Perfect Competition

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Perfect Competition

Assumptions:

1. Homogeneous Divisible Output
2. Perfect Information
3. No Transaction Costs
4. Price Taking – The firms are "small"
5. No Externalities.
6. Free Entry and Exit.

Examples of perfect competition

1. Foreign exchange markets.
2. Agricultural markets.
3. Internet related industries.
4. What else?

Short Run Equilibrium

- Short-run: the number of firms n in the market is fixed
- Demand function: $Q^d = A - BP$;
- Assume each firm has the same production technology: $Tc(q) = C + Dq + Eq^2$,
  where q is the quantity the firm chooses to produce and $Tc(q)$ is the firm's total cost for producing q units.

Question: the short-run equilibrium price P^*?
(hint: the short-run equilibrium price clears the market)

An individual Firm's Problem

- Each firm produces to maximize profits:

$$\pi = Pq - Tc(q)$$

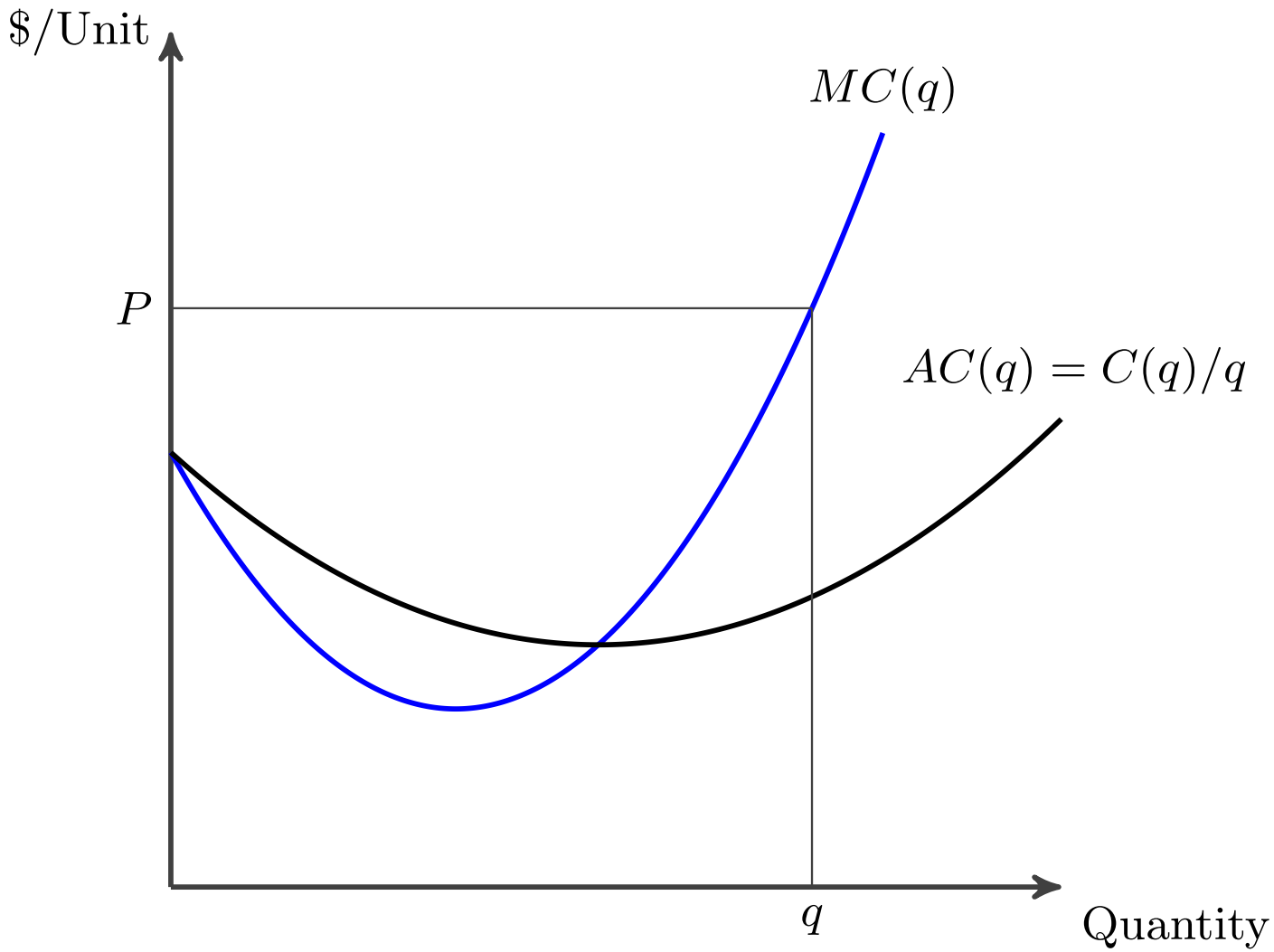
  - Under perfect competition, each firm is a price-taker.
- The firm will increase production as long as the marginal cost of unit is less than the marginal revenue (the price).

