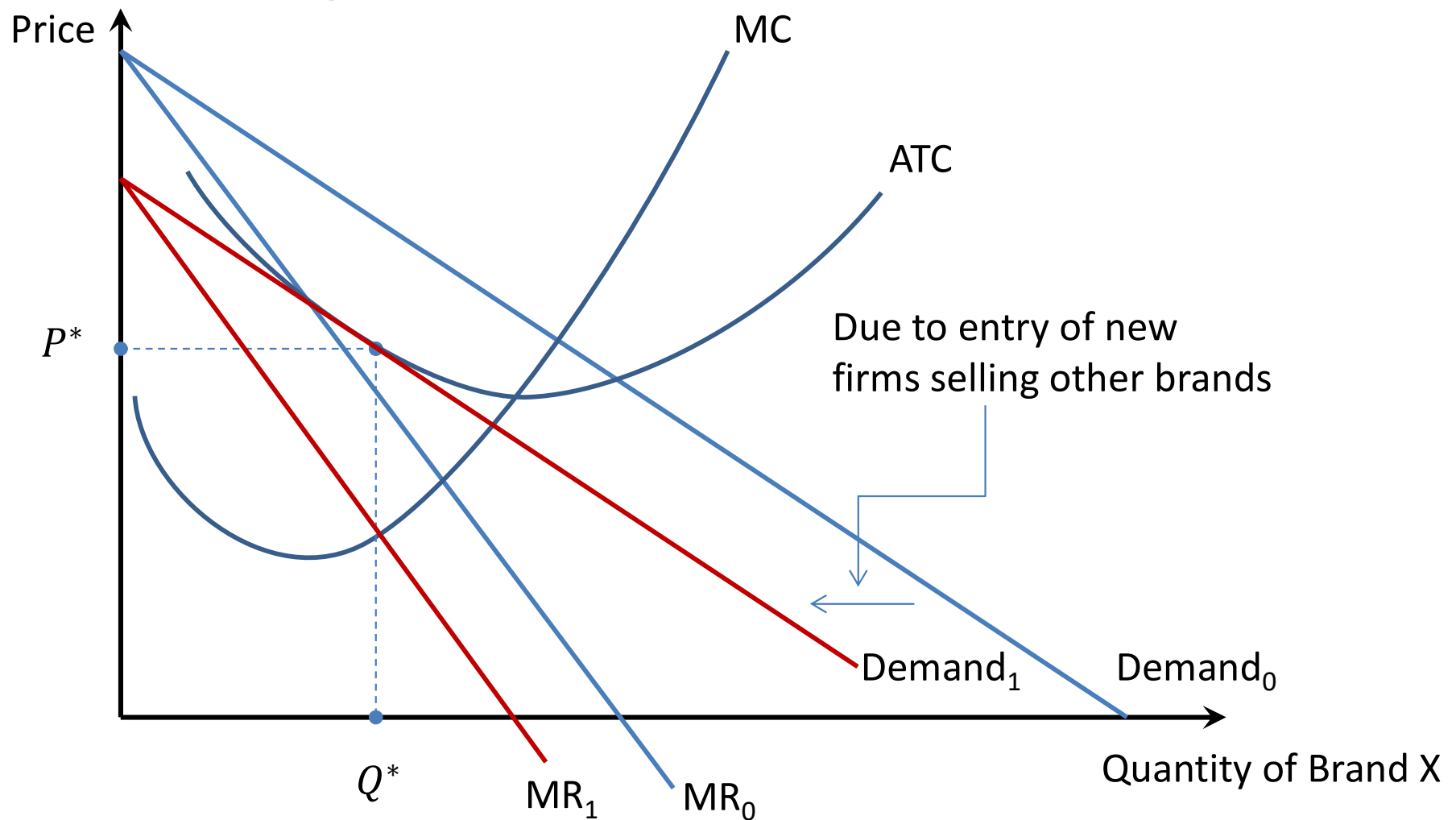
Profit-Maximization Rule for Monopolistic Competition

- To maximize profits, a monopolistically competitive firm produces where its marginal revenue equals marginal cost.
- The profit-maximizing price is the maximum price per unit that consumers are willing to pay for the profit-maximizing level of output.
- The profit-maximizing output, Q^* , is such that $MR(Q^*) = MC(Q^*)$ and the profit-maximizing price is $P^* = P(Q^*)$.

