MICROECONOMICS 2

LECTURE 7
Competitive Firms and Markets

The love of money is the root of all virtue

George Bernard Shaw

Outline

Challenge

     The Rising Cost of Keeping on Truckin'

1. **Perfect Competition**

2. **Profit Maximization**

3. **Competition in the Short Run**

4. **Competition in the Long Run**

Challenge Solution

Challenge:
The Rising Cost of Keeping on Truckin'

Background

- In recent years, federal and state fees have increased substantially, and truckers have had to adhere to many new regulations.

- The many additional fees and costly regulations that a trucker or firm must pay to operate are largely lump-sum costs, which are not related to the number of miles driven.

Questions

- What effect do these new fixed costs have on the trucking industry's market price and quantity?

- Are individual firms providing more or fewer trucking services?

- Does the number of firms in the market rise or fall?

1. Perfect Competition

- **Market structure** provides information about how firms operating in the market will behave; it is a function of:

  - the number of firms in the market

  - the ease with which firms can enter and leave the market

  - the ability of firms to differentiate their products from those of their rivals

- **Perfect competition** is one type of market structure in which buyers and sellers choose to be price takers.

  - A firm is unable to sell its output at a price greater than market price. A consumer is unable to purchase at a price less than the market price.

  - This is what most people mean when they talk about "competitive firms."

Perfect Competition

- Perfect competition is a market structure in which:

  - there are a large number of firms

  - firms sell identical products

  - buyers and sellers have full information about prices charged by all firms

  - transaction costs, the expenses of finding a trading partner and completing the trade above and beyond the price, are low

  - firms can freely enter and exit the market

- Examples:

  - Agricultural/commodities markets like wheat and soybeans

  - Building and construction

Perfect Competition: Assumptions

1. Large number of firms

   - No single firm's actions can raise or lower the price.

   - Individual firm's demand curve is a horizontal line at market price.

2. Identical (homogeneous) products

   - If all firms are selling identical products, it is difficult for any firm to raise the price above the going market price charged by all firms.

3. Full information

   - Consumer knowledge of all firms' prices makes it easy for consumers to buy elsewhere if any one firm raised its price above market price.

4. Negligible transaction costs

   - Buyers and sellers waste little time or money finding each other.

5. Free entry and exit

   - Leads to large number of firms and promotes price taking.
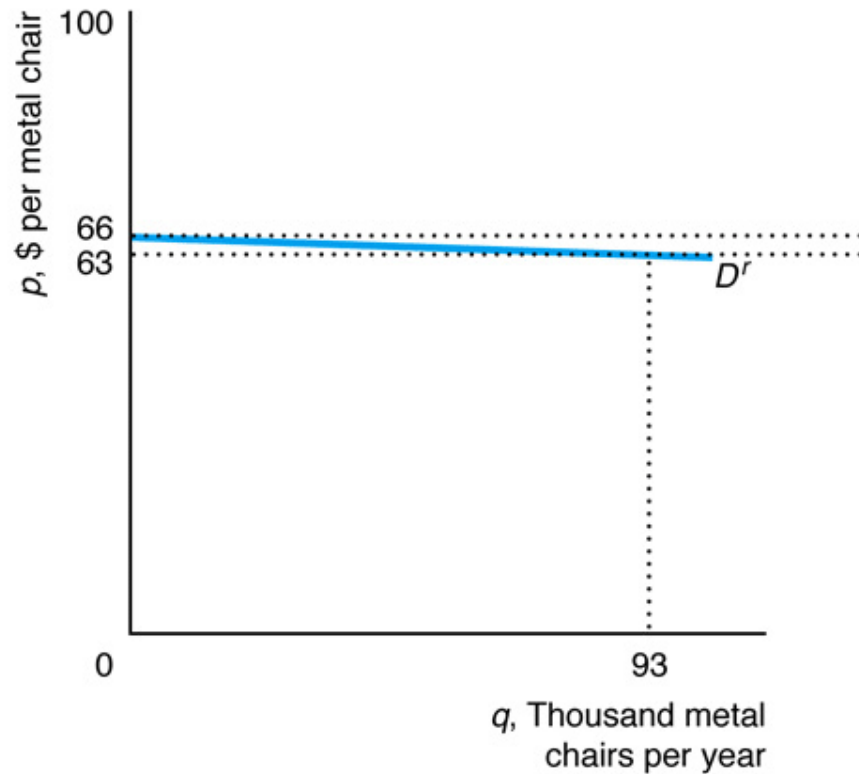
Competitive Firm's Demand

- Are perfectly competitive firms' demand curves really flat?

- A firm's residual demand curve, Dr(p), is the portion of the market demand that is not met by other sellers at any given price.
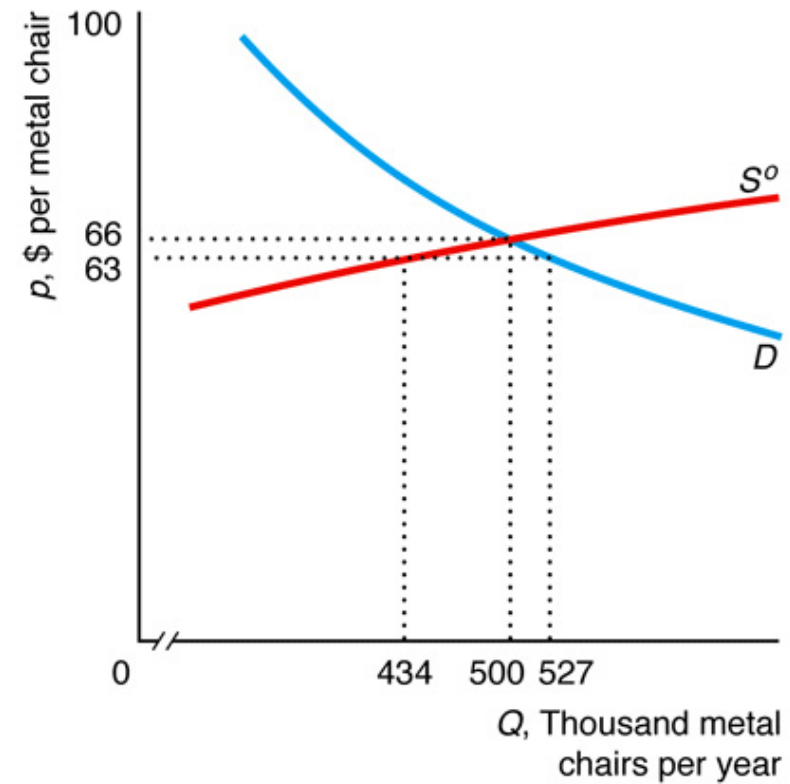
$$D^r(p) = D(p) - S^o(p)$$

- D(p) = market demand

- So(p) = amount supplied by other firms

- If not perfectly horizontal, the residual demand curve of an individual firm is much flatter than market demand.

Competitive Firm's Demand

(a) Firm

p, \$ per metal chair

100

66
63

D^r

0

93

q, Thousand metal chairs per year

(b) Market

p, \$ per metal chair

100

S^o

66
63

D

0

434   500 527

Q, Thousand metal chairs per year

2. Profit Maximization

- Profit maximization in this class always refers to **economic profit**, which is revenue minus opportunity cost.

  - Differs from business profit, which only subtracts off explicit costs from revenues.

- Maximizing profit involves two important questions:

  1. **Output decision:** If the firm produces, what output level (q*) maximizes its profit or minimizes its loss?

  2. **Shutdown decision:** Is it more profitable to produce q* or to shut down and produce no output?

Profit Maximization: Output rules

- A firm can use one of three equivalent output rules to choose how much output to produce:

    1. A firm sets its output where its profit is maximized.

    2. A firm sets its output where its marginal profit is zero.

    3. A firm sets its output where its marginal revenue equals its marginal cost.

- Output rules #1 and #2 are easily depicted in a single graph.

