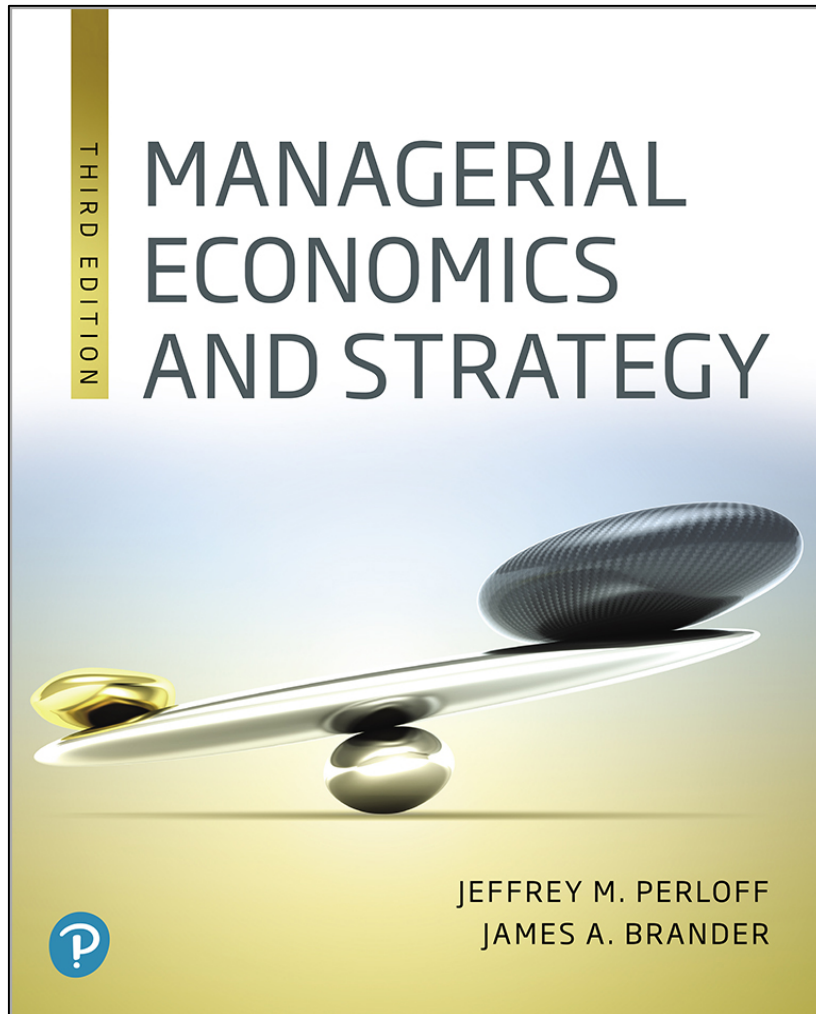


Managerial Economics and Strategy

Third Edition



Chapter 8

Competitive Firms and
Markets

Managerial Problem

The Rising Cost of Keeping on Truckin'

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

Solution Approach

- We need to combine our understanding of demand curves with knowledge about firm and market supply curves to predict industry price, quantity, and profits.

Empirical Methods

- The relevant market structure is **perfect competition** where buyers and sellers are **price takers** and firms have a **horizontal demand**.
- To maximize profit in the **short run**, the firm takes the price from the market and with **marginal cost** determines its output.
- Firms have **zero economic profit** in the **long run**.
- Perfect competition maximizes **economic well-being of the society**.

Learning Objectives (1 of 2)

8.1 Perfect Competition

Describe the characteristics of perfect competition

8.2 Competition in the Short Run

Graphically identify the competitive equilibrium and derive the short-run supply curve

Learning Objectives (2 of 2)

8.3 Competition in the Long Run

Contrast the short-run and long-run competitive equilibria and supply curves

8.4 Competition Maximizes Economic Well-Being

Use the concept of surplus to show the main advantage of perfect competition

8.1 Perfect Competition (1 of 3)

- Perfect competition is a market structure in which buyers and sellers are price takers.
 - A price-taking firm cannot affect the market price for a product, it faces a horizontal demand and it sells at the market price.

Characteristics of a Perfect Competitive Market

Large Number of Buyers and Sellers

- If the sellers in a market are small and numerous, no single firm can raise or lower the market price.

Identical Products

- Buyers perceive firms sell identical or homogeneous products. Granny Smith apples are identical, all farmers charge the same price.

