

Unit 6.
Firm behaviour
and market structure:
perfect competition

In accordance with the APT programme objectives of the lecture are to help You to:

- determine short-run and long-run equilibrium, both for the profit-maximizing individual firm and for the industry;
- explain the equilibrium relationships among price, marginal and average revenues, marginal and average costs, and profits;
- understand the adjustment process to long-run equilibrium.

Required reading

Begg, D., R.Dornbusch, S.Fischer. Economics. 8th edition. McGraw Hill. 2005.

Chapter 8. Perfect competition and pure monopoly:

8.1. Perfect competition;

8.2. A perfectly competitive firm's supply decision;

8.3. Industry supply curves;

8.4. Comparative statics for a competitive industry;

8.5. Global competition.

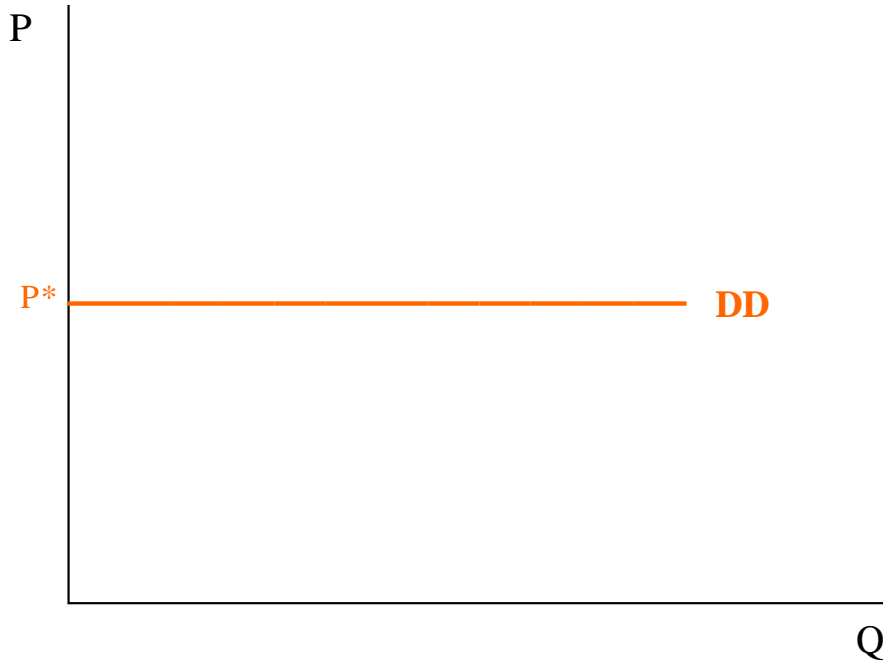
Questions to be revised

- ✓ The relationships among the short-run and long-run costs: total, average and marginal;
- ✓ Total and marginal revenue;
- ✓ The profit-maximizing rule;
- ✓ Market supply and the law of supply;
- ✓ Market equilibrium;
- ✓ Efficiency of a competitive market;
- ✓ Tax incidence and dead weight loss.

Perfect Competition

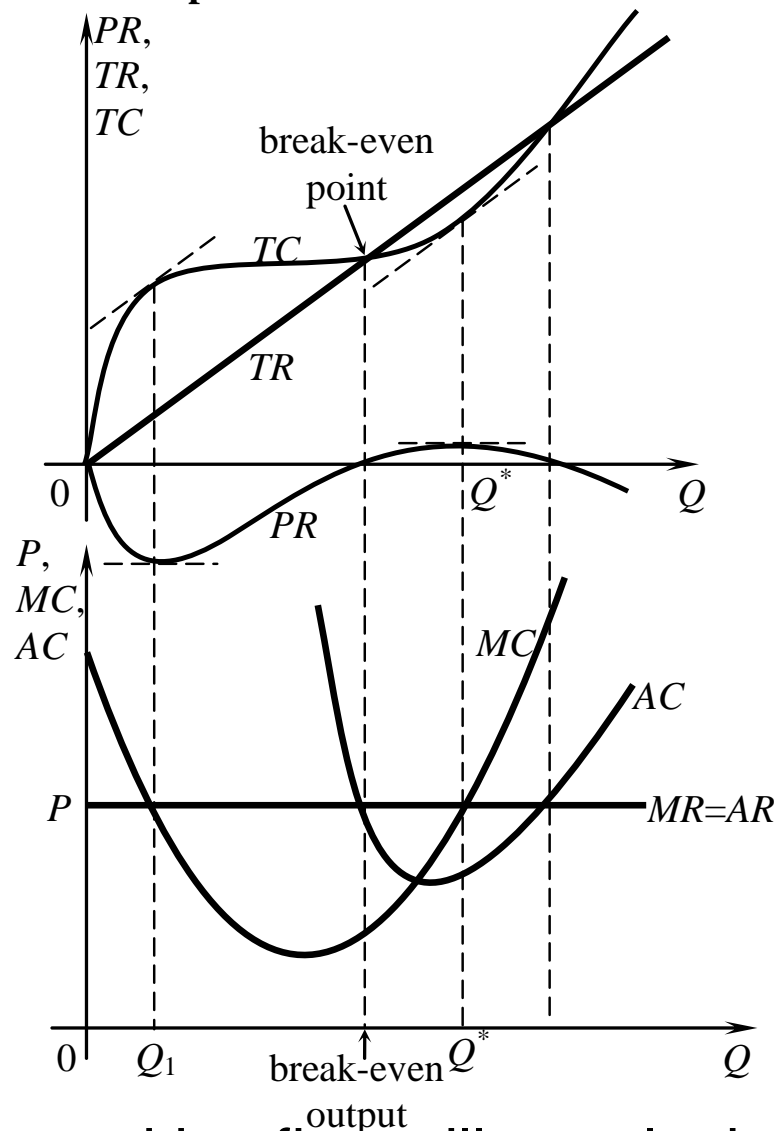
- Many buyers and sellers
- Each market participant is too small to affect the market price: firms are price-takers
- All firms produce an identical (homogeneous) good
- Free entry and exit

Competitive Firm's Demand Curve



- A competitive firm can sell as much as it wants at the market price P^* .
- It cannot sell anything at a higher price.
- Its demand curve DD is horizontal.

Profit maximization by a competitive firm in short run.



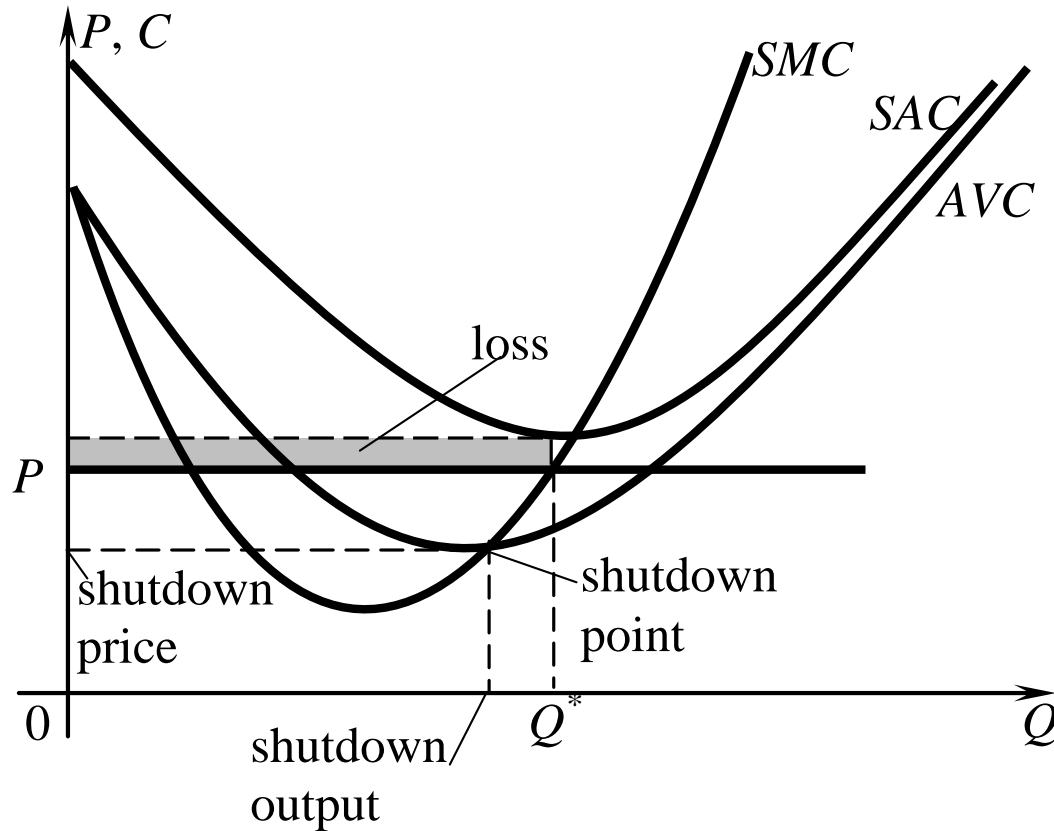
A competitive firm will supply the product according to the rule: $P=MC(Q)$.