Profit Maximization: Output rules

Output rules #1 (maximum profit); and #2 (zero marginal profit) both point to q*.
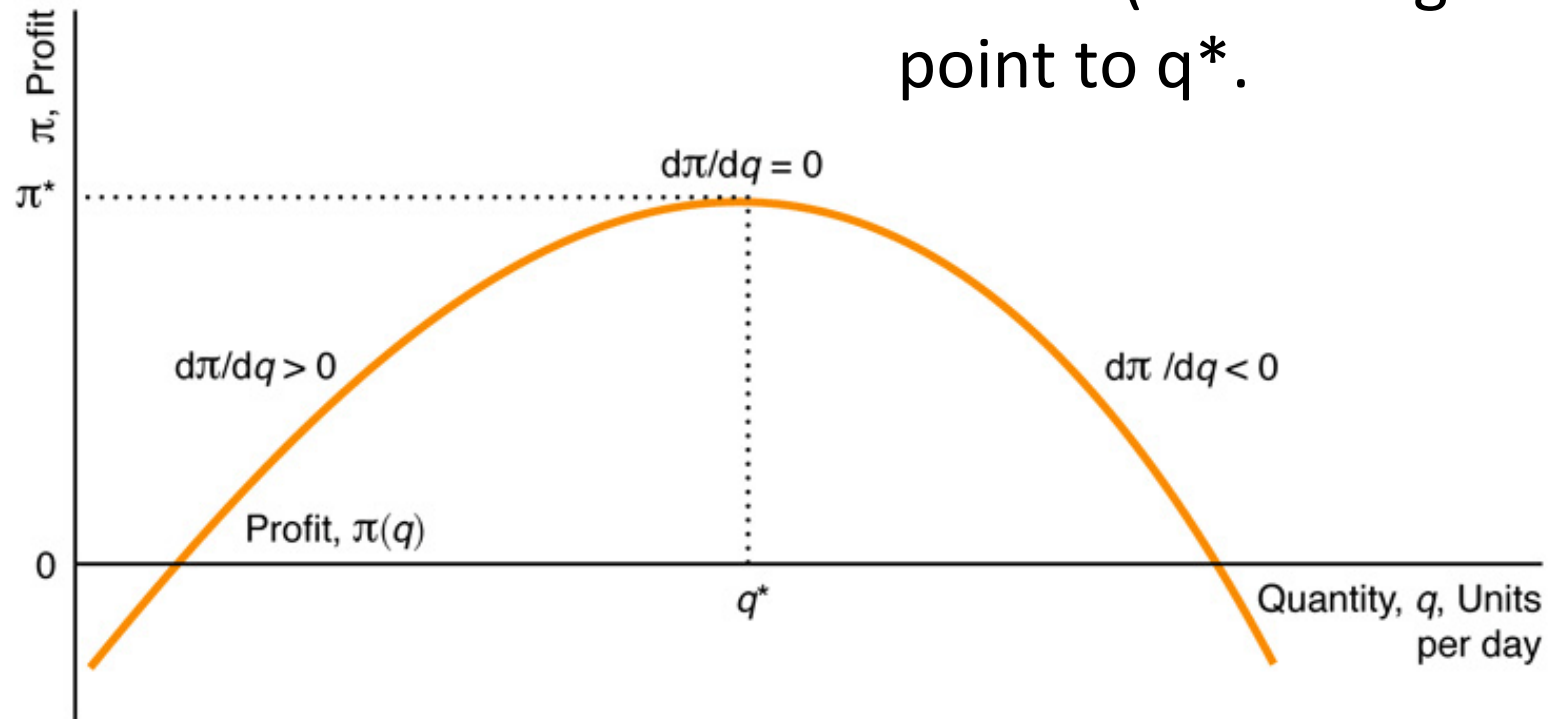
Profit Maximization: Output rules

- Output rule #3 (marginal revenue = marginal cost) is less obvious on the previous graph.

- Mathematically, if we take the derivative of π(q) = R(q) – C(q) with respect to output and set it equal to zero (output rule #2), we find:

$$\frac{\mathrm{d}\pi(q^*)}{\mathrm{d}q} = \frac{\mathrm{d}R(q^*)}{\mathrm{d}q} - \frac{\mathrm{d}C(q^*)}{\mathrm{d}q} = MR(q^*) - MC(q^*) = 0$$

$$MR(q^*) = MC(q^*)$$

Profit Maximization: Shutdown rules

- A firm shuts down only if it can reduce its loss by doing so.

  - **Shutting down** means that the firm stops producing (and thus stops receiving revenue) and stops paying avoidable costs.

  - Only fixed costs are unavoidable because they are sunk costs.

  - Firms compare revenue to variable cost when deciding whether to stop operating.

  - Shutting down may be temporary.

- The shut down decision is a short run decision because, in the long run all costs are avoidable.

3. Competition in the Short Run

- Given this general description of firms' profit maximization decisions, how do perfectly competitive firms maximize profits in the SR?

- Because it faces a horizontal demand curve, a competitive firm can sell as many units of output as it wants at the market price, p.

- Revenue is R(q) = pq, thus, q* satisfies:

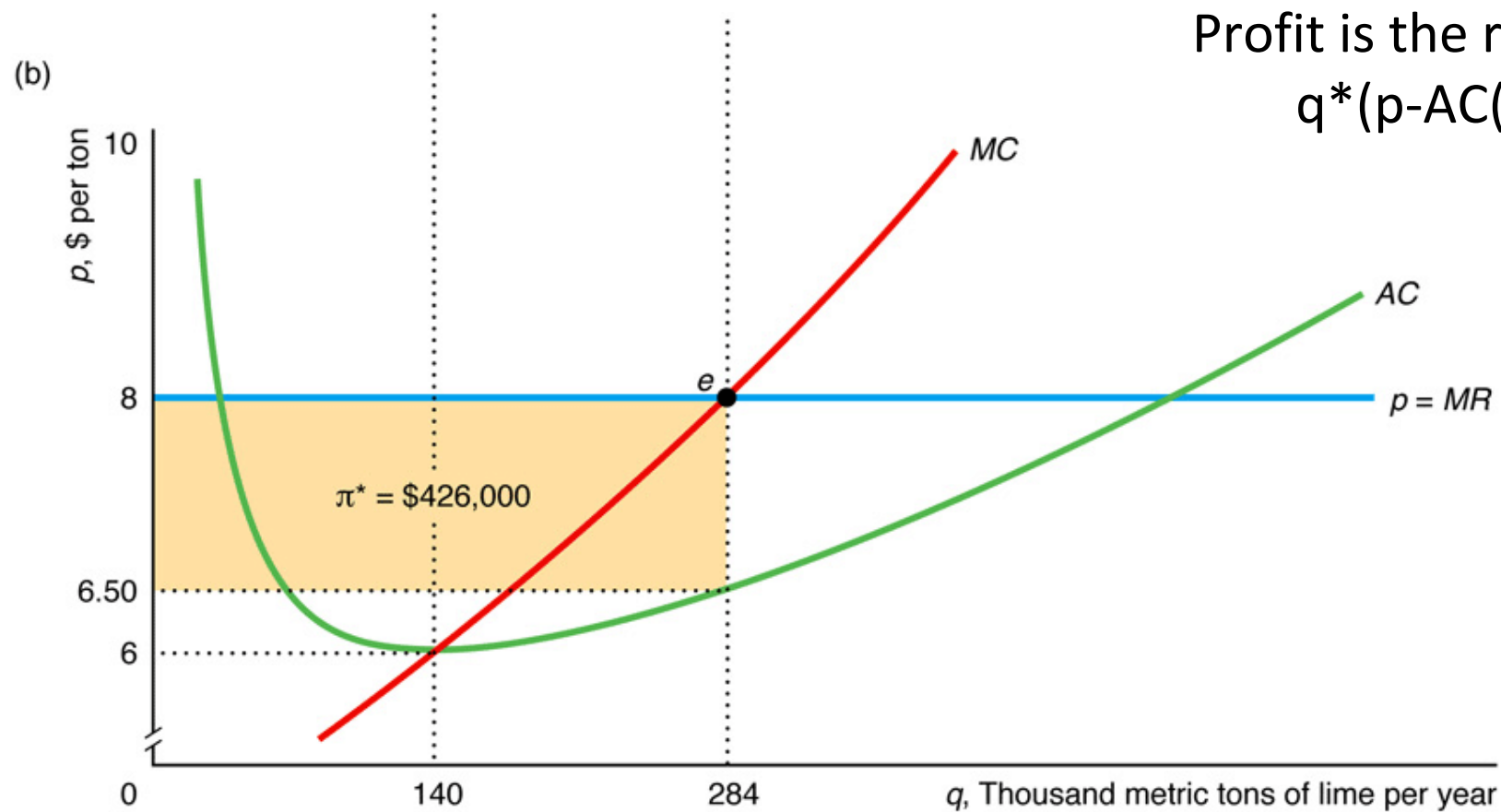$$\frac{d\pi(q^*)}{dq} = \frac{dpq^*}{dq} - \frac{dC(q^*)}{dq} = p - MC(q^*) = 0$$

- Marginal cost equals the market price

- MC = p is equivalent to MC = MR because MR = p in perfect competition.