$$P = MC(q) = D + 2Eq$$

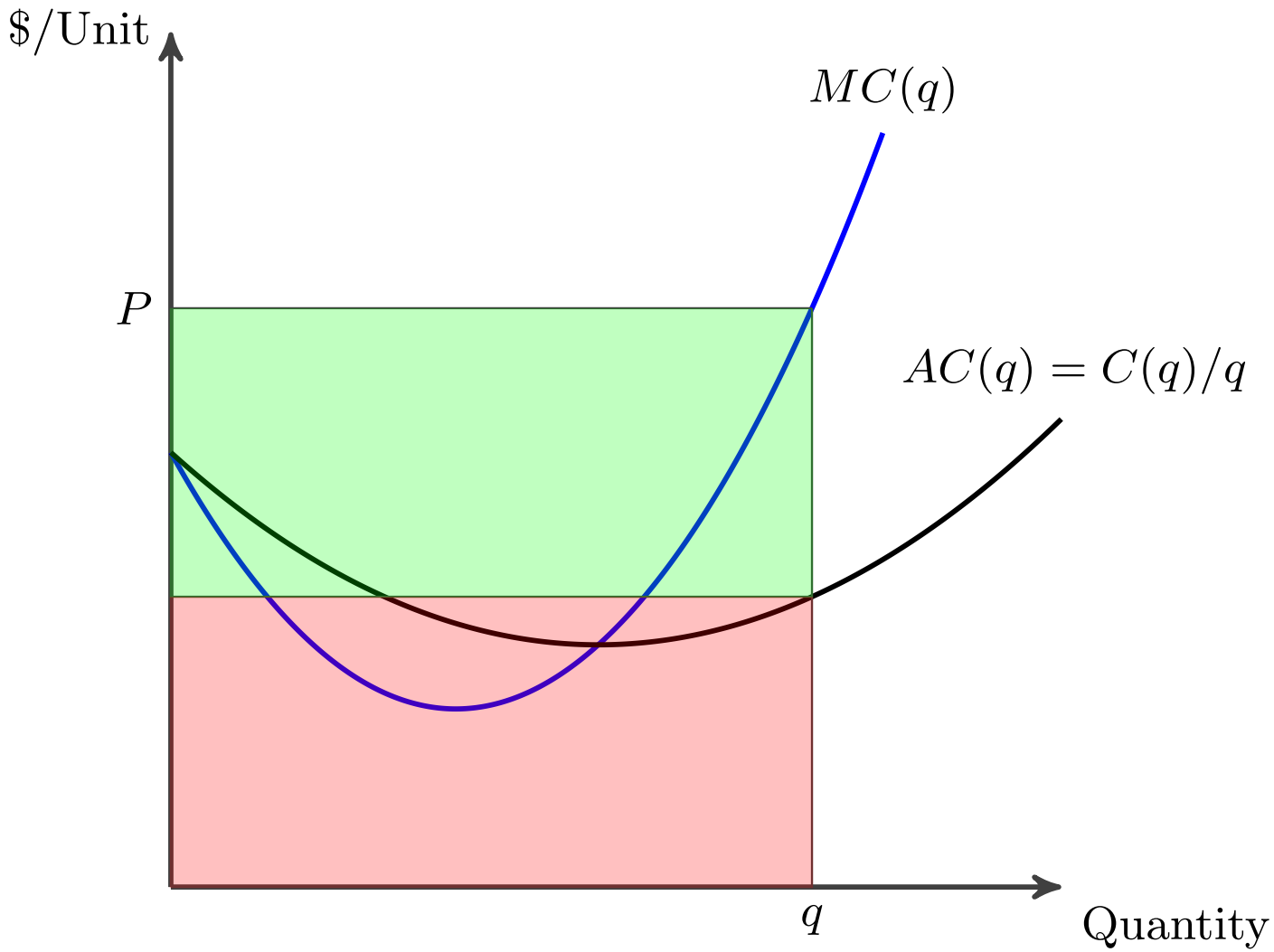
- Each individual firm's supply curve:

$$q^s = (P - D)/(2E)$$

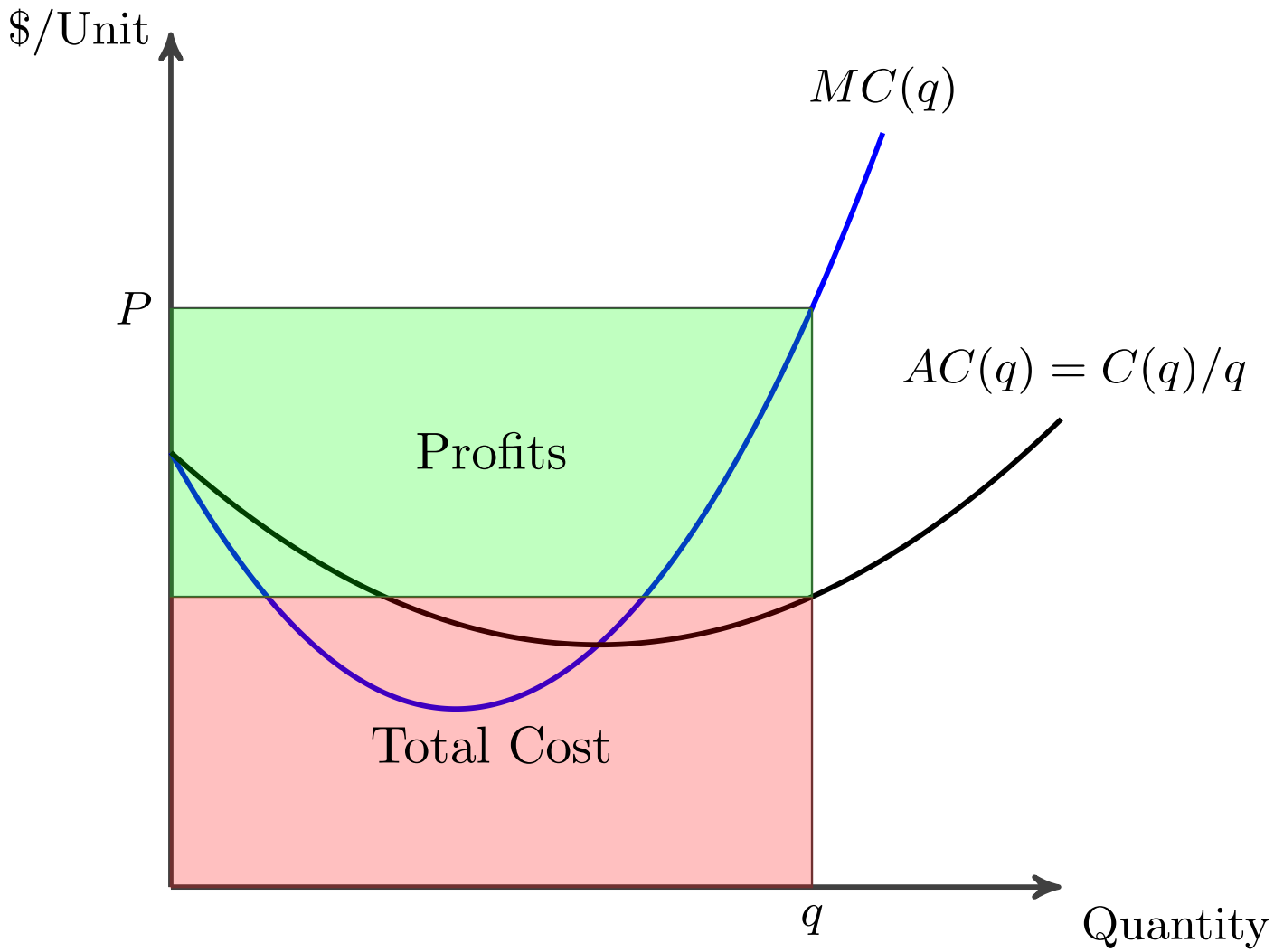
A Price Taking Firm: Short Run



A Price Taking Firm: Short Run



A Price Taking Firm: Short Run