Full Information

- Buyers know the prices charged by all firms and that products are identical. No single firm can unilaterally raise its price above the market equilibrium price.

8.1 Perfect Competition (2 of 3)

Negligible Transaction Costs

- Buyers and sellers do not have to spend much time and money finding each other or hiring lawyers to write contracts to make a trade.
- Perfectly competitive markets have very low transaction costs.

Free Entry and Exit

- The ability of firms to enter and exit a market freely in the long run leads to a large number of firms in a market and promotes price taking.

Perfect Competition in the Chicago Mercantile Exchange

- It has the five characteristics of perfect competition: many buyers and sellers; they trade identical products; have full price information; waste no time to make a trade; and anyone can be a buyer or seller.

8.1 Perfect Competition (3 of 3)

Deviations from Perfect Competition

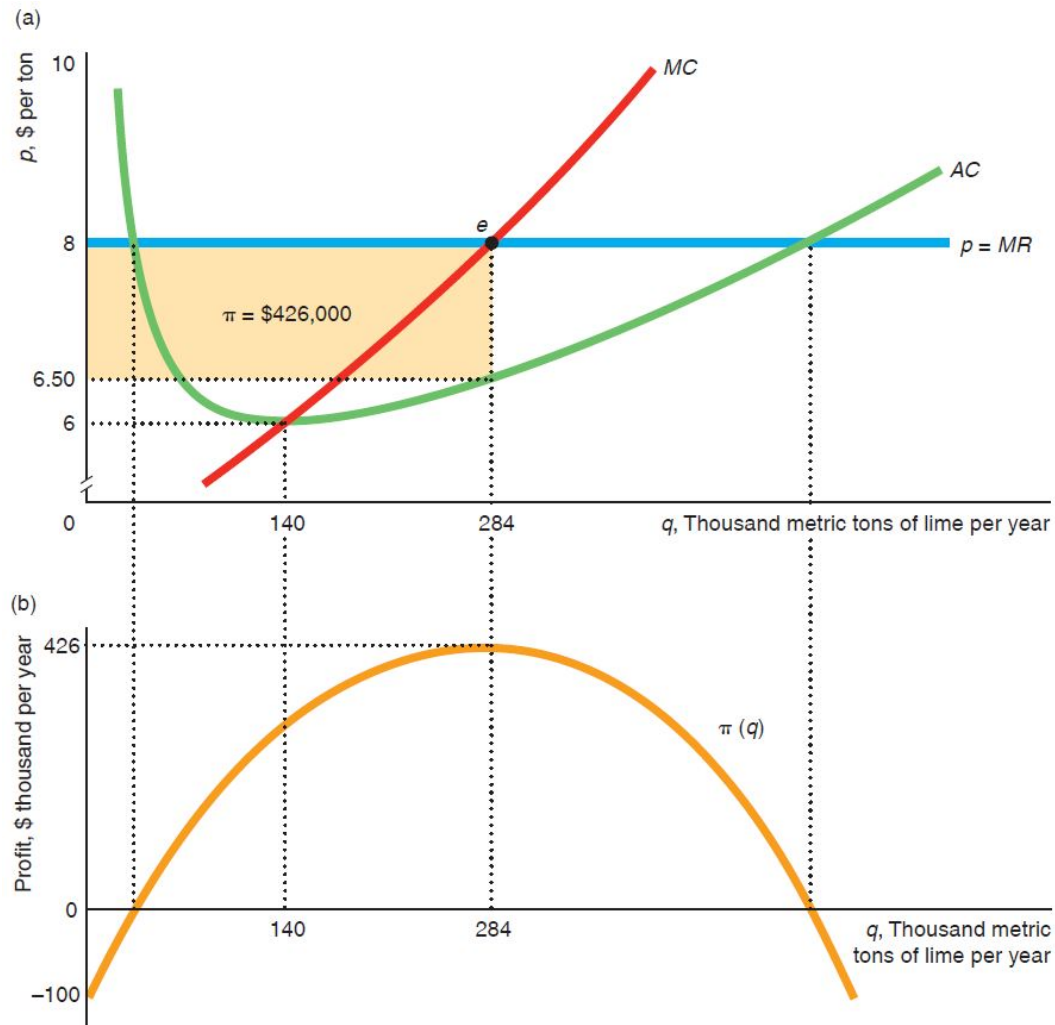
- Many markets possess some but not all of the characteristics of perfect competition. But, buyers and sellers are, for all practical purposes, price takers.
- Cities use zoning laws and fees to limit the number of stores or motels, yet there are many sellers and all are price takers.
- From now on, we will use the terms **competition** and **competitive** to refer to all markets in which no buyer or seller can significantly affect the market price—they are price takers—even if the market is not perfectly competitive.