Competition in the Short Run

Profit is maximized at q where Revenue-Cost is greatest

(a)

Competition in the Short Run

Profit is the rectangle
q*(p-AC(q*))
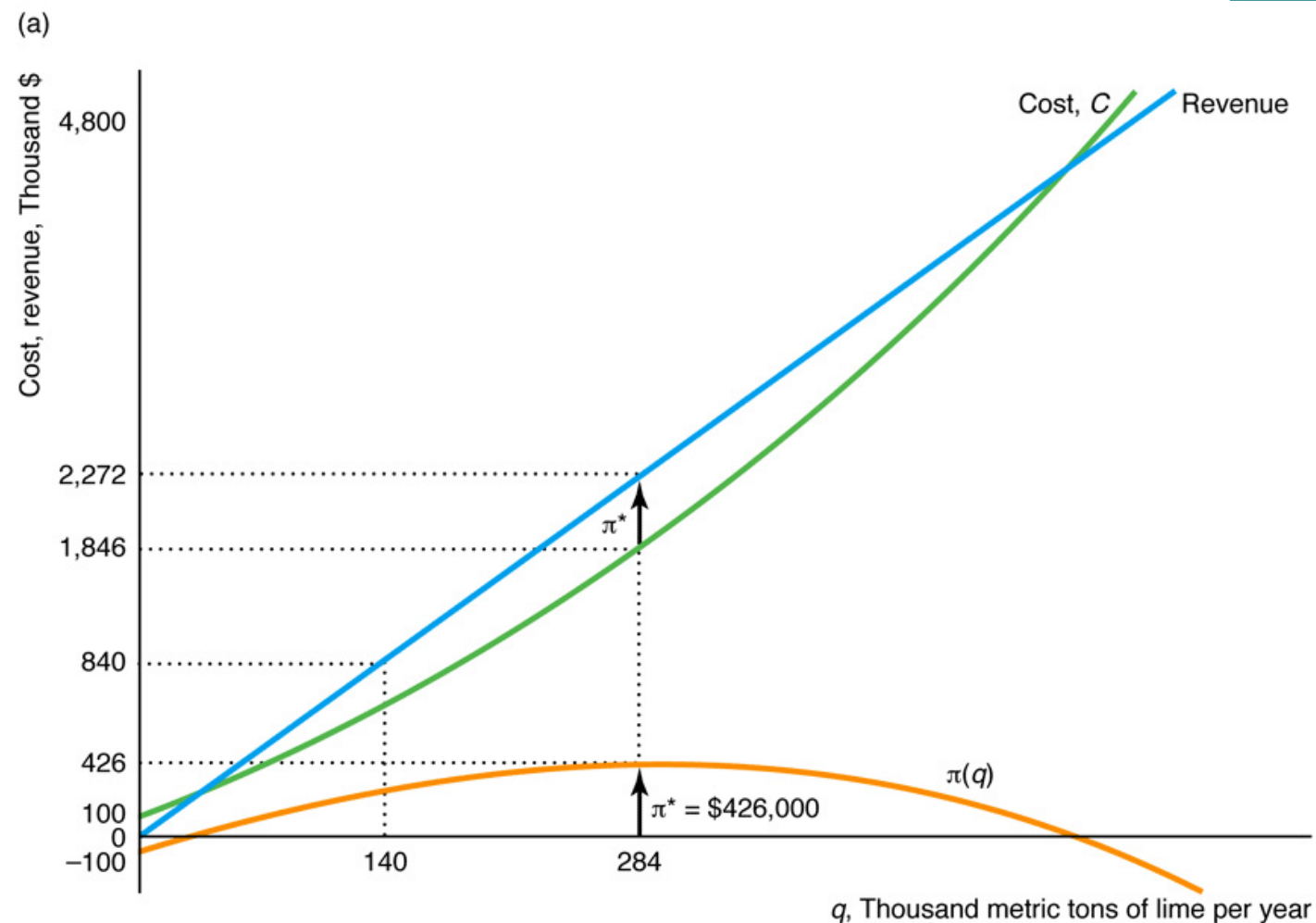
Competition in the Short Run

- The graph on the previous slide does not allow us to address the firm's shut down decision.

- Recall that firms compare revenues to variable costs to determine shutdown:

$$pq < VC(q) \qquad p < \frac{VC(q)}{q} = AVC$$

- Shut down if market price is less than the minimum of its SR average variable cost curve.

- Thus, our graphical analysis of firm profit maximization decisions require an AVC curve to address the shut down decision.

The Short-Run Shutdown Decision

If AC(q*)>p>AVC(q*), then firm operates, but at a loss.
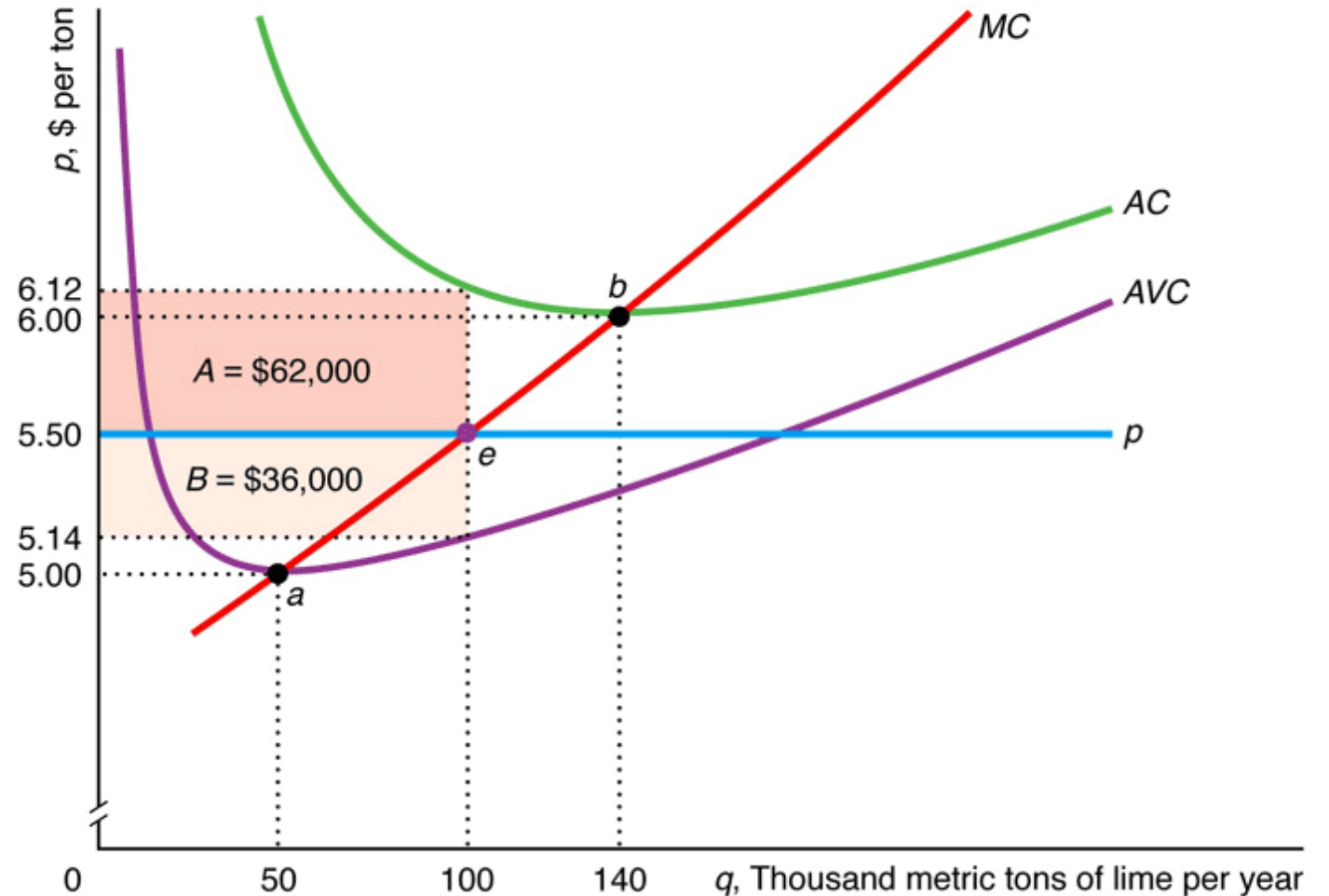
Short-Run Firm Supply Curve

- Firms will choose to produce as long as market price is above the AVC minimum, so that is where a firm's supply curve begins.

- As we consider higher and higher market prices, the horizontal firm demand curve rises and intersects MC at higher and higher quantities.

  - In this fashion, the relationship between market price and profit-maximizing quantity is traced out.

  - This is the perfectly competitive firm's supply curve.