Example: APT 1999

Question 3

- b. For the perfectly competitive (a price taker) firm, explain why the relationship between demand and marginal revenue exists.

Short-Run Output Decision and Supply

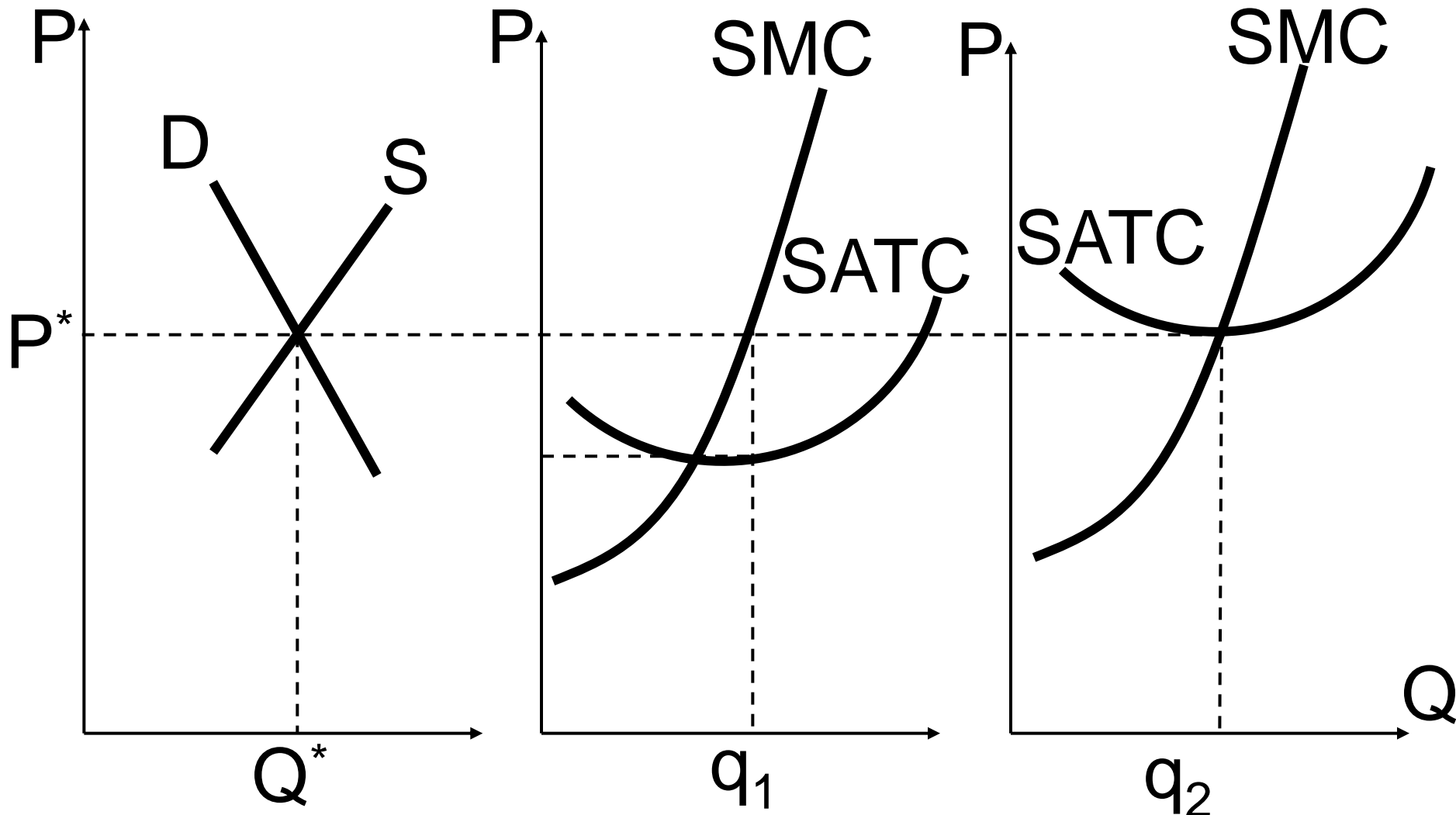


A competitive firm will supply the product in short run according to the rule $P=MC(Q)$ if $MC \geq AVC_{min}$.

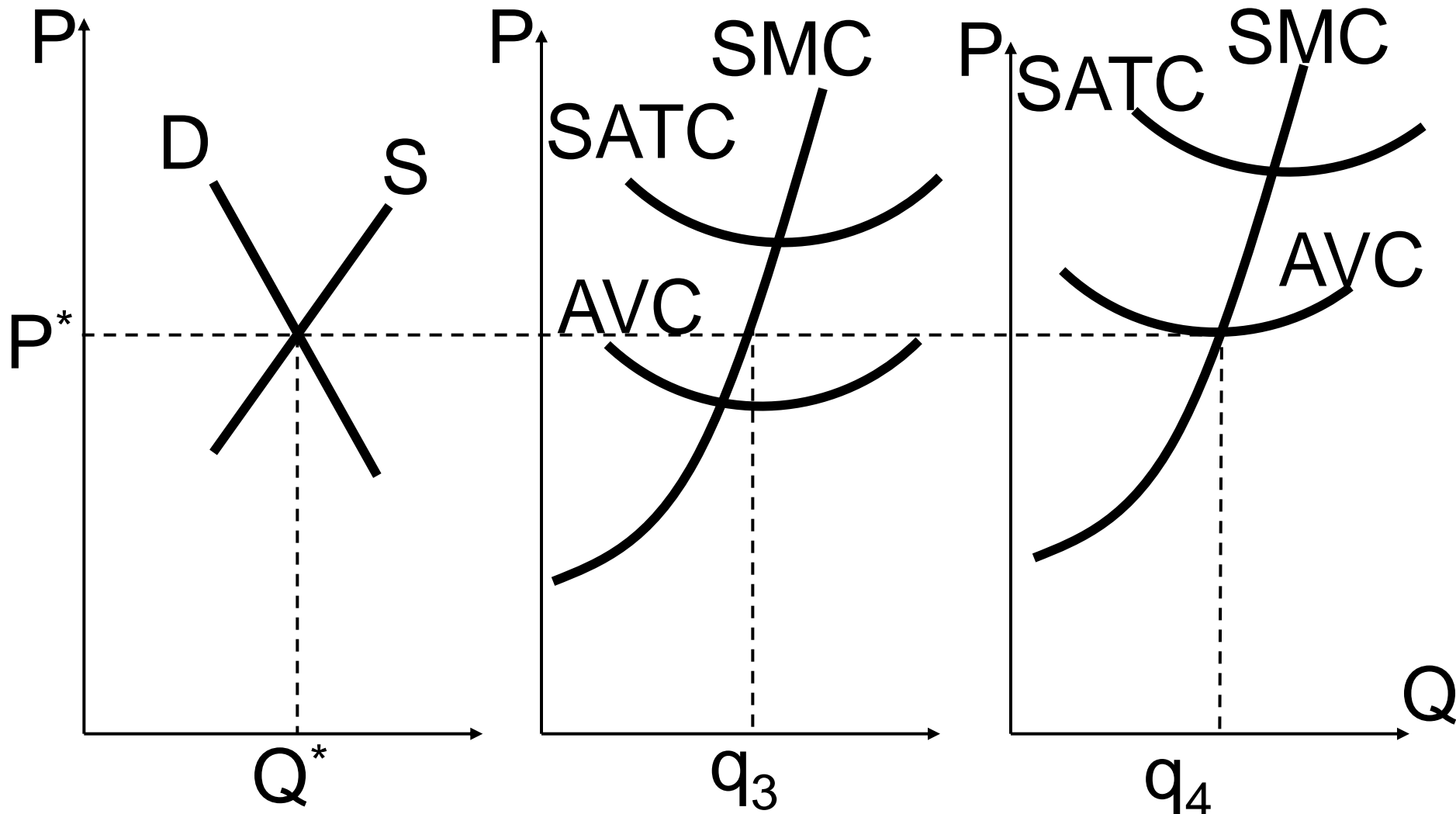
Example: APT 2007, form B (continued)

3. For each of the following statements, indicate whether it is true, false, or uncertain and explain why.
- (a) Average total cost is always greater than average variable cost by a constant amount.
 - (b) In the short run, a perfectly competitive firm always maximizes profit when average total cost is at minimum.
 - (c) If a firm shuts down in the short run, its profits will equal zero.