8.2 Competition in the Short Run (1 of 7)

How Much to Produce

- How much to produce is the 1st step in the two-step decision-making process to determine how to maximize profit.
 - As we know from Chapter 7: to maximize profit, find q where $MR(q) = MC(q)$
 - A competitive firm has a horizontal demand, it can sell any q at the market price, p . Given that revenue $R = pq$, then $MR = p$
 - A profit-maximizing competitive firm produces the amount of output, q , at which $p = MC(q)$
- Graphical Presentation
 - In Figure 8.1, the market price of lime is $p = \$8$ per metric ton (horizontal demand). The MC curve crosses the horizontal demand curve at point e where the firm's output is 284 units.
 - The $\pi = \$426,000$, shaded rectangle in panel a. Panel b shows that this is the maximum profit.

Figure 8.1 How a Competitive Firm Maximizes Profit



8.2 Competition in the Short Run (2 of 7)

Whether to Produce

- Once a firm determines the output level that maximizes its profit or minimizes its loss, it must decide whether to produce that output level or to shut down and produce nothing.
 - Of course, if the firm is making a profit, it will produce Q .
 - But, if it is making a loss in the short run, should the firm shutdown?
- **Common Confusion:** A firm should shut down if it is making a loss.
 - This intuition holds if the firm is making a loss in the long run, but it may be wrong in the short run.
 - In the short run, a firm should operate if it can cover more than its variable cost, even if it cannot fully cover its unavoidable fixed cost.

8.2 Competition in the Short Run (3 of 7)

Whether to Produce

- Whether to produce is the 2nd step in the two-step decision-making process to determine how to maximize profit.
 - Shutdown rule: $R < VC$ (Chapter 7).
 - Shutdown rule for a competitive firm: $p < AVC = VC / q$

The Market Price Is Above Minimum AC

- In Figure 8.2, if price above \$6 (point *b*), the **firm operates with a positive profit**.

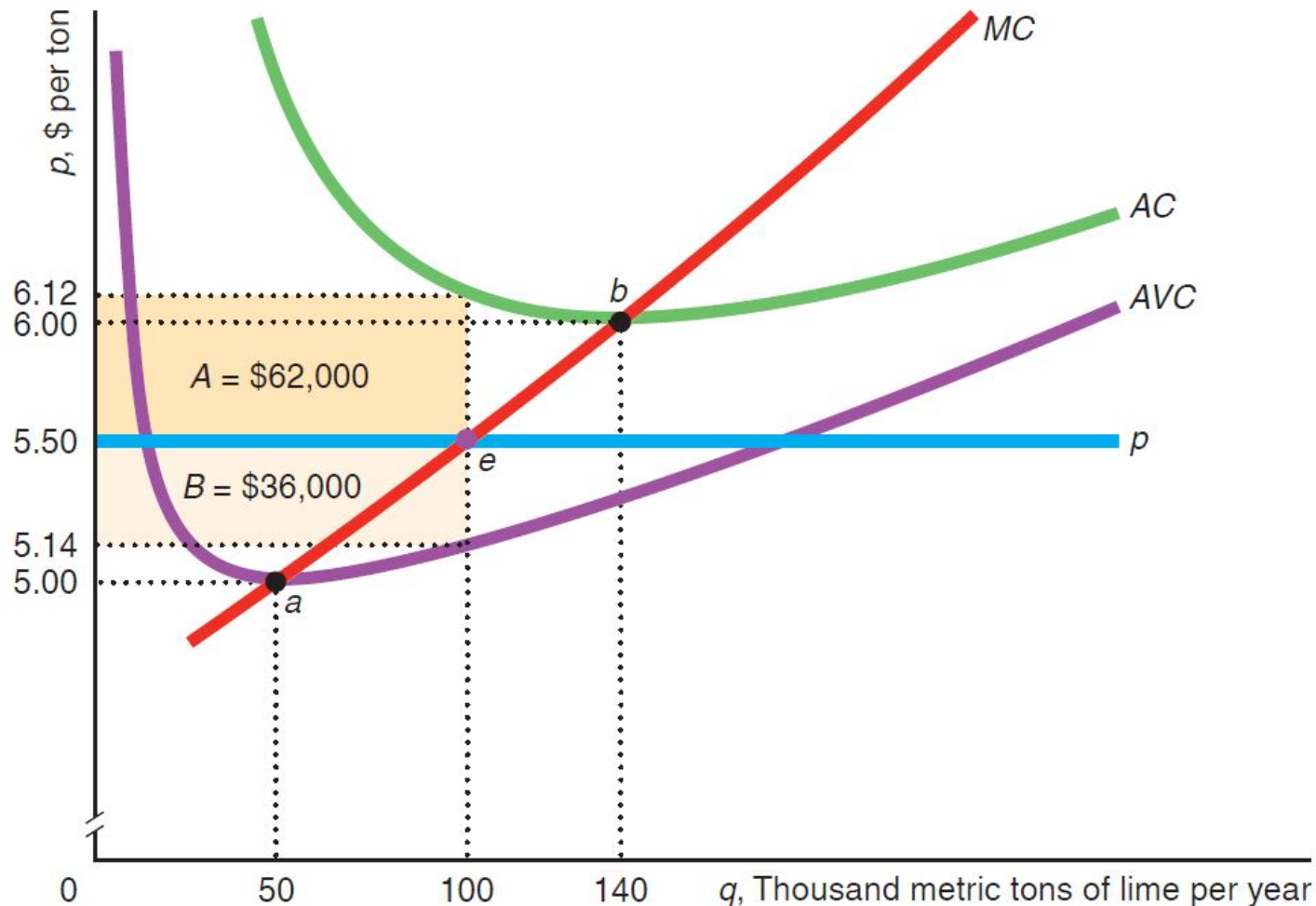
The Market Price Is Between Minimum AC and The Minimum AVC