Short-Run Firm Supply Curve

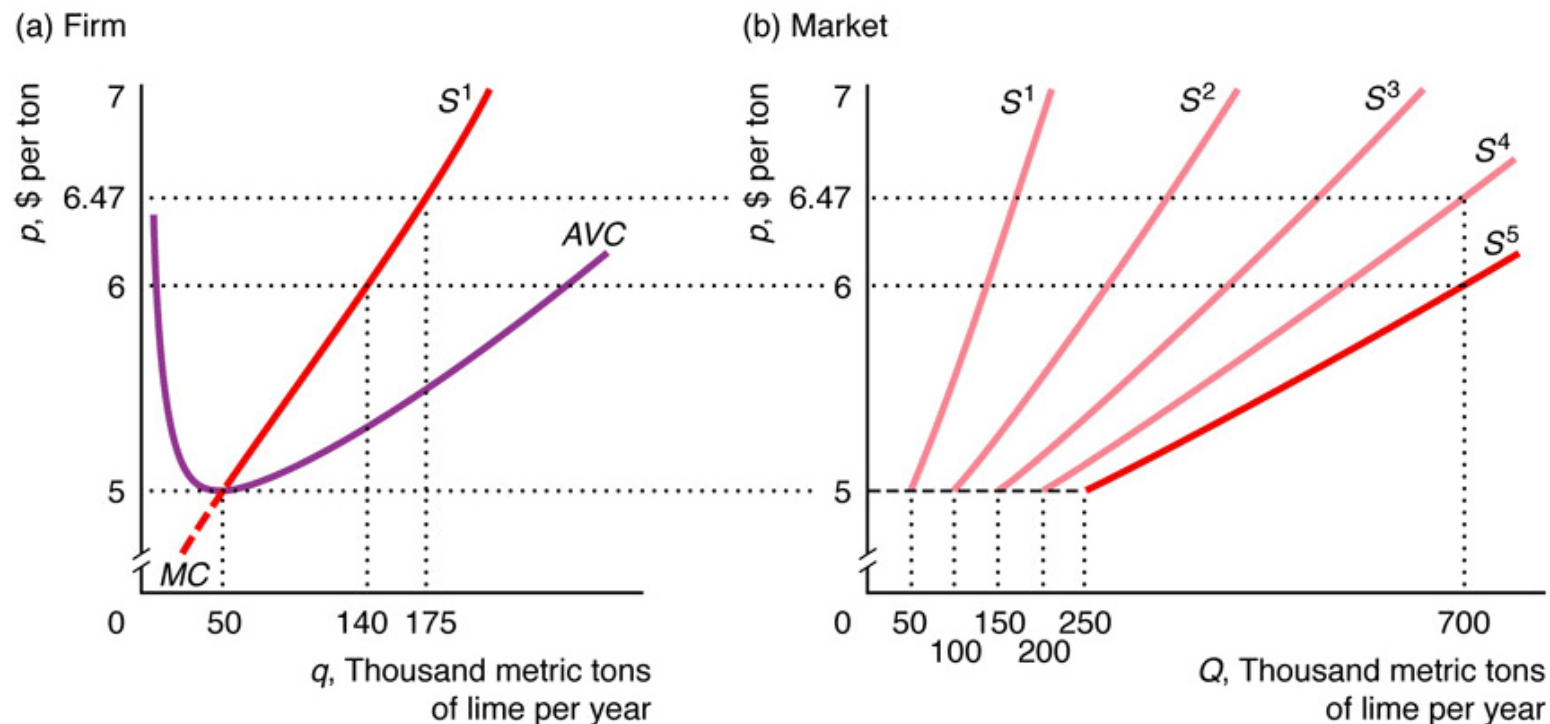S is the section of MC above min AVC.
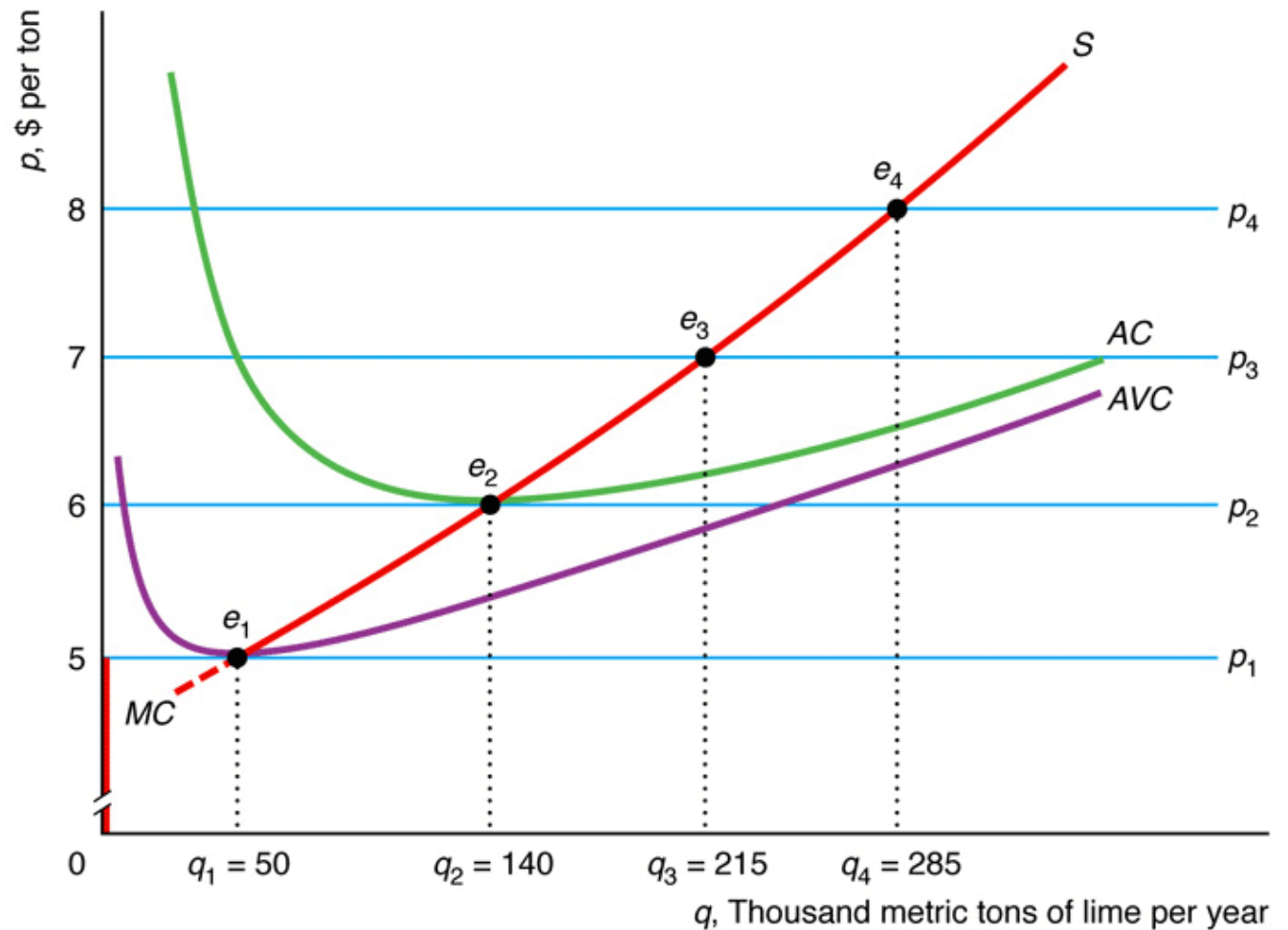
Short-Run Firm Supply Curve