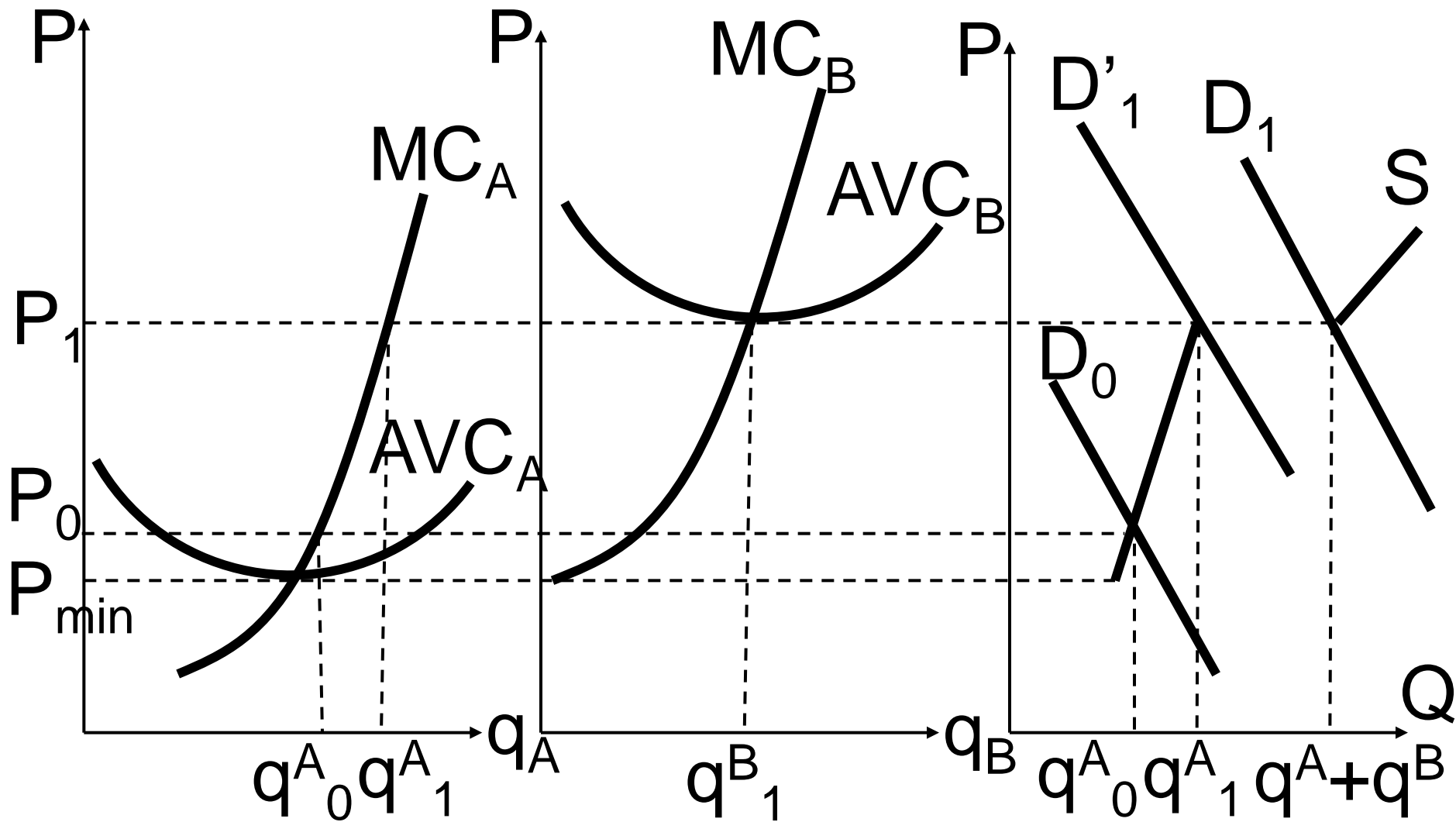
Equilibrium of a competitive firm and industry in the short run



Equilibrium of a competitive firm and industry in the short run



Short-Run Industry Supply Curve



Long-Run Output Decision

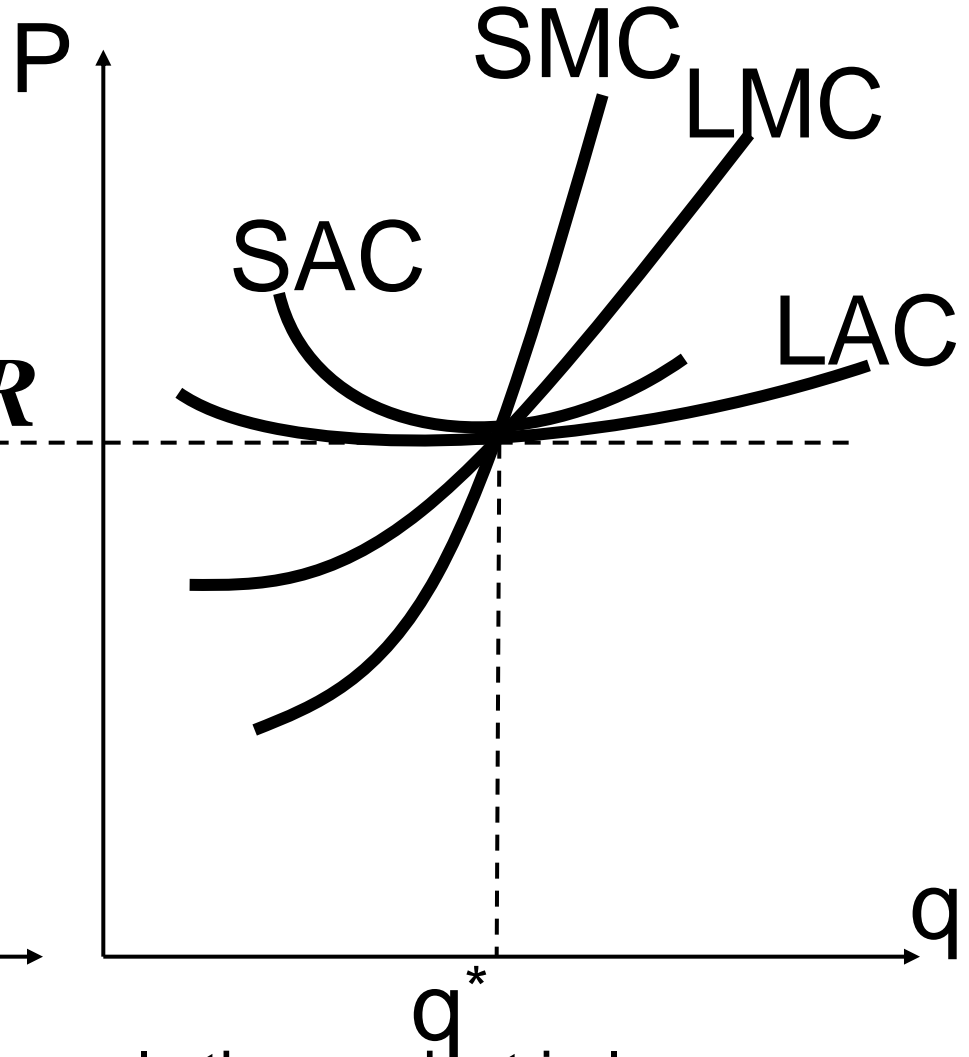
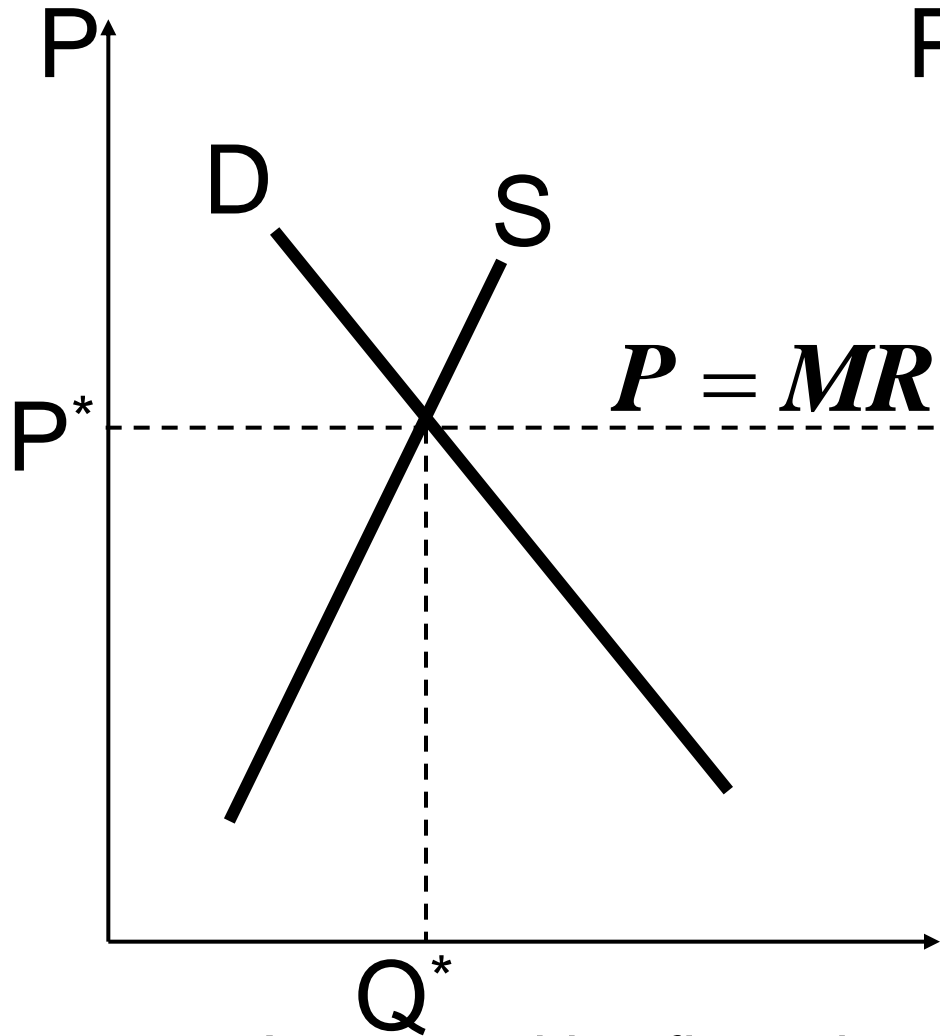
Firm (Producer) makes decisions:

- 1) whether it wants to be in the market, and, if so,
- 2) how much output to produce.

Decision 2: $MR=P=MC$;

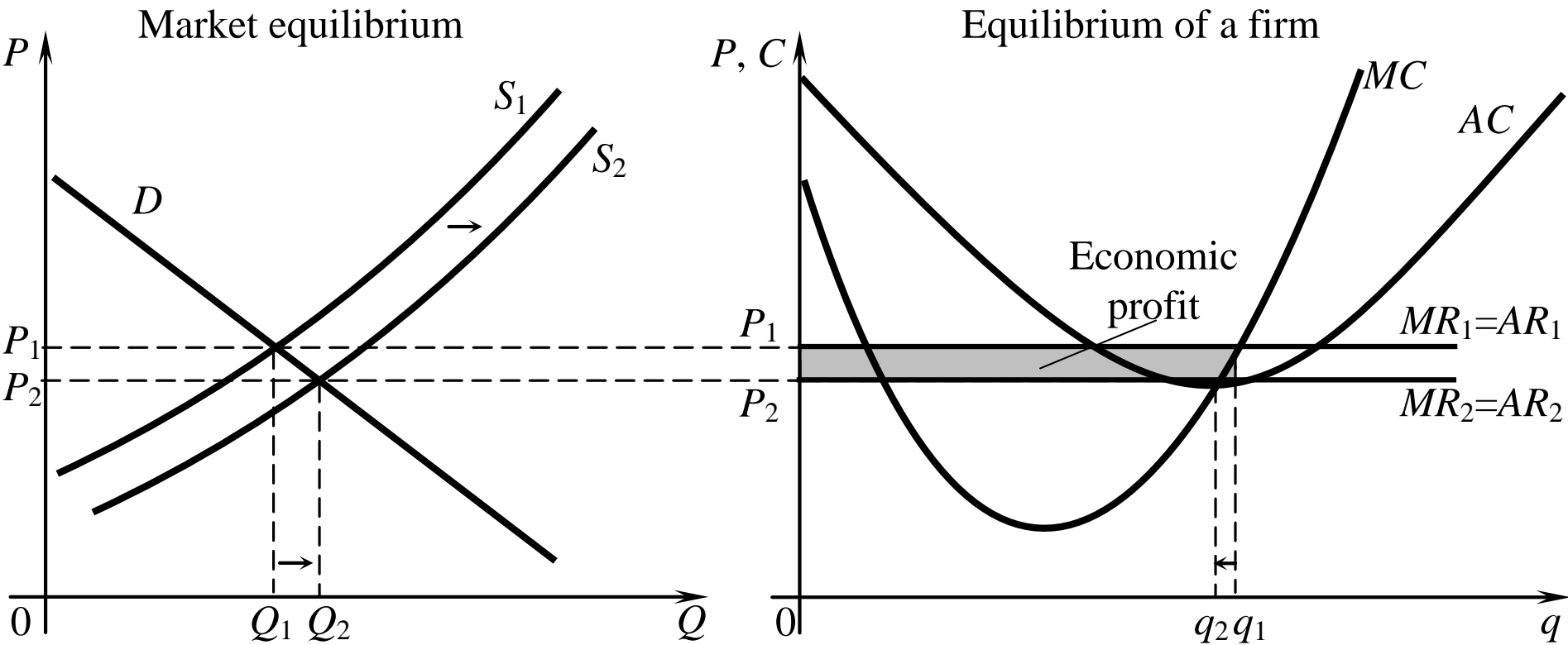
Decision 1: Price must exceed average cost.

Long-Run Output Decision and Supply



A competitive firm will supply the product in long run according to the rule $P=MC(Q)$ if $MC \geq AC_{min}$.

Equilibrium of a competitive firm and industry in long run.



- When the market price exceeds P_2 , a typical firm can make an economic profit.
- Hence many new firms will enter, and the price will fall back to P_2 .

Comparative Statics for a Competitive Industry

Equilibrium:

SR: market price equates the quantity demanded to the total quantity supplied by the given number of firms in the industry when each firm produces on its short-run supply curve;

LR: market price equates the quantity demanded to the total quantity supplied when each firm produces on its long-run supply curve, and the marginal firm makes only normal profits.

$$P = MR = LMC = SMS$$

$$P = LAC = SAC$$

Example: APT 2006 (continued)

Short-Run Total Cost Function

Quantity Produced	Total Cost (in dollars)
0	20
1	27
2	38
3	53
4	72
5	95
6	122

2. The table above gives the short-run total cost function for a typical firm in a perfectly competitive industry.
- What is the dollar value of the firm's total fixed cost?
 - Calculate the marginal cost of producing the first unit of output.
 - If the price the firm receives for its product is \$20, indicate the firm's profit-maximizing quantity of output and explain how you determined your answer.
 - Given your results in part (c), explain what will happen to the number of firms in the industry in the long run.