- In Figure 8.2, the competitive firm still **operates** if price between \$5 and \$6, (points *a* and *b*). It loses money but operates to minimize the loss.

The Market Price Is Less Than the Minimum AVC

- In Figure 8.2, the competitive firm **shuts down** if market price is below \$5, (below point *a*).

Figure 8.2 The Short-Run Shutdown Decision



8.2 Competition in the Short Run (4 of 7)

Managerial Implication:

Sunk Costs and the Shutdown Decision

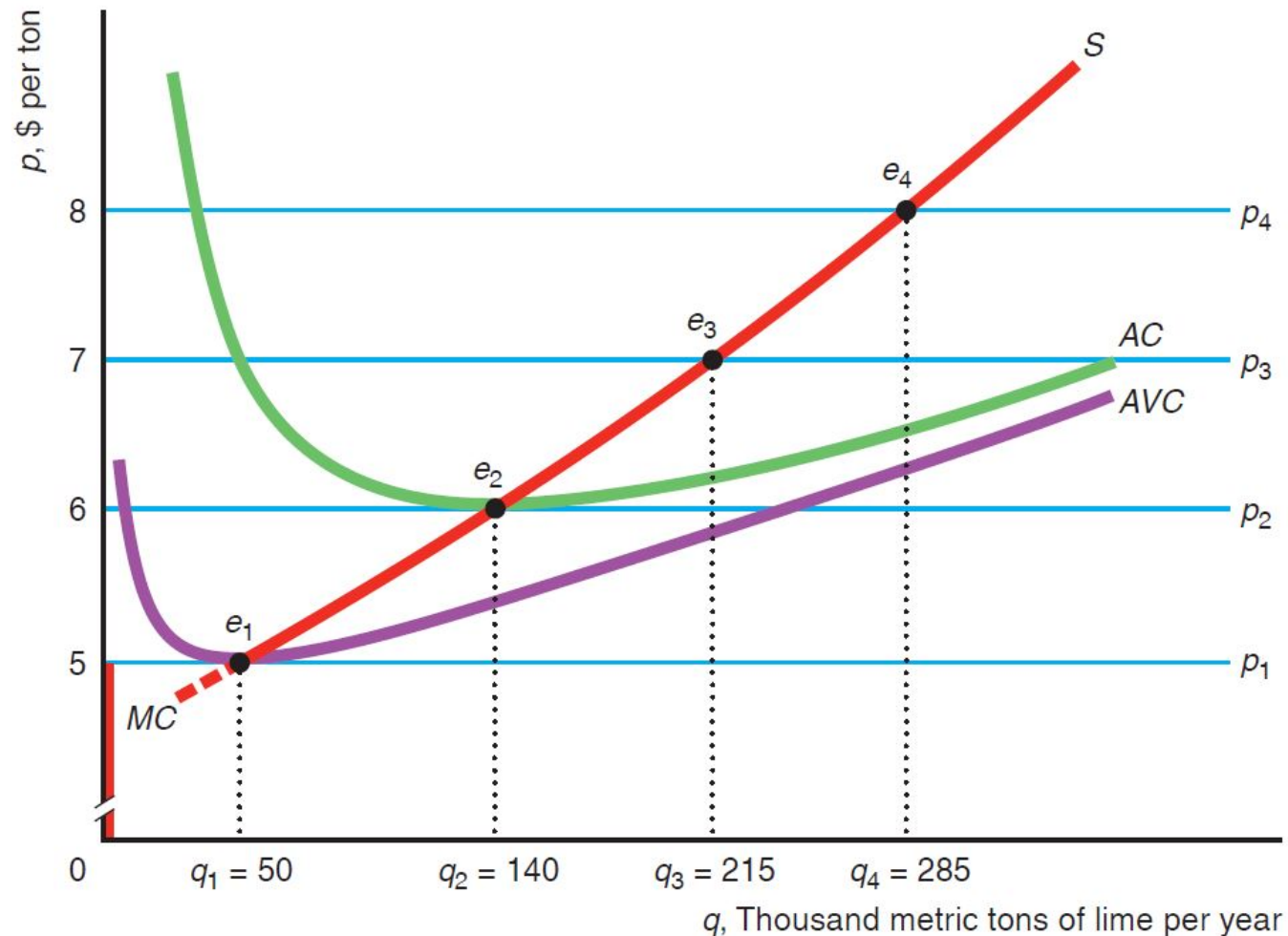
- When making shutdown decisions, good managers **ignore** unavoidable (sunk) fixed costs (Chapter 6).
 - The manager of a competitive firm should continue operating if price at least equals average variable cost and revenue is not sufficient to fully cover the sunk fixed costs.
 - As long as price exceeds average variable cost, the firm at least partially offsets the sunk fixed costs by operating instead of absorbing the entire amount as a loss.