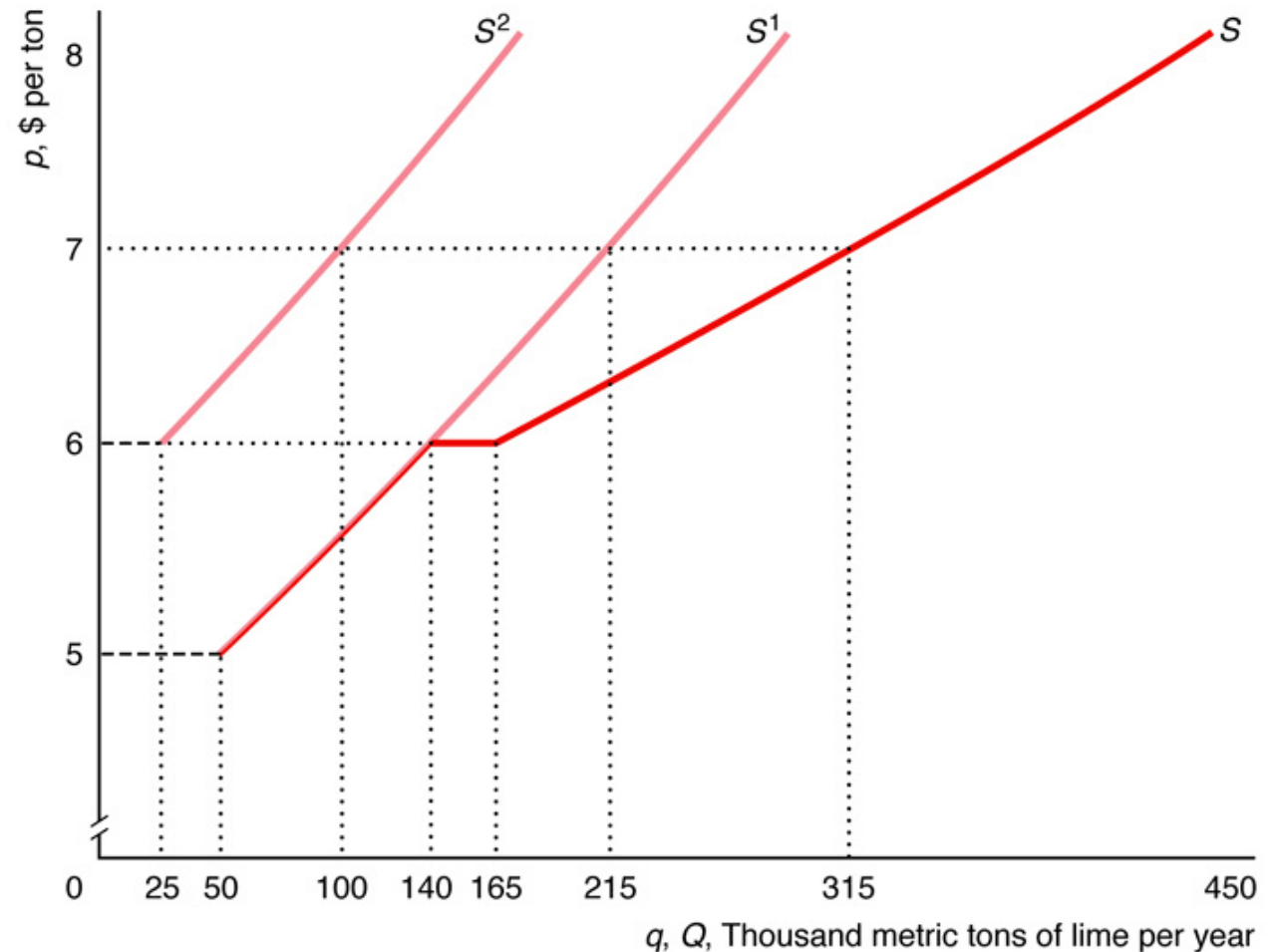If the prices of inputs (factor prices) increase, a firm's production costs rise, and its supply shifts left.
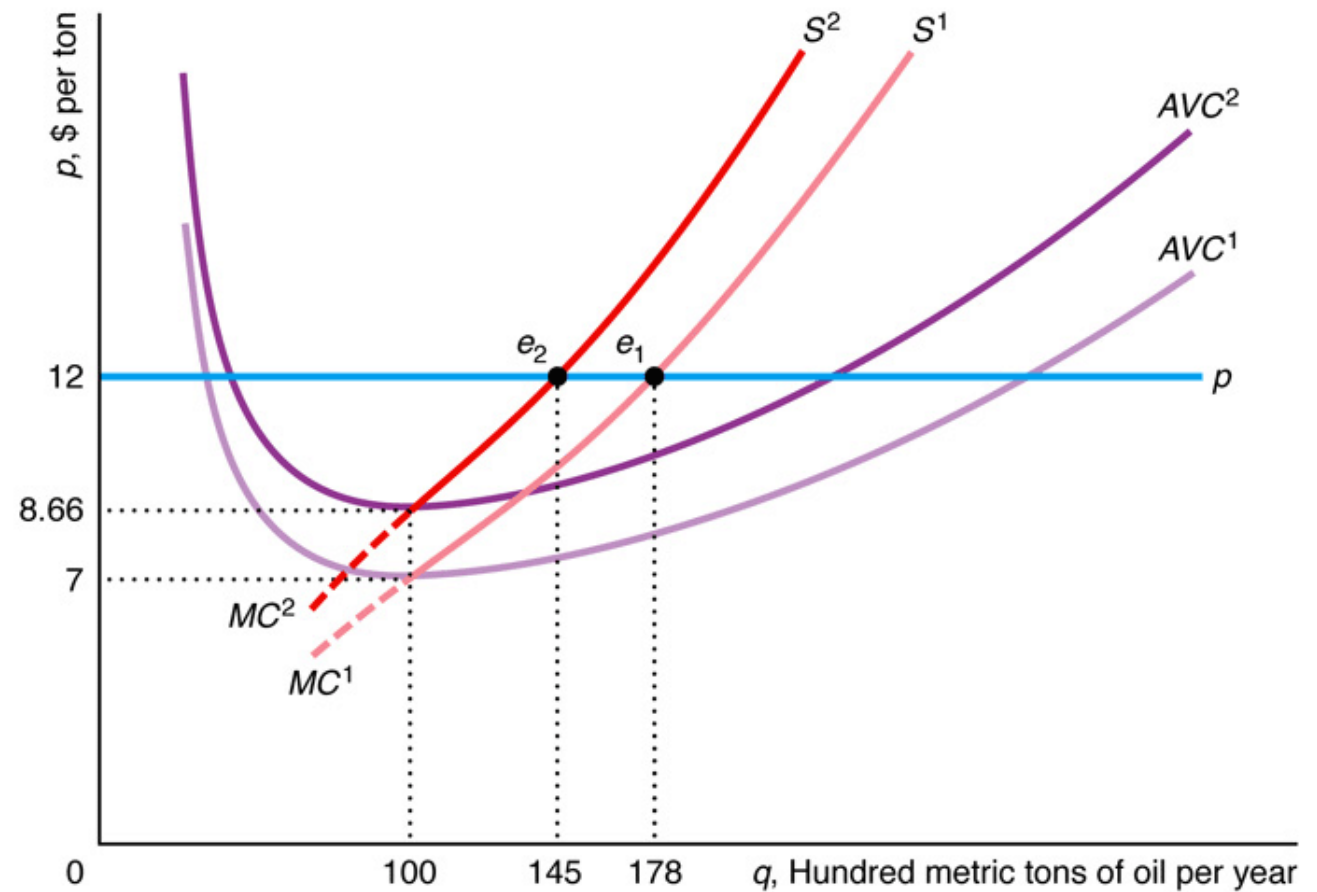
Short-Run Market Supply (Identical Firms)

The market supply curve is the horizontal sum of the firm supply curves.
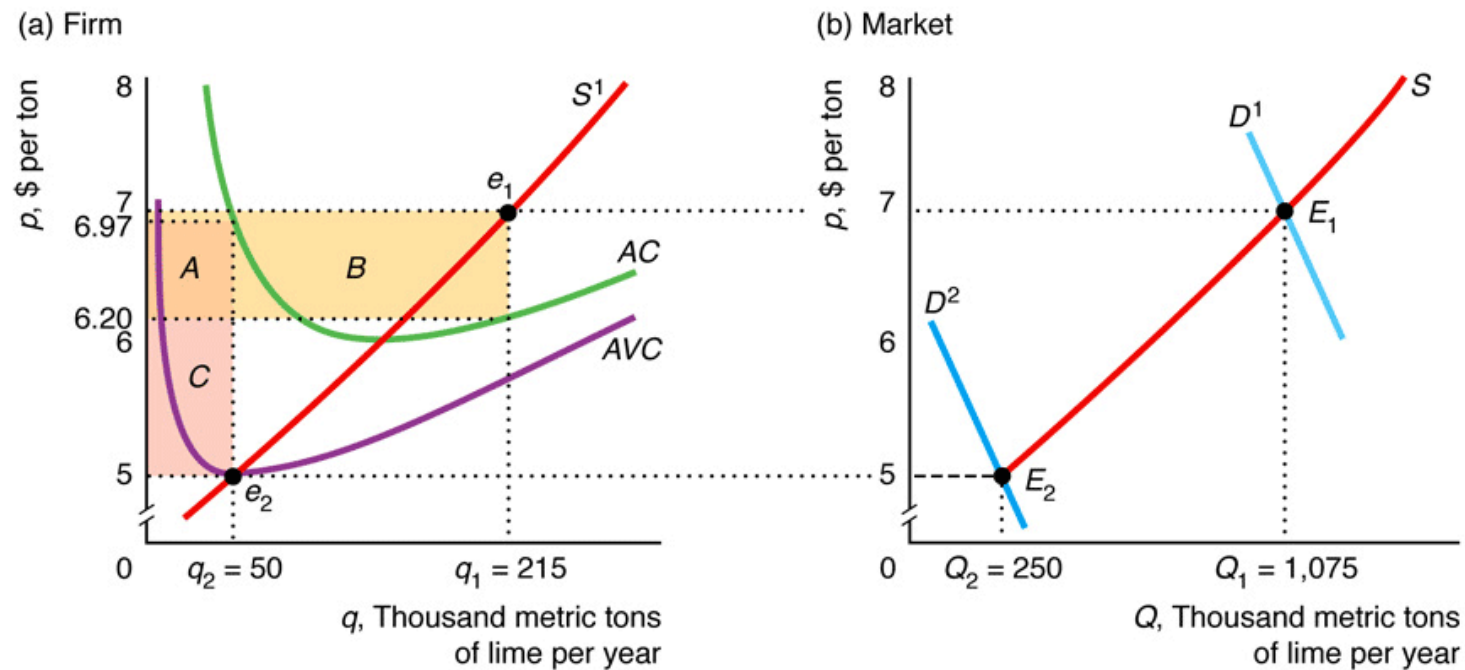

(a) Firm

(b) Market

Short-Run Market Supply (Different Firms)

The market supply curve is the horizontal sum of the firm supply curves.