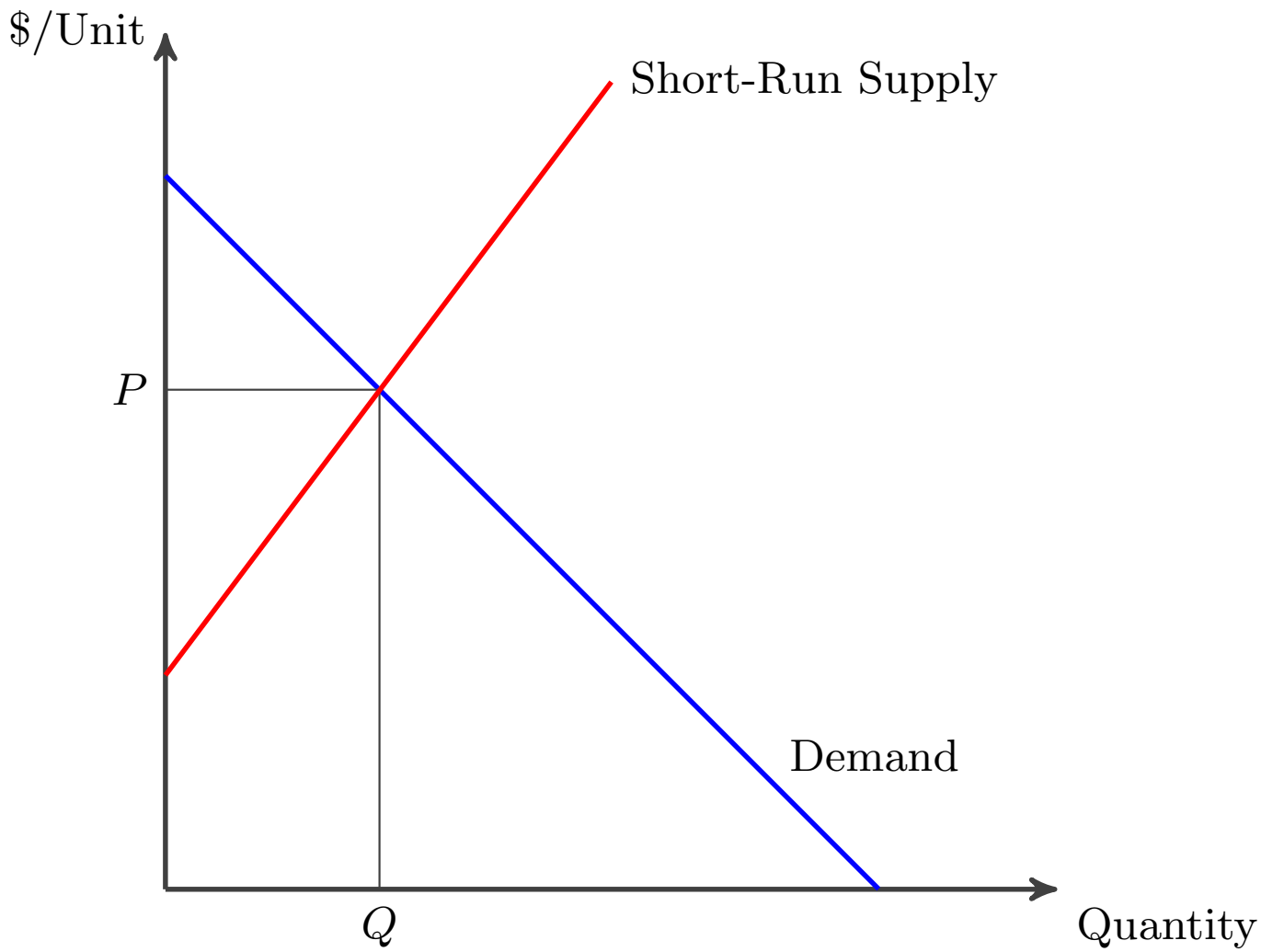
Short-run Equilibrium Price

- Market demand: $Q^d = A - BP$;
- Market(aggregate) supply: $Q^s = nq^s = n(P - D)/(2E)$