8.2 Competition in the Short Run (5 of 7)

The Short-Run Firm Supply Curve

- A competitive firm chooses its output to maximize profit or minimize losses when $p = MC(q)$.
- Graphical Presentation
 - In Figure 8.3 the market price increases from $p_1 = \$5$ to $p_2 = \$6$ to $p_3 = \$7$ to $p_4 = \$8$. The respective profit-maximizing outputs are e_1 through e_4 .
 - As the market price increases, the equilibria trace out the marginal cost curve.
 - The competitive firm's short-run supply curve is the **marginal cost curve above its minimum average variable cost** (red line that starts at point e_1 in Figure 8.3).

Figure 8.3 How the Profit-Maximizing Quantity Varies with Price



8.2 Competition in the Short Run (6 of 7)

The Short-Run Market Supply Curve

- Market supply curve: **horizontal sum** of the supply curves of all the individual firms in the market.

Short-Run Market Supply with Identical Firms

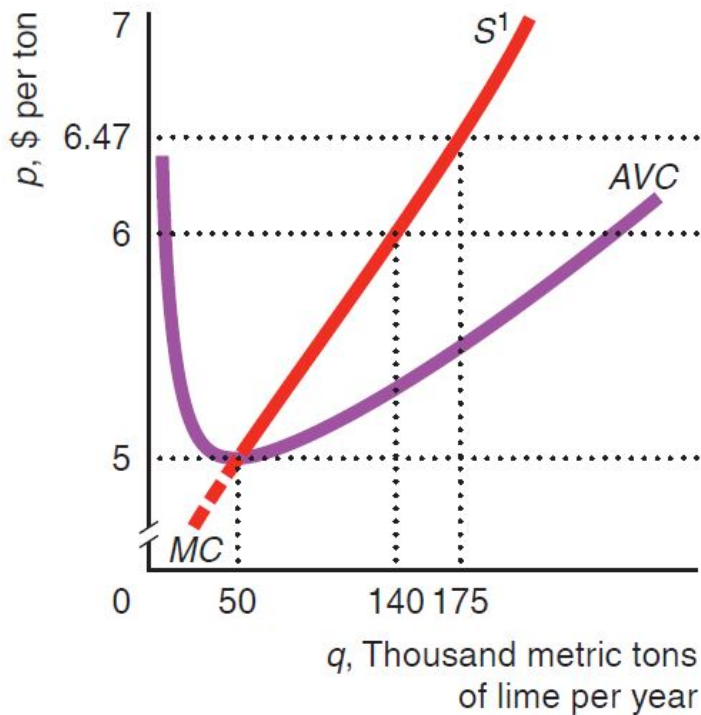
- In the short run, the maximum number of firms in a market, n , is fixed. In panel a of Figure 8.4, there is one firm and in panel b, there are 4 firms identical to the one in panel a.
- If all firms are **identical**, each firm's costs are identical, supply curves are identical. The **market supply at any price is n times the supply of an individual firm; flatter**. In panel b of Figure 8.4, S^5 is the market supply of 4 identical firms.