Short-Run Competitive Equilibrium

Market equilibrium (point E_1) indicates price faced by individual firm, and therefore, profit-maximizing quantity, q_1.
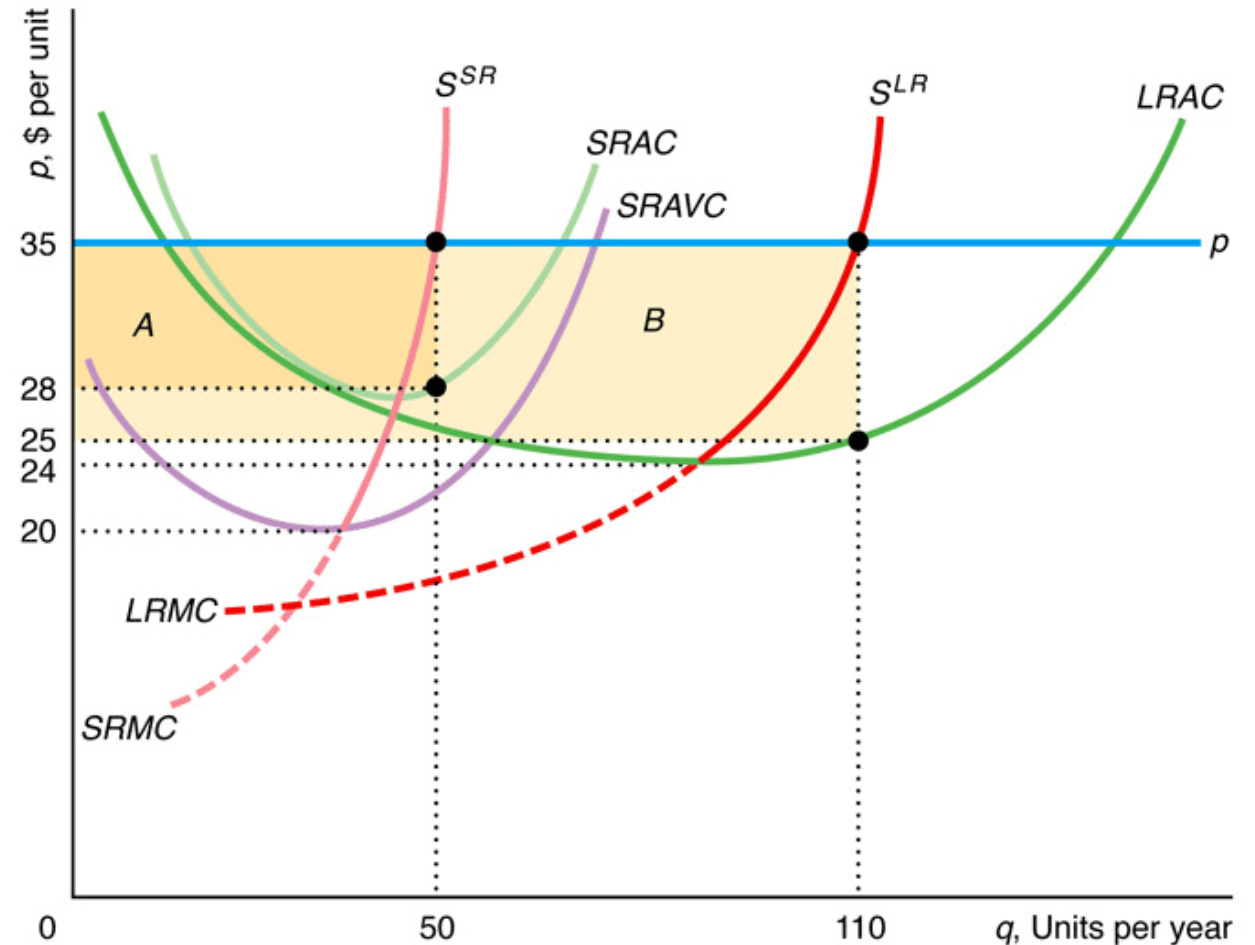
4. Competition in the Long Run

- Long-Run Output Decision

  - The firm chooses the quantity that maximizes profit using the same rule as in the SR: MC = MR.

- Long-Run Shutdown Decision

  - Because all costs are variable in the LR, the firm shuts down if it would suffer an economic loss by continuing to operate.

  - Graphically, relevant shutdown point is the minimum of the LR average cost curve.

Long-Run Firm Supply Curve

- Firm produces more in the LR than in the SR

  - 110 units instead of just 50 units

- Firm earns higher profit in the LR than in the SR.

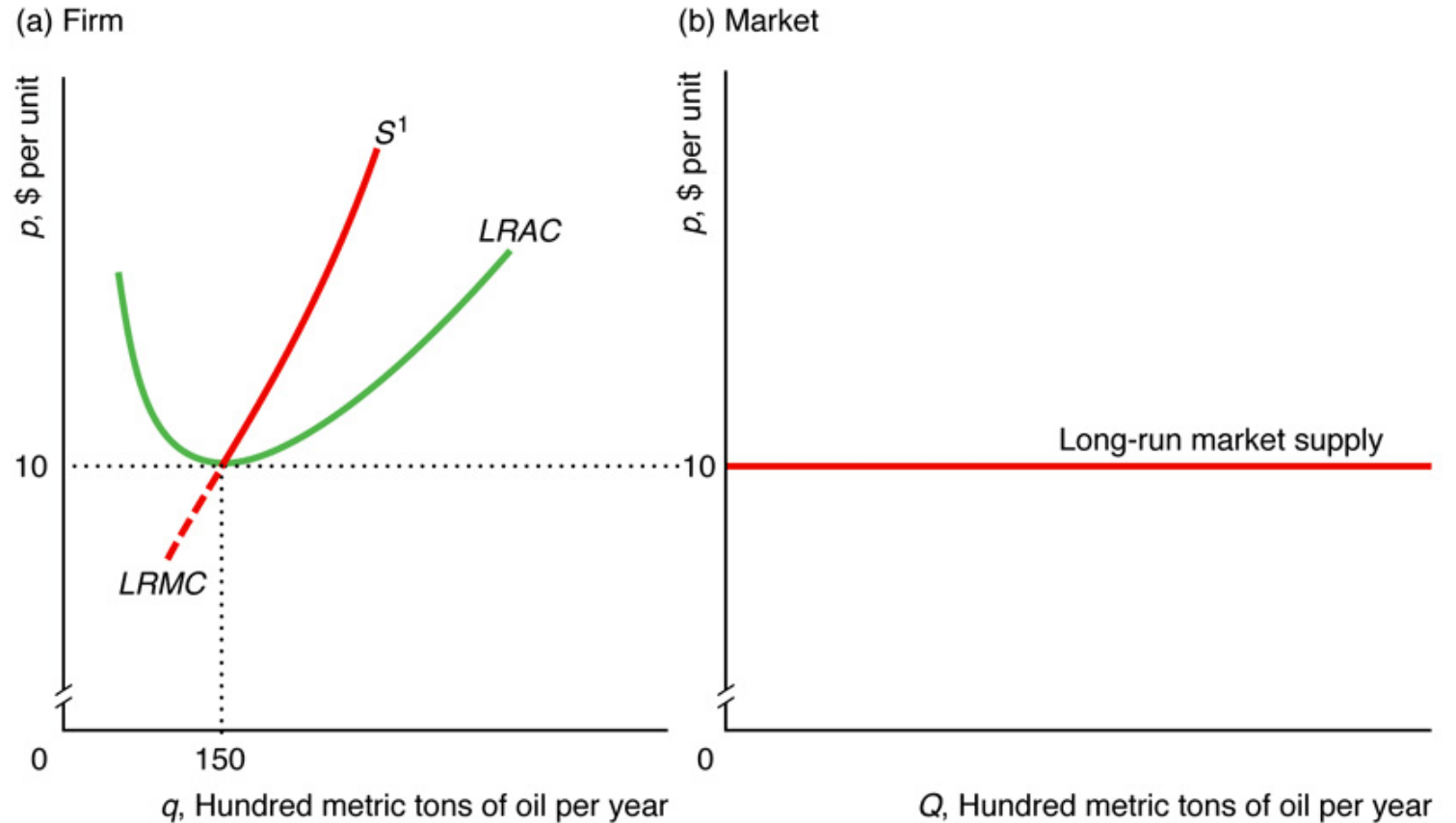 - A+B instead of just A

Long-Run Market Supply Curve

- As in the SR, the LR competitive market supply curve is the horizontal sum of individual firm supply curves.

- In the LR, firms can enter or exit the market, so the number of firms is not fixed as it is in the SR.

  - A firm enters the market if it can make a long-run profit.

  - A firm exits the market to avoid a long-run loss.

- With identical firms, free entry into the market, and constant input prices the LR market supply curve is flat at the minimum LRAC.

Long-Run Market Supply Curve

Identical firms, free entry into the market, and constant input prices.