- Short-run equilibrium price clears the market:

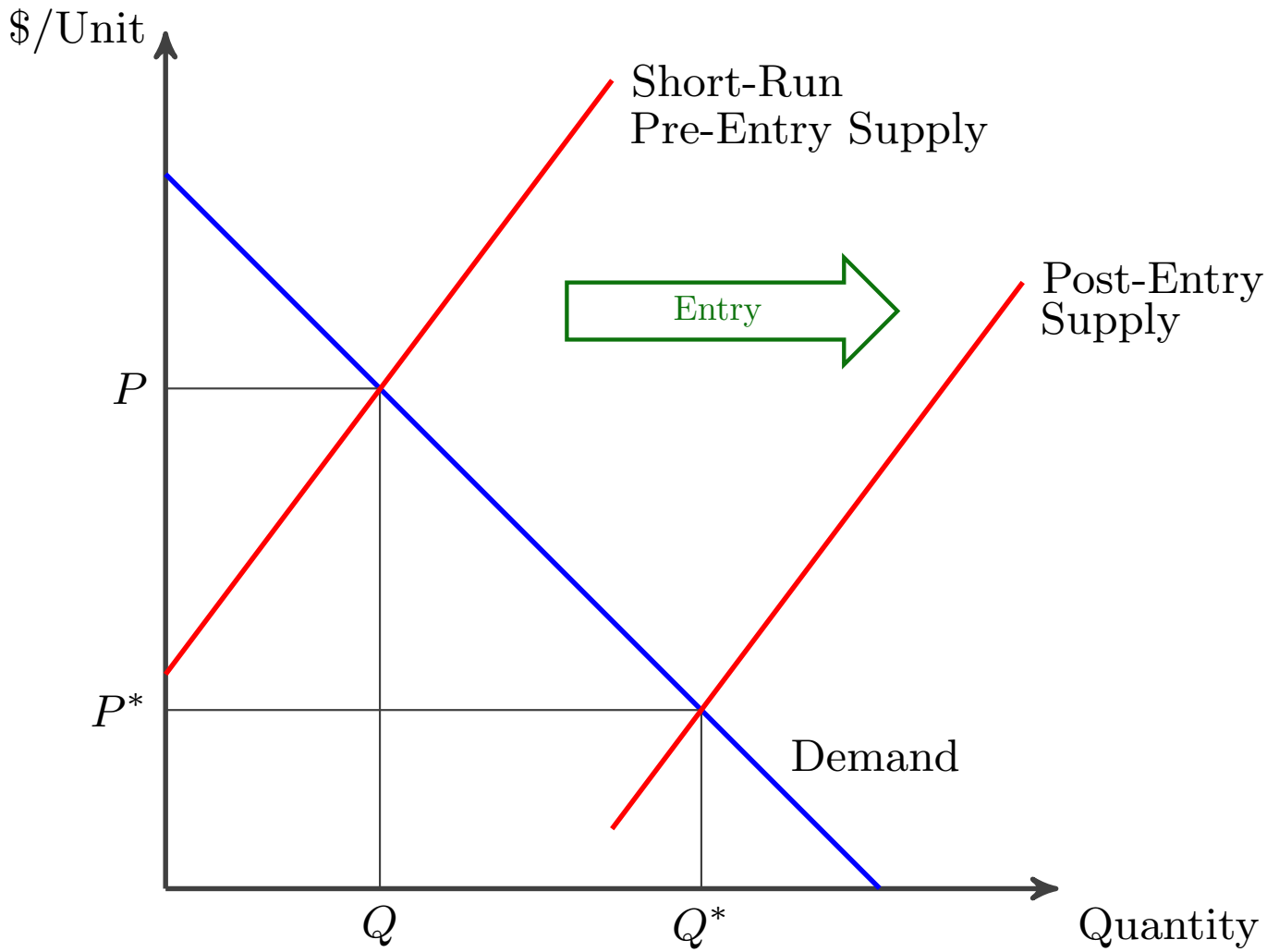
$$D^d(P^*) = D^s(P^*) \leftrightarrow A - BP^* = n(P^* - D)/(2E)$$