Short-Run Market Supply with Firms That Differ

- If the firms have different costs functions, their supply curves and shutdown points differ. Figure 8.5 in the textbook shows this market supply; flatter.

Figure 8.4 Short-Run Market Supply with Five Identical Lime Firms

(a) Firm



(b) Market

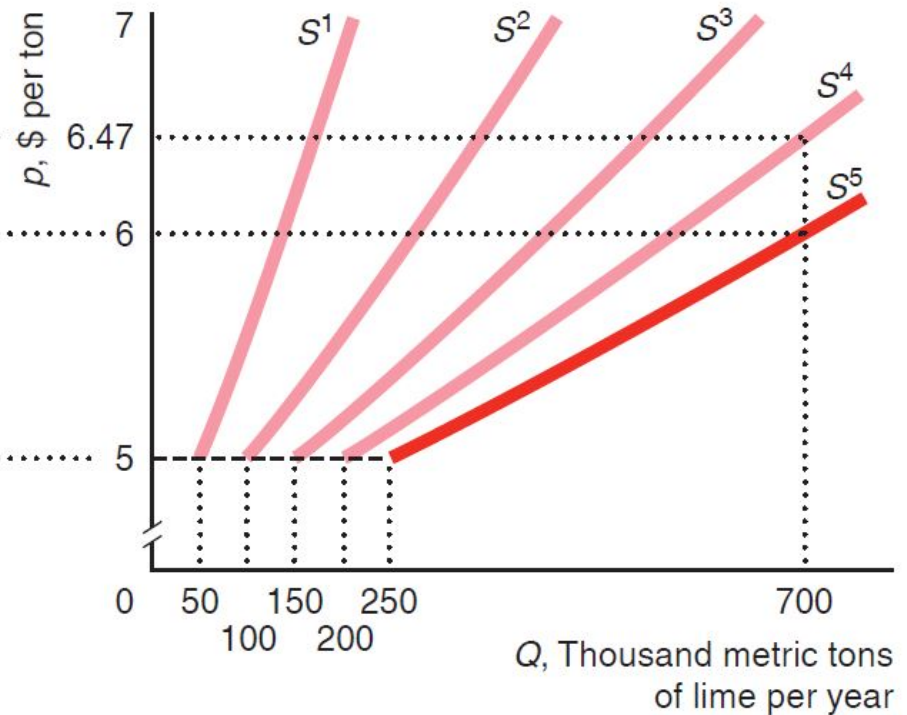
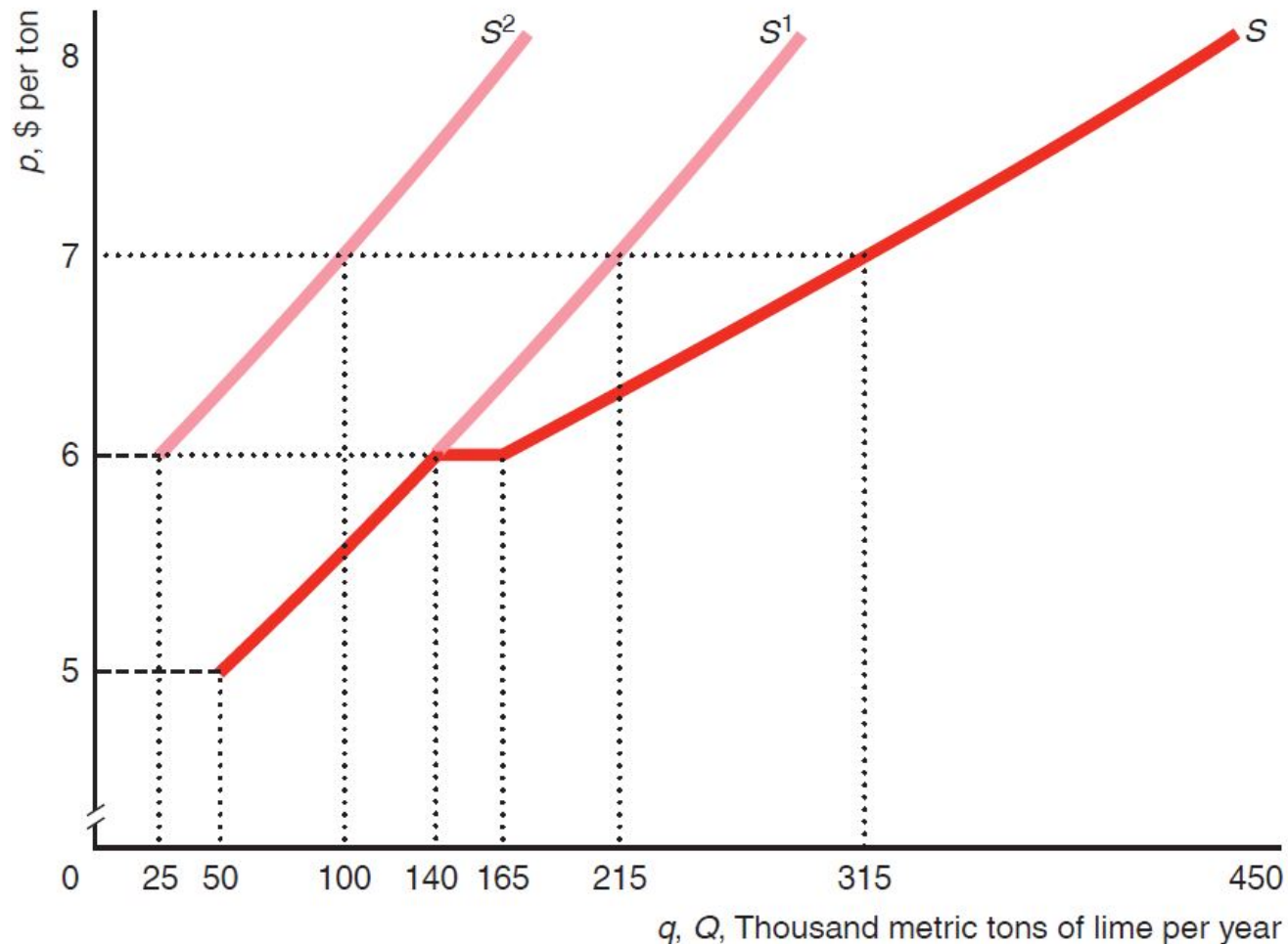