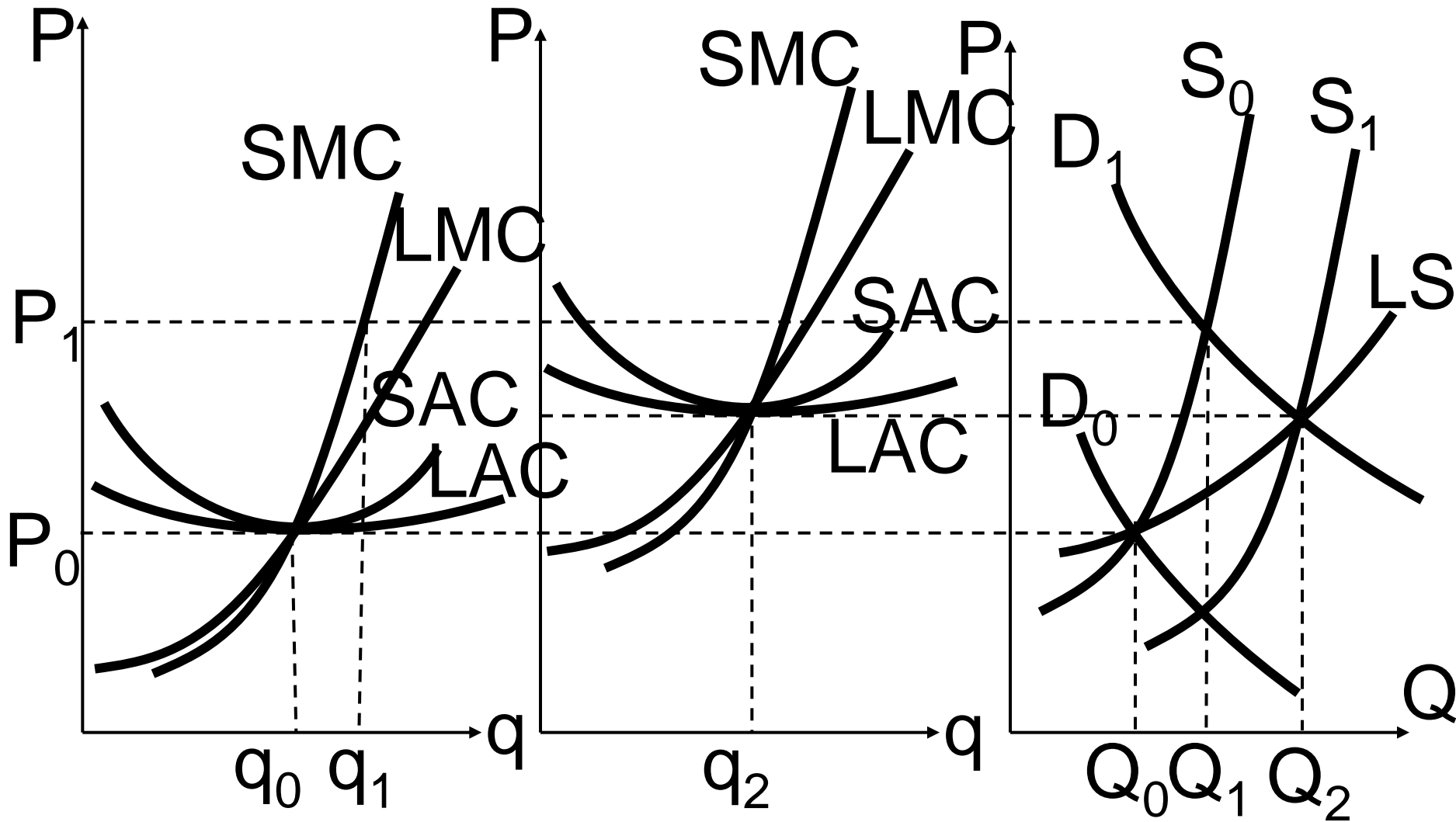
Example: APT 2003

1. J & P Company operates in a perfectly competitive market for smoke alarms. J & P is currently earning short-run positive economic profits.
 - (a) Using correctly labeled side-by-side graphs for the smoke alarm market and J & P Company, indicate each of the following for both the market and the J & P Company.
 - (i) Price
 - (ii) Output
 - (b) In the graph in part (a) for J & P, indicate the area of economic profits that J & P Company is earning in the short run.
 - (c) Using a new set of correctly labeled side-by-side graphs for the smoke alarm market and J & P Company, show what will happen in the long run to each of the following.
 - (i) Long-run equilibrium price and quantity in the market
 - (ii) Long-run equilibrium price and quantity for J & P Company

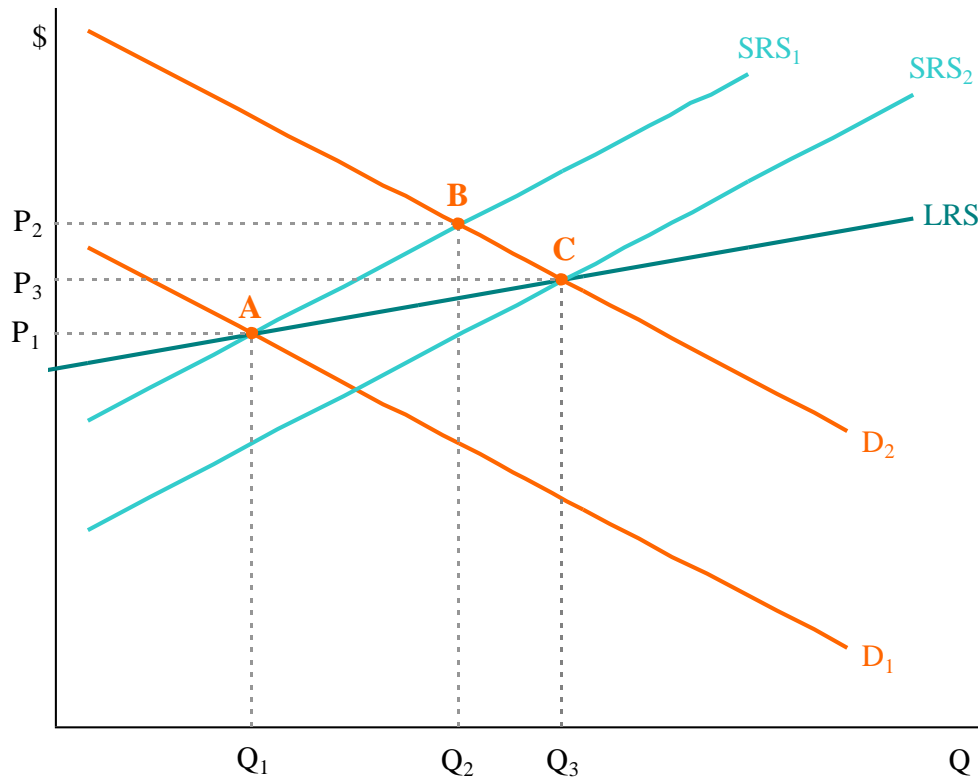
Industry Supply Curves

- Industry SRS - horizontal sum of the SRS curves of individual (existing) firms.
- Industry LRS - horizontal sum of the LRS curves of existing firms and *firms that might potentially enter the industry*.
- LRS curve is flatter than the SRS curve.

Upward-sloping Long-Run Supply Curve in an Increasing Cost Industry



Upward-sloping Long-Run Supply Curve in an Increasing Cost Industry

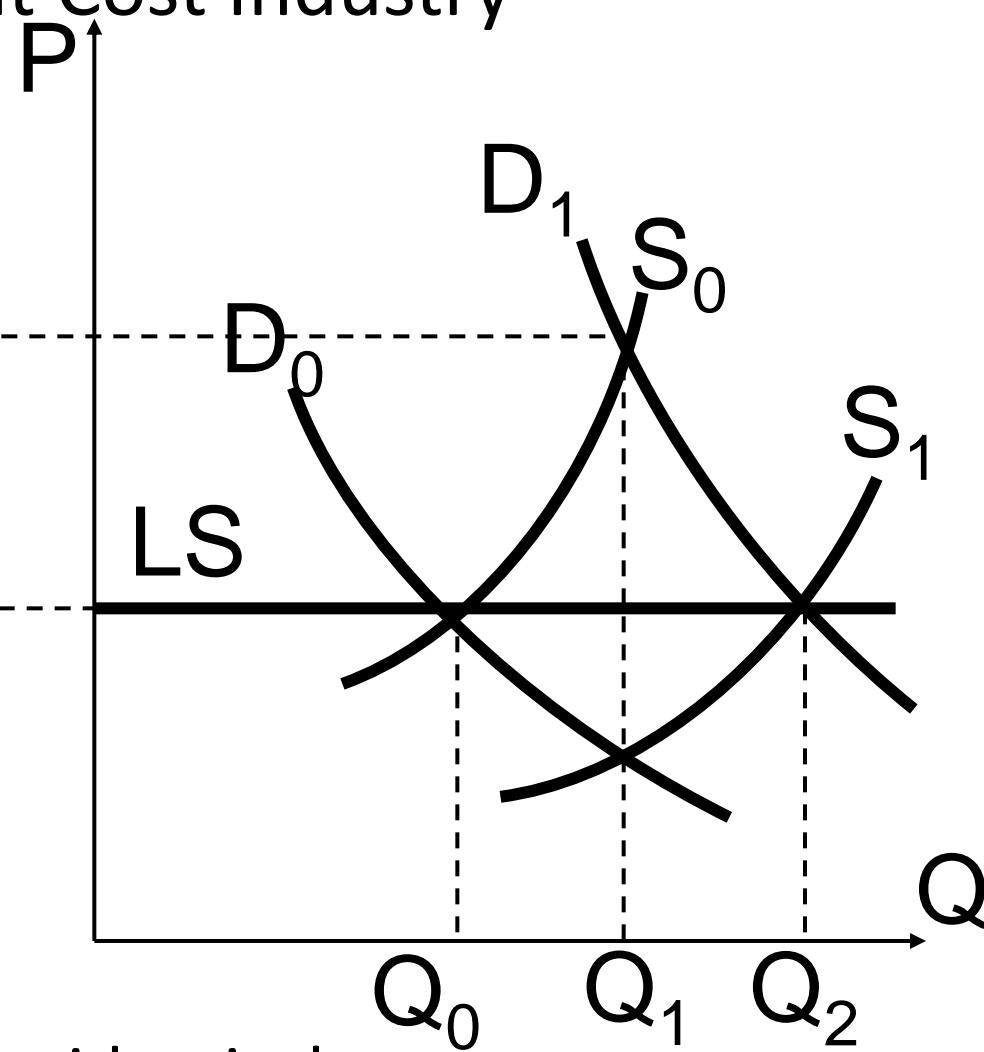
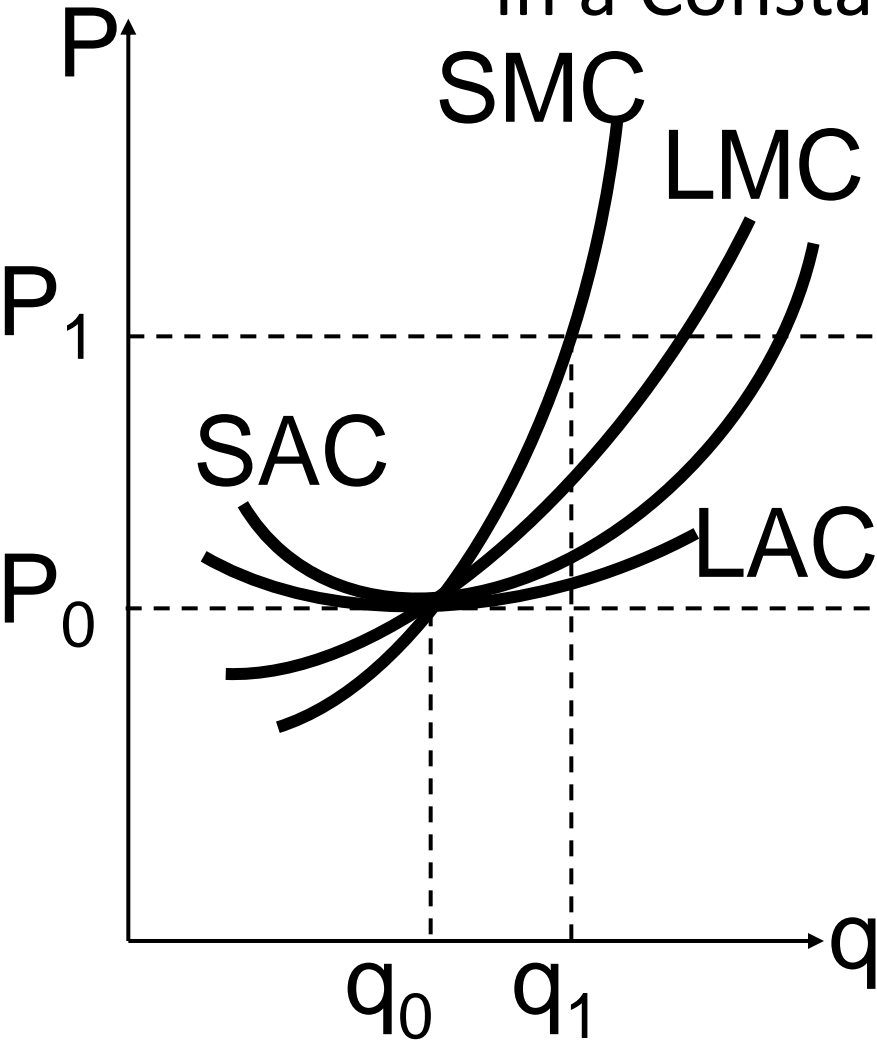