- Each individual firm's profit in the short-run equilibrium: positive, negative, or zero?
- What would happen if the profit in the short-run equilibrium is nonzero?

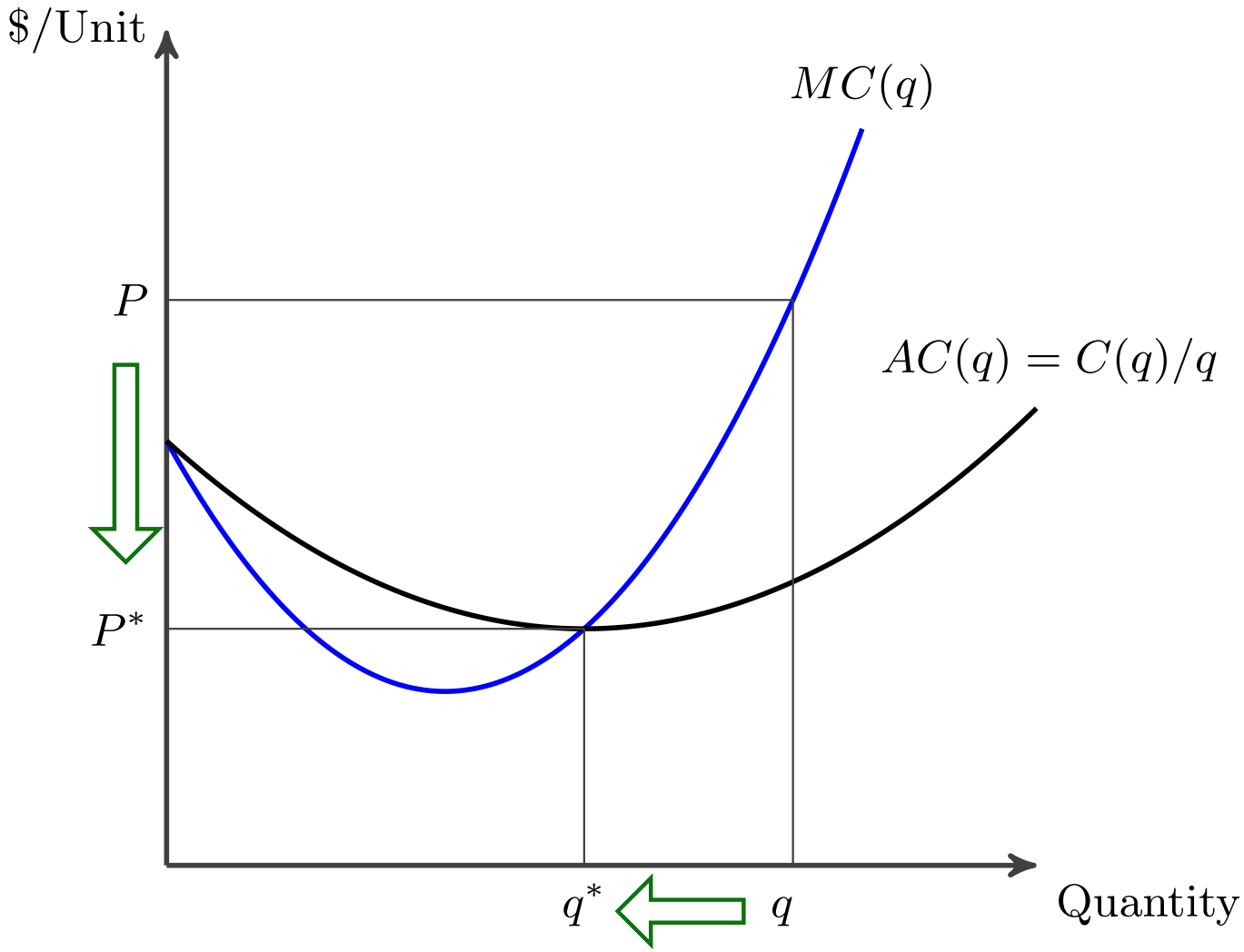
Short and Long Run Equilibrium



Short and Long Run Equilibrium



A Price Taking Firm - Long Run Equilibrium



Long Run Equilibrium

- Suppose firm's short-run profit is positive,
  - Firms producing at marginal cost would make *positive* profits and would encourage entry.
  - Entry cause supply curve to shift to the right until firms can break-even.
- In the long-run equilibrium, there is no entry or exit. That is, the firms active in the market is making zero profit.
  - $\pi = P^*_{long} q - Tc(q) = 0$, so $P^*_{long} = Ac(q)$
  - In addition: $P^*_{long} = Mc(q)$
  - Each firm's production q^*_{long}: $Mc(q^*_{long}) = Ac(q^*_{long})$
  - Long-run equilibrium price: $P^*_{long} = Mc(q^*_{long})$
  - Demand in the long-run equilibrium: $Q^d(P^*_{long}) = A - BP^*_{long}$;
  - Market supply in the long-run equilibrium: $Q^s(P^*_{long}) = Q^d(P^*_{long})$
  - The number of firms in the long-run equilibrium: $n^*_{long} = \frac{Q^s(P^*_{long})}{q^*_{long}}$

Perfect Competition Summary

Short run vs. Long Run

- Short Run
  - Price is given by equilibrium in market.
  - Firms set q s.t. $P = MC$ to maximize profits.