Figure 8.5 Short-Run Market Supply with Two Different Lime Firms



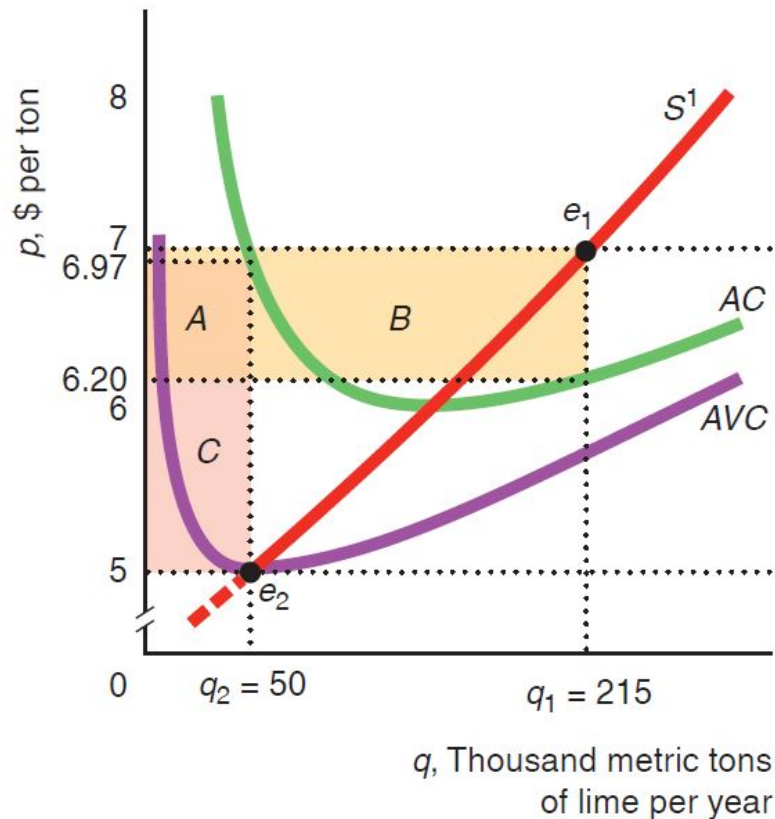
8.2 Competition in the Short Run (7 of 7)