- With an expansion of output of the industry input prices go up or higher-costs producers enter the market.
- A is the point of the initial short-run and long-run equilibrium.
- An increase in demand shifts the demand curve to the right (or up).
- In the short run the equilibrium moves from A to B. $Q \uparrow$, $P \uparrow$
Existing firms make positive economic profits.
- In the long run existing firms expand their capital stock, new firms enter the industry, SRS curve shifts down. The equilibrium moves from B to C. $Q \uparrow$, $P \downarrow$

Example: APT 2011, form B

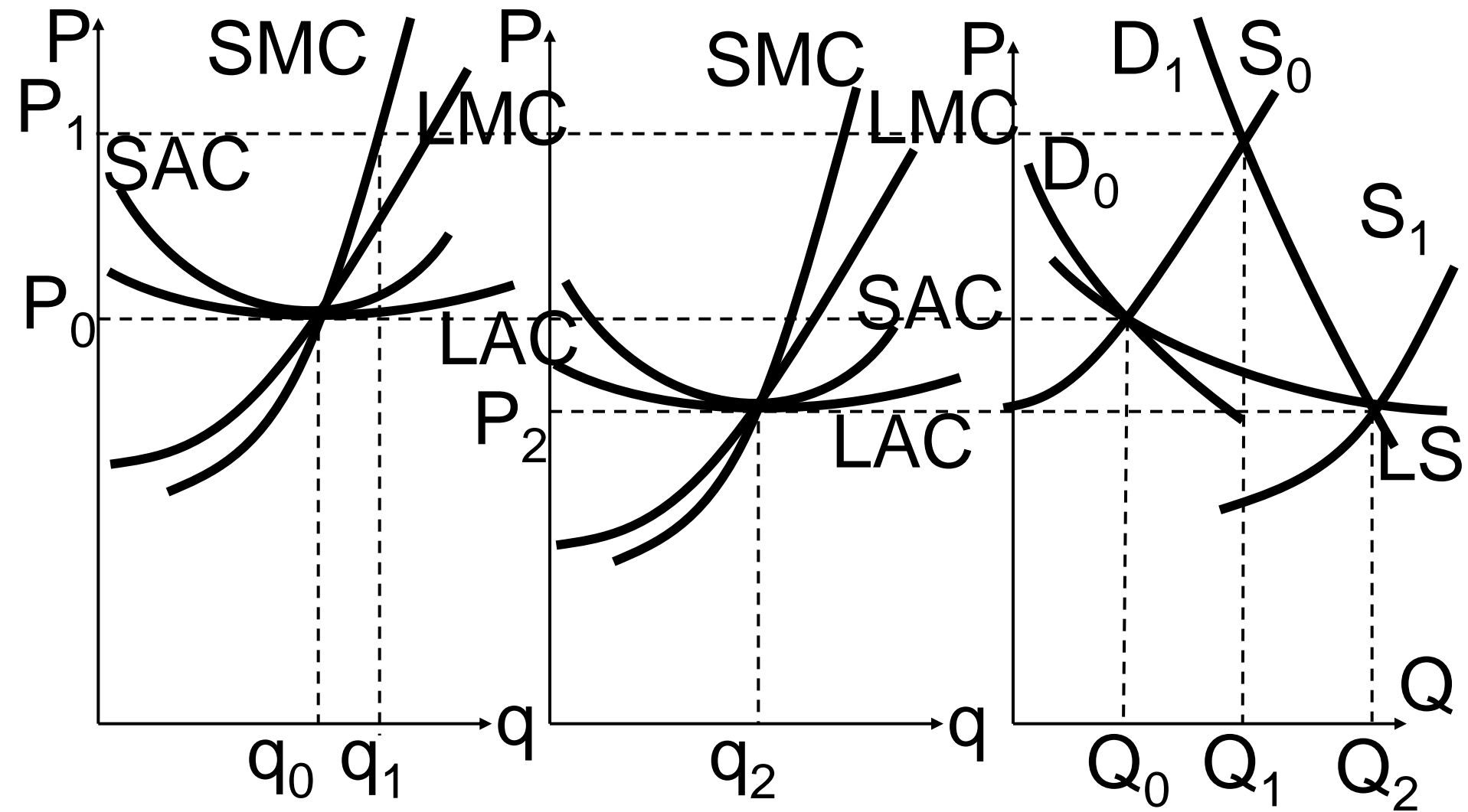
1. Suppose that roses are produced in a perfectly competitive, increasing-cost industry in long-run equilibrium with identical firms.
 - (a) Draw correctly labeled side-by-side graphs for the rose industry and a typical firm and show each of the following.
 - (i) Industry equilibrium price and quantity, labeled P_m and Q_m , respectively
 - (ii) The firm's equilibrium price and quantity, labeled P_f and Q_f , respectively
 - (b) Is P_m larger than, smaller than, or equal to P_f ?
 - (c) Assume that there is an increase in the demand for roses. On your graphs in part (a), show each of the following.
 - (i) The new short-run industry equilibrium price and quantity, labeled P_{m2} and Q_{m2} , respectively
 - (ii) The new short-run profit-maximizing price and quantity for the typical firm, labeled P_{f2} and Q_{f2} , respectively
 - (d) As the industry adjusts to a new long-run equilibrium,
 - (i) what will happen to the number of firms in the industry? Explain.
 - (ii) will the firm's average total cost curve shift upward, shift downward, or remain unchanged?
 - (e) In the long run, compare the firm's profit-maximizing price to each of the following.
 - (i) P_f in part (a)(ii)
 - (ii) P_{f2} in part (c)(ii)