(a) Firm

p, $ per unit

S^1

$LRAC$

10

$LRMC$

0   150

q, Hundred metric tons of oil per year

(b) Market

p, $ per unit

Long-run market supply

10

0

Q, Hundred metric tons of oil per year

Long-Run Market Supply Curve

Three scenarios in which LR market supply is not flat:

1. LR market supply when entry is limited

   ▪ Upward-sloping if government restricts number of firms, firms need a scarce resource, or if entry is costly

2. LR market supply when firms differ

   ▪ Upward-sloping if firms with relatively low minimum LRAC are willing to enter market at lower prices than others

3. LR market supply when input prices vary with output

   ▪ In an **increasing-cost market** input prices rise with output and LR market supply is upward-sloping

   ▪ In a **decreasing-cost market** input prices fall with output and LR market supply is downward-sloping
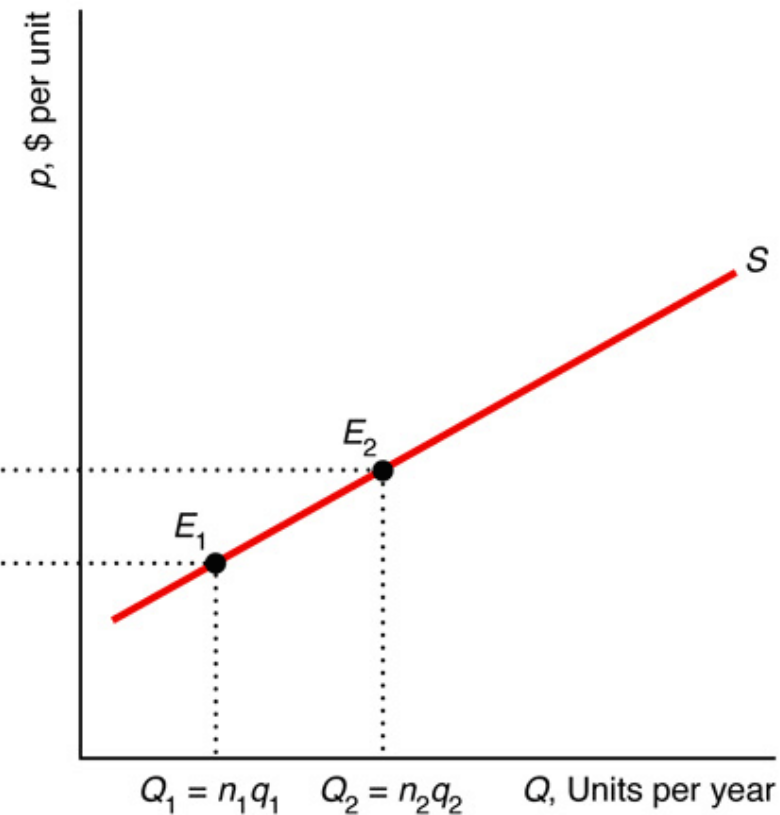
Long-Run Market Supply Curve
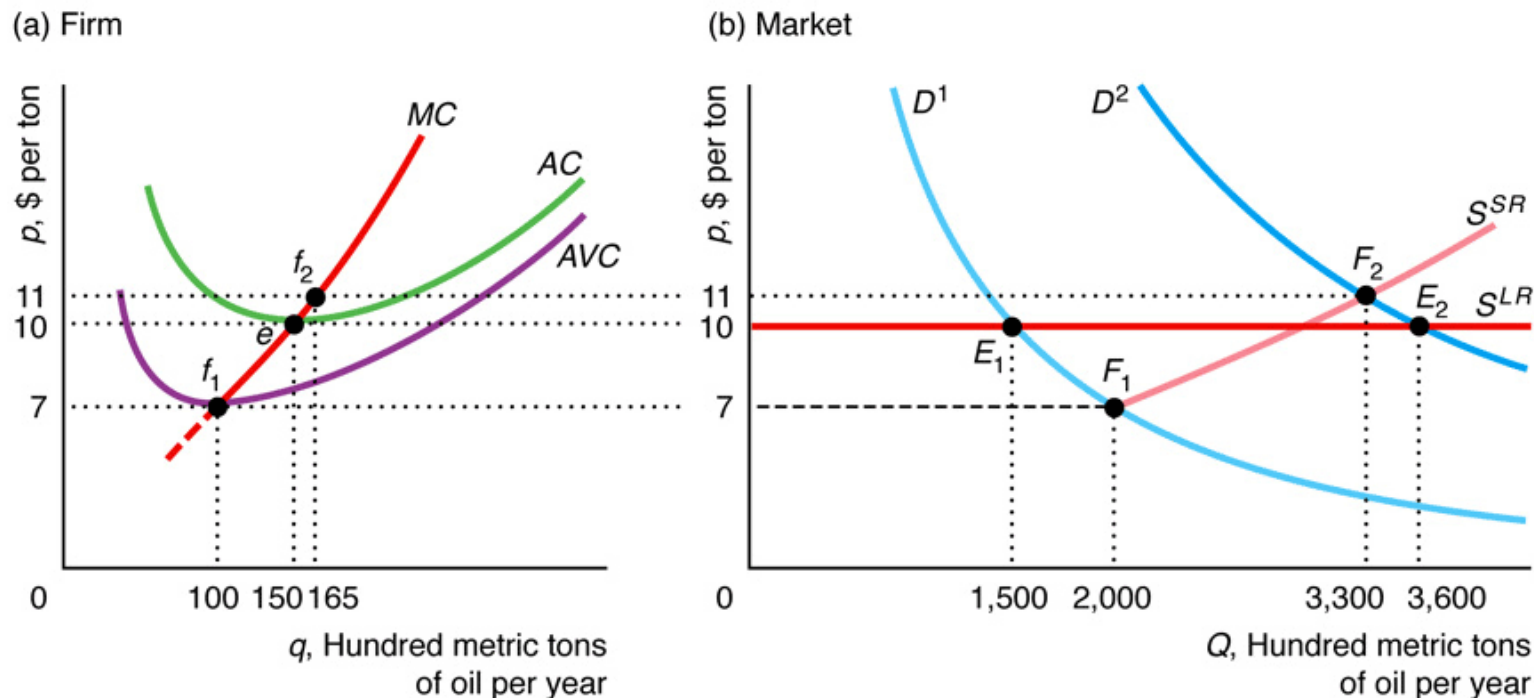## Increasing-Cost Market

(a) Firm
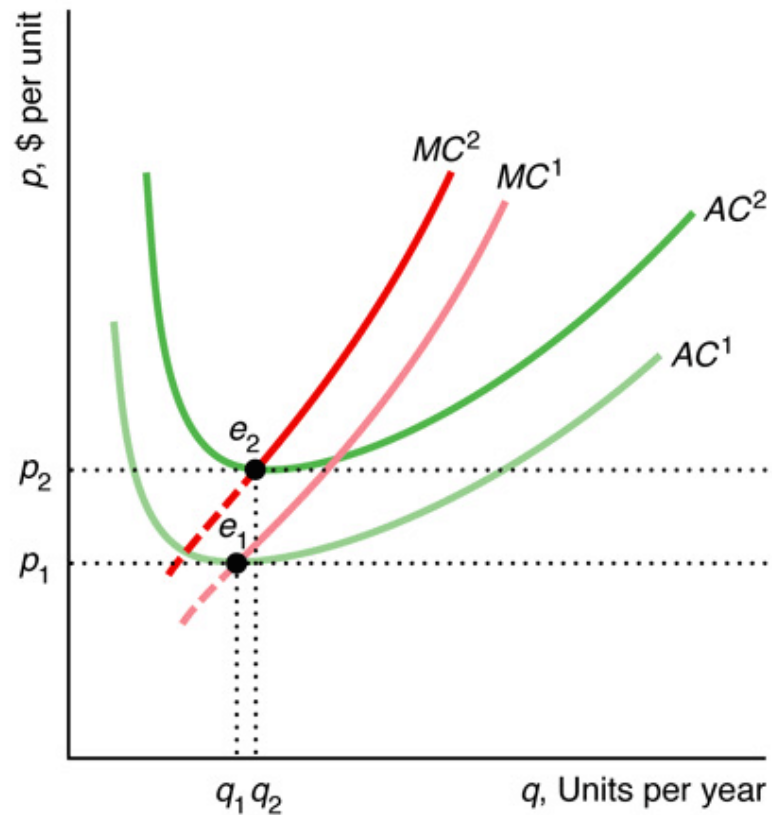
(b) Market

Long-Run Competitive Equilibrium

Equilibrium occurs at the intersection of LR market demand and LR market supply, which is different from SR market supply.

Challenge Solution

- Increase in the fixed cost of regulatory compliance has four long-run effects:

  - Average total cost of a representative trucking company increases, shifts from AC^1 to AC^2