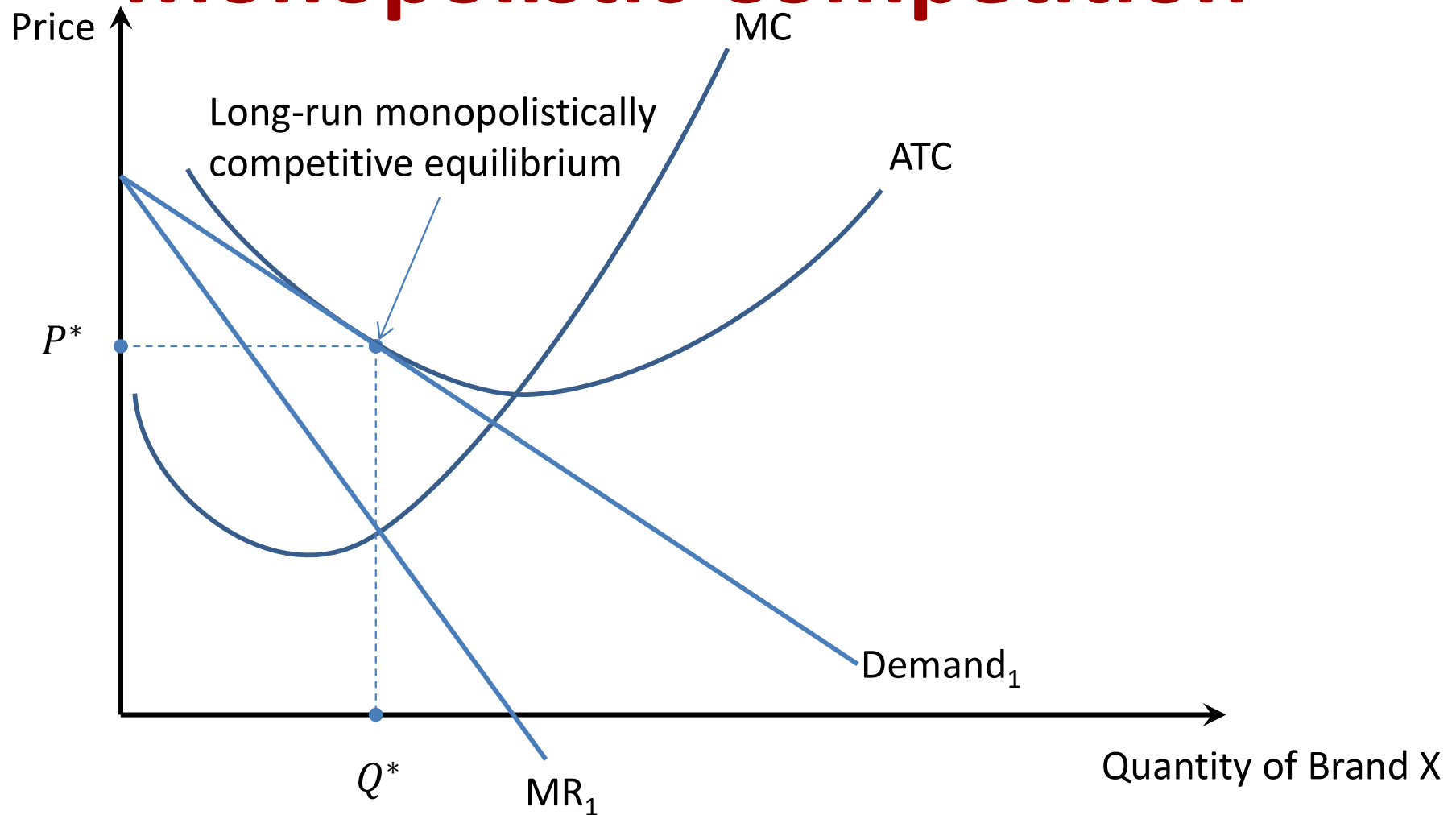
Long-Run Equilibrium

- If firms in monopolistically competitive markets earn short-run
 - profits, additional firms will enter in the long run to capture some of those profits.
 - losses, some firms will exit the industry in the long run.

Effect of Entry on a Monopolistically Competitive Firm's Demand



Long-Run Equilibrium under Monopolistic Competition



The Long-Run and Monopolistic Competition

- In the long run, monopolistically competitive firms produce a level of output such that:
 1. $P > MC$
 2. $P = ATC > \text{minimum of average costs}$

Take-home Message

- For a firm in a **perfectly competitive market**, price = marginal revenue = average revenue.
- If $P > AVC$, a firm maximizes profit by producing the quantity where $P = MC$. If $P < AVC$, a firm will shut down in the short run.
- With free entry and exit, profits = 0 in the long run, and $P = \text{minimum } ATC$.
- **Monopoly** firms maximize profits by producing the quantity where marginal revenue equals marginal cost. The monopoly price will be greater than marginal cost, leading to a deadweight loss.