Horizontal Long-Run Supply Curve in a Constant Cost Industry

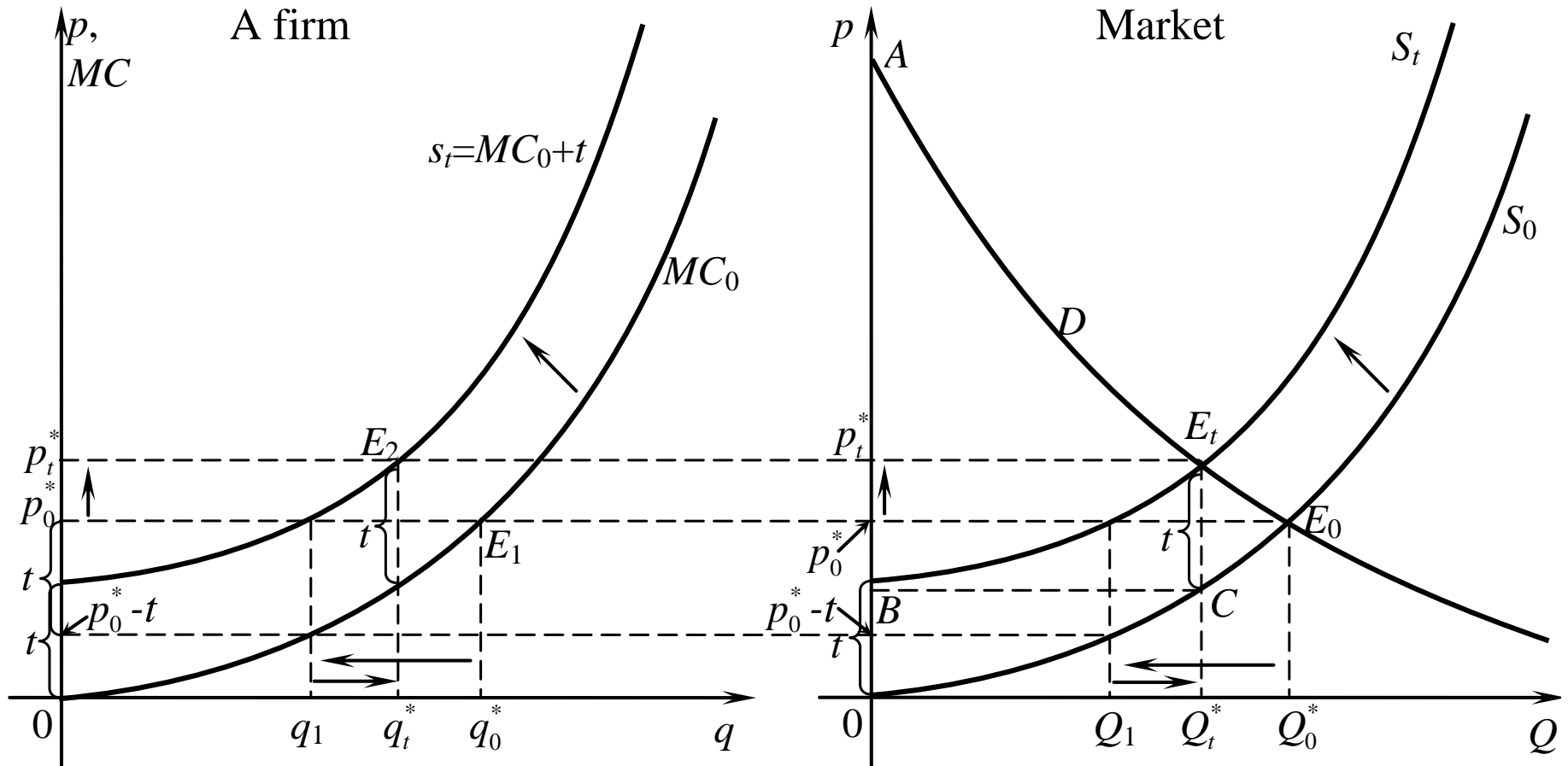


- All firms are identical
- Input costs do not change with output

Downward-sloping Long-Run Supply Curve in a Decreasing Cost Industry



Per unit tax and competitive equilibrium in short run



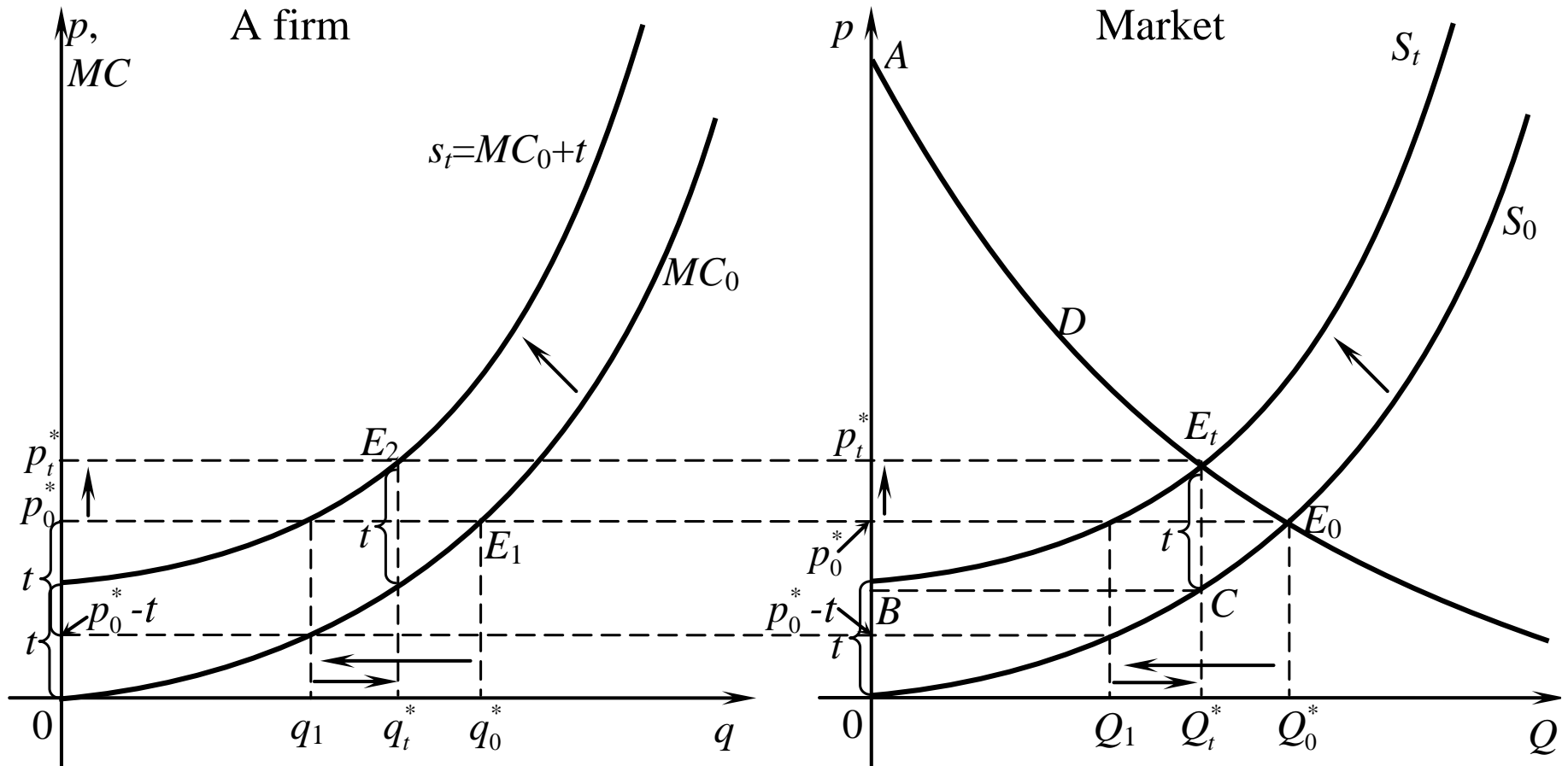
Profit without tax: $PR_0 = pq - TC_0(q)$

Profit maximization without tax: $p = MC_0(q)$

Profit with a per unit tax: $PR_t = pq - TC_0(q) - tq = (p - t)q - TC_0(q)$

Profit maximization with tax: $\frac{dPR_t}{dq} = p - t - MC_0(q) = 0$
 $p = MC_0(q) + t$