  - Each trucking company provides a greater amount of service, q_1 to q_2

  - Market quantity decreases, Q_1 to Q_2

  - The number of trucking companies decreases, n_1 to n_2

(a) Firm

p, \$ per unit

MC

$AC^2 = AC^1 + \mathcal{L}/q$

AC^1

p_2 e_2

p_1 e_1

q_1 q_2 q, Units per year

(b) Market

p, \$ per unit

E_2 S^2

p_2

E_1 S^1

p_1

D

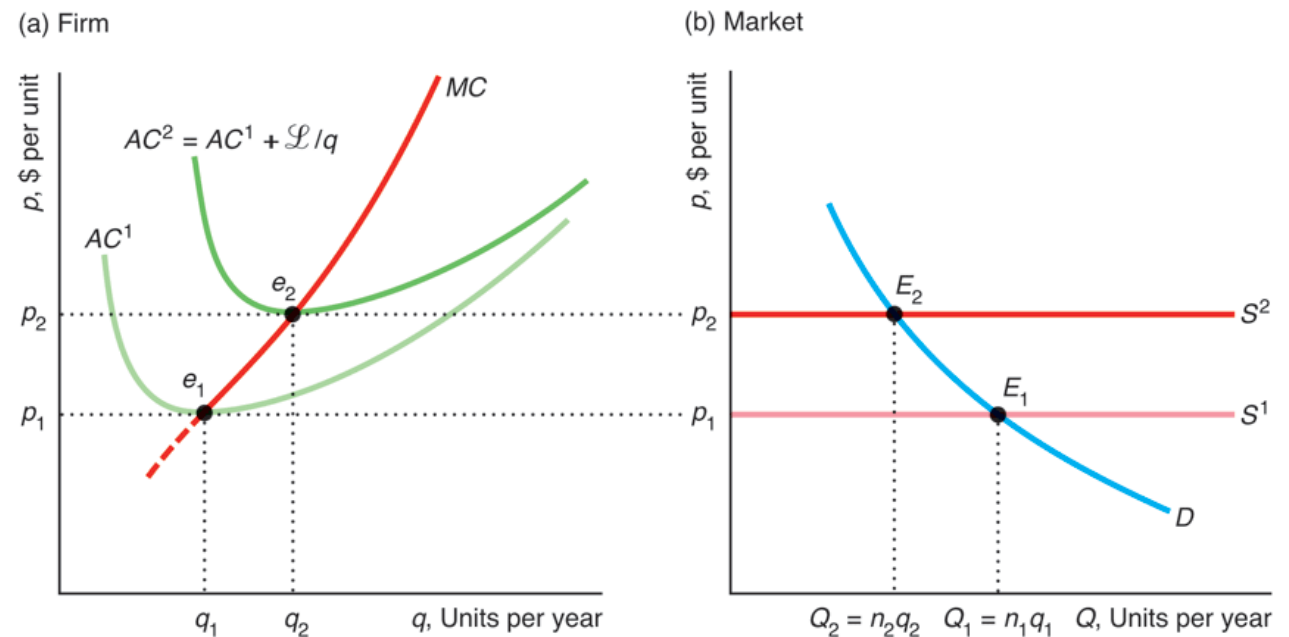$Q_2 = n_2 q_2$ $Q_1 = n_1 q_1$ Q, Units per year
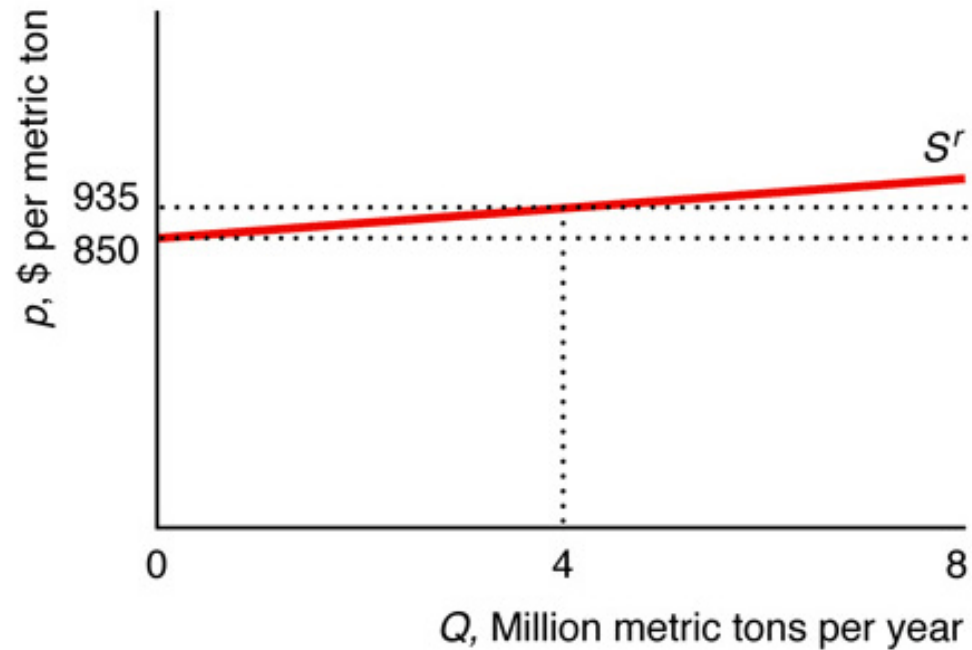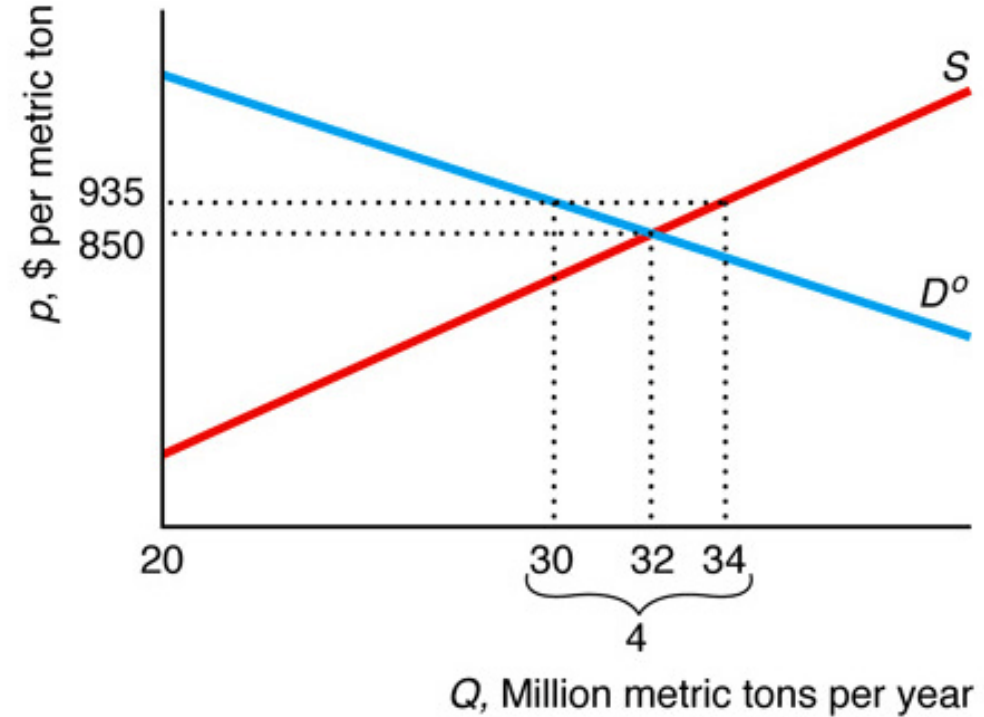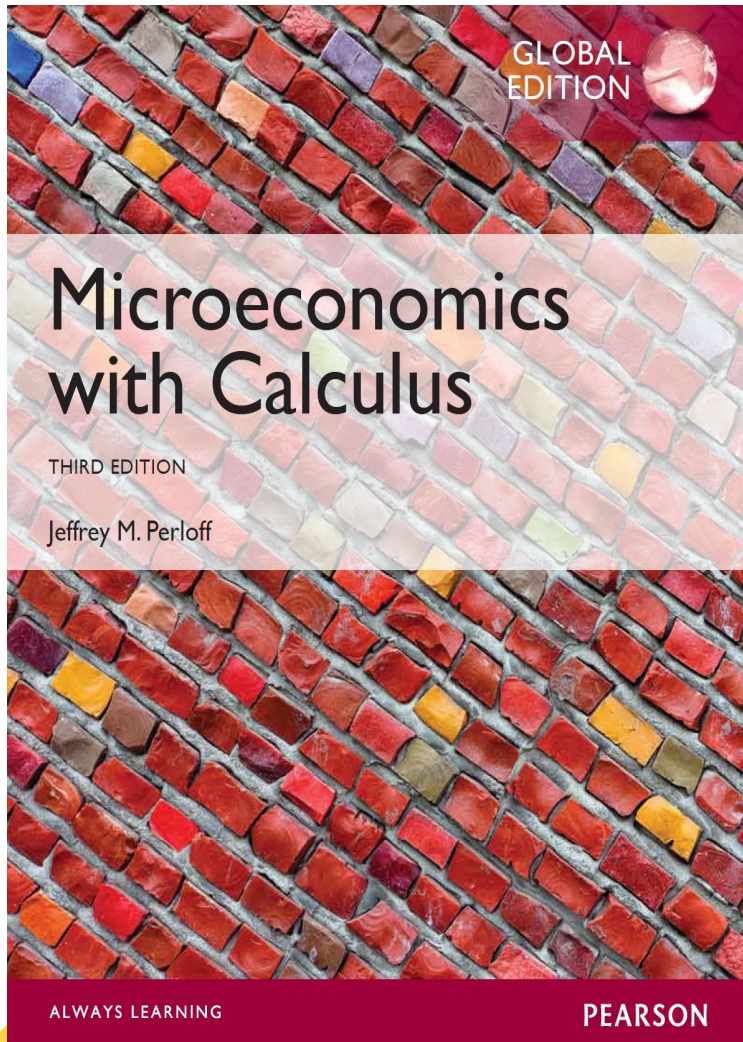
Figure 8.13. Excess of Residual Supply Curve

(a) Japan's Excess Supply Curve

(b) World Supply and Rest of World Demand

REFERENCE

Chapter 8 - Microeconomics: Theory and Applications with Calculus, 3rd Edition. By Jeffrey M. Perloff. 2014 Pearson Education.