  - Can make positive, negative, or zero profits. Why?
- Long Run
  - Firms enter (exit) if positive (negative) profit
  - Market supply shifts out (back) and price goes down (up)
  - Firms enter (exit) until there is 0 profit.
  - We'll see later that this outcome is *efficient*.

Example: Perfect competition I

Assume that the manufacturing of cellular phones is a perfectly competitive industry. The market demand for cellular phones is described by a linear demand function $Q_D = \frac{6000-50P}{9}$. There are fifty manufacturers of cellular phones. Each manufacturer has the same production costs $TC(q) = 100 + q^2 + 10q$

(a) Show that a firm in this industry maximizes profit by producing $q = \frac{P-10}{2}$

(b) Derive the industry supply curve and show that it is $Q_S = 25P - 250$

(c) Find the market price and aggregate quantity traded in equilibrium.

(d) How much output does each firm produce? Show that each firm earns zero profit in equilibrium.

Example: Perfect competition II

Find the short run equilibrium price and quantity if:

- Demand: $Q^d = 1100 - 50P$
- 20 Firms, each firm's total cost is

$$Tc(q) = 30 + 10q + q^2$$

- Figure out the short-run equilibrium price.
- Is the market in its long run equilibrium? If not, what will happen?
- Solve for the long run equilibrium price, quantity, and the number of firms.