Per unit tax and competitive equilibrium in short run: welfare effects

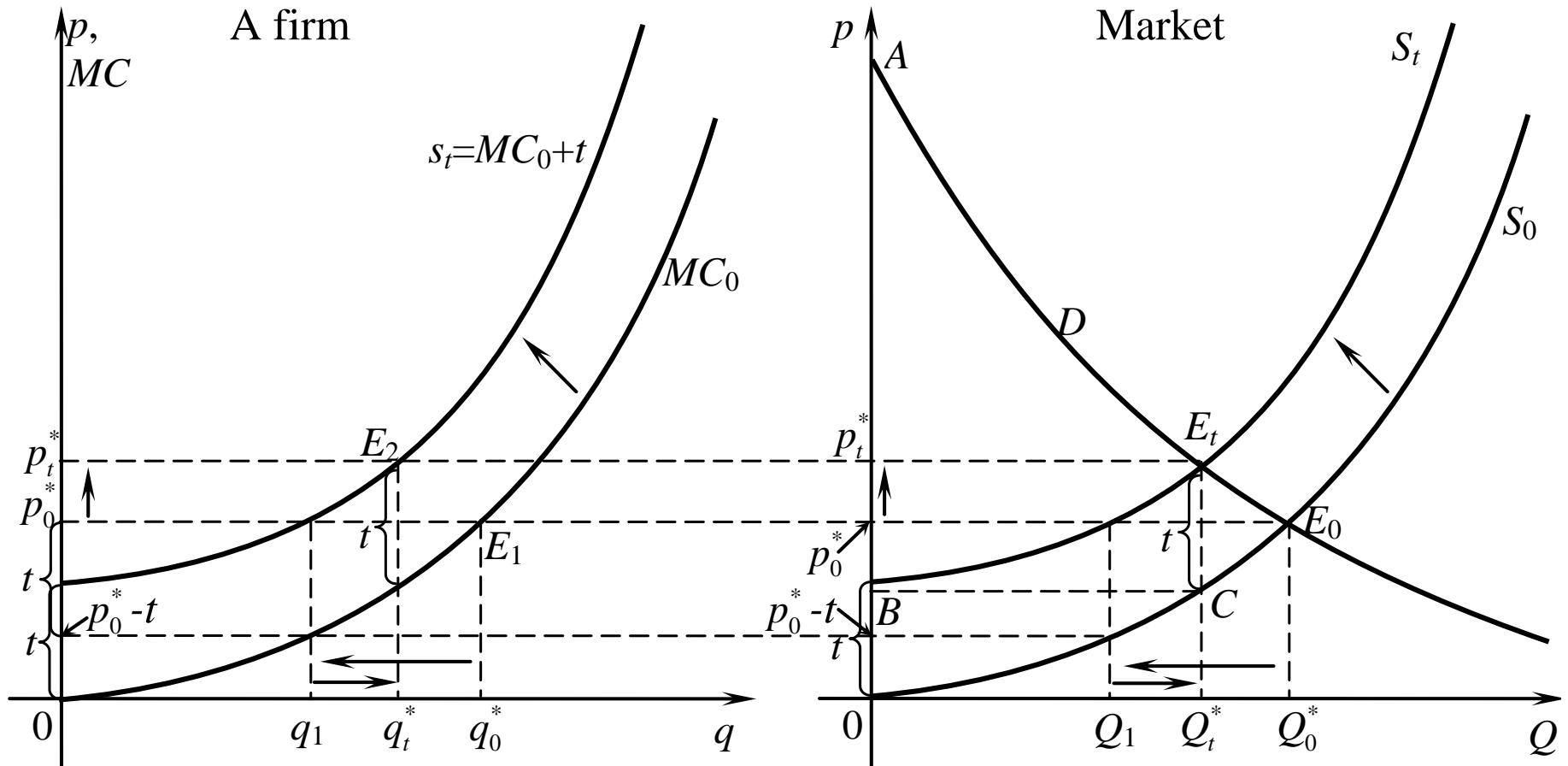


Consumer surplus without tax: $CS_0 = S_{Ap_0^*E_0}$

Consumer surplus with tax: $CS_t = S_{Ap_t^*E_t}$

Change in consumer surplus: $\Delta CS = S_{p_0^*p_t^*E_tE_0}$

Per unit tax and competitive equilibrium in short run: welfare effects



Variable cost without tax: $VC_0 = S_{0E_0Q_0^*}$

Producer surplus without tax: $PS_0 = TR_0 - VC_0 = S_{0p_0^*E_0}$

Variable cost with tax: $VC_t = S_{0CQ_t^*}$

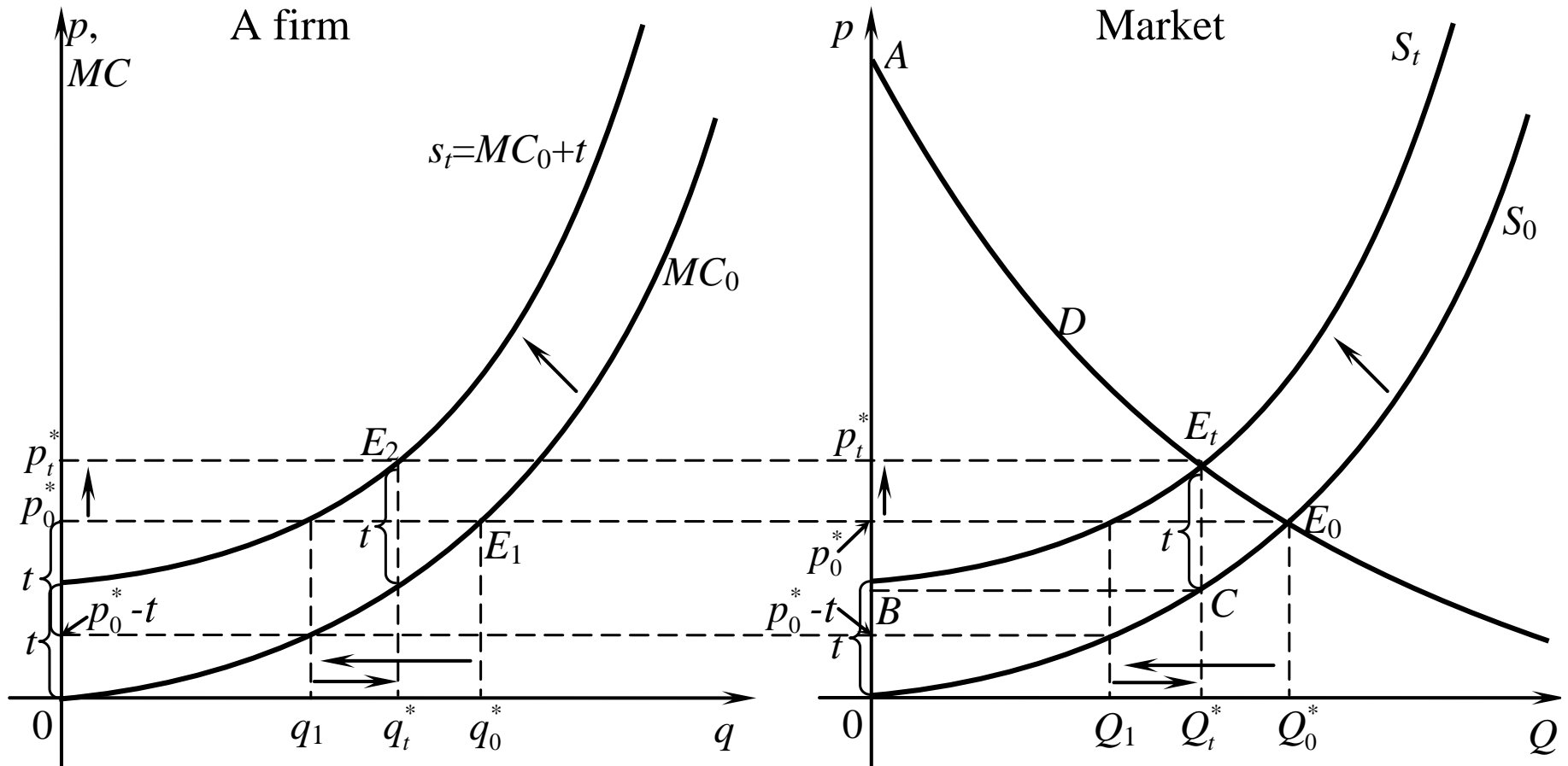
Producer surplus with tax: $PS_t = TR_t - T - VC_t = S_{0BC}$

Change in producer surplus: $\Delta PS = S_{Bp_0^*E_0F}$

Total revenue without tax: $TR_0 = S_{0p_0^*E_0Q_0^*}$

Total revenue with tax: $TR_t = S_{0p_t^*E_tQ_0^*}$

Per unit tax and competitive equilibrium in short run: welfare effects



Tax revenue of the government: $T = tQ_t^* = S_{Bp_t^*E_tC}$

$$DWL = \Delta CS + \Delta PS - T = S_{CE_tE_0}$$

Example: APT 2006 (continued)

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 - Calculate the marginal cost of producing the first unit of output.
 - If the price the firm receives for its product is \$20, indicate the firm's profit-maximizing quantity of output and explain how you determined your answer.
 - Given your results in part (c), explain what will happen to the number of firms in the industry in the long run.
 - Assume that this firm operates in a constant-cost industry and has reached long-run equilibrium. If the government imposes a per-unit tax of \$2, indicate what will happen to the firm's profit-maximizing output in the long run.