Short-Run Competitive Equilibrium

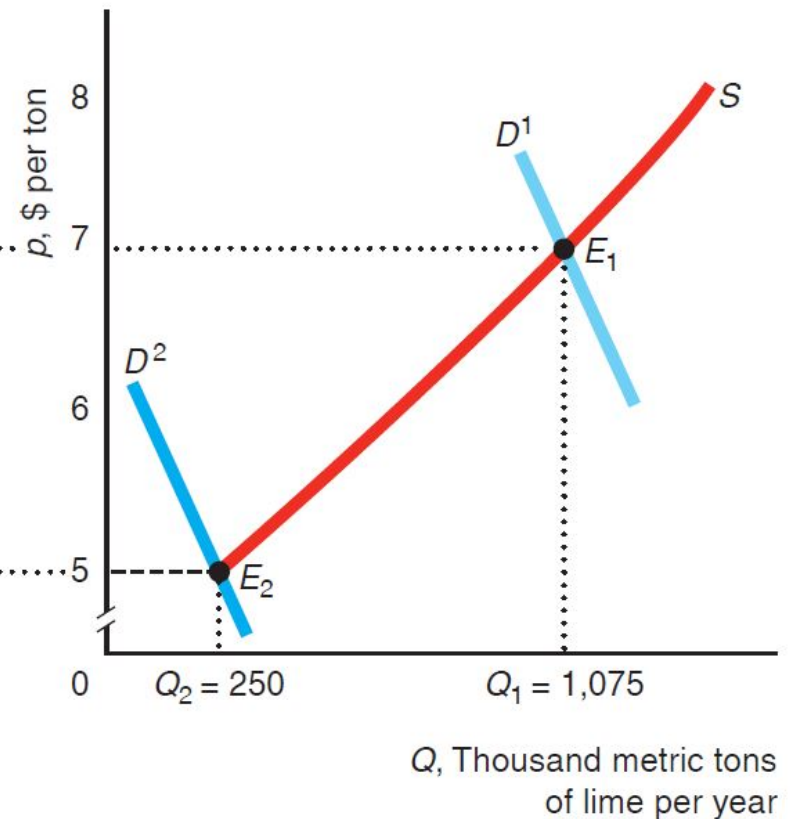
- By combining the short-run market supply curve and the market demand curve, we can determine the short-run competitive equilibrium.
- Graphical Presentation
 - Suppose that there are five identical firms in the lime manufacturing industry. Panel a of Figure 8.6 shows the short-run cost curves and the supply curve, S^1 , for a typical firm, and panel b shows the corresponding short-run competitive market supply curve, S .
 - If the market demand curve is D^1 , the short-run equilibrium is E_1 , the market price is \$7, and market output is $Q_1 = 1,075$ units (panel a). Each firm takes the market price, maximizes profit at e_1 , and no firm wants to change its behavior, so e_1 is the firm's equilibrium.
 - If the demand curve shifts to D^2 , the market equilibrium is $p = \$5$ and $Q_2 = 250$ units (panel a). At that price, each firm produces $q = 50$ units and loses \$98,500, area $A + C$. However, they do not shut down.

Figure 8.6 Short-Run Competitive Equilibrium in the Lime Market

(a) Firm



(b) Market



8.3 Competition in the Long Run (1 of 6)

Long-Run Competitive Profit Maximization

- Objective: Firms want to maximize long-run profit and all costs are variable or avoidable.
- Decision 1: How Much to Produce
 - To maximize profit or minimize a loss, firm operates where long-run marginal profit is zero—where MR (price) equals long-run MC .
- Decision 2: Whether to Produce
 - After determining the output level, q^* , the firm shuts down if its revenue is less than its avoidable cost (all costs). So, it shuts down if it would make an economic loss by operating.

The Long-Run Firm Supply Curve

- It is the firm's long-run marginal cost curve above the minimum of its long-run average cost curve.
 - It forecasts the plant size that could maximize profit.

8.3 Competition in the Long Run (2 of 6)

The Long-Run Market Supply Curve

- The competitive market supply curve is the horizontal sum of the supply curves of the individual firms.
- However, in the long run, firms can enter or leave the market.
- Thus, before the horizontal sum, we need to determine how many firms are in the market at each possible market price.

Entry and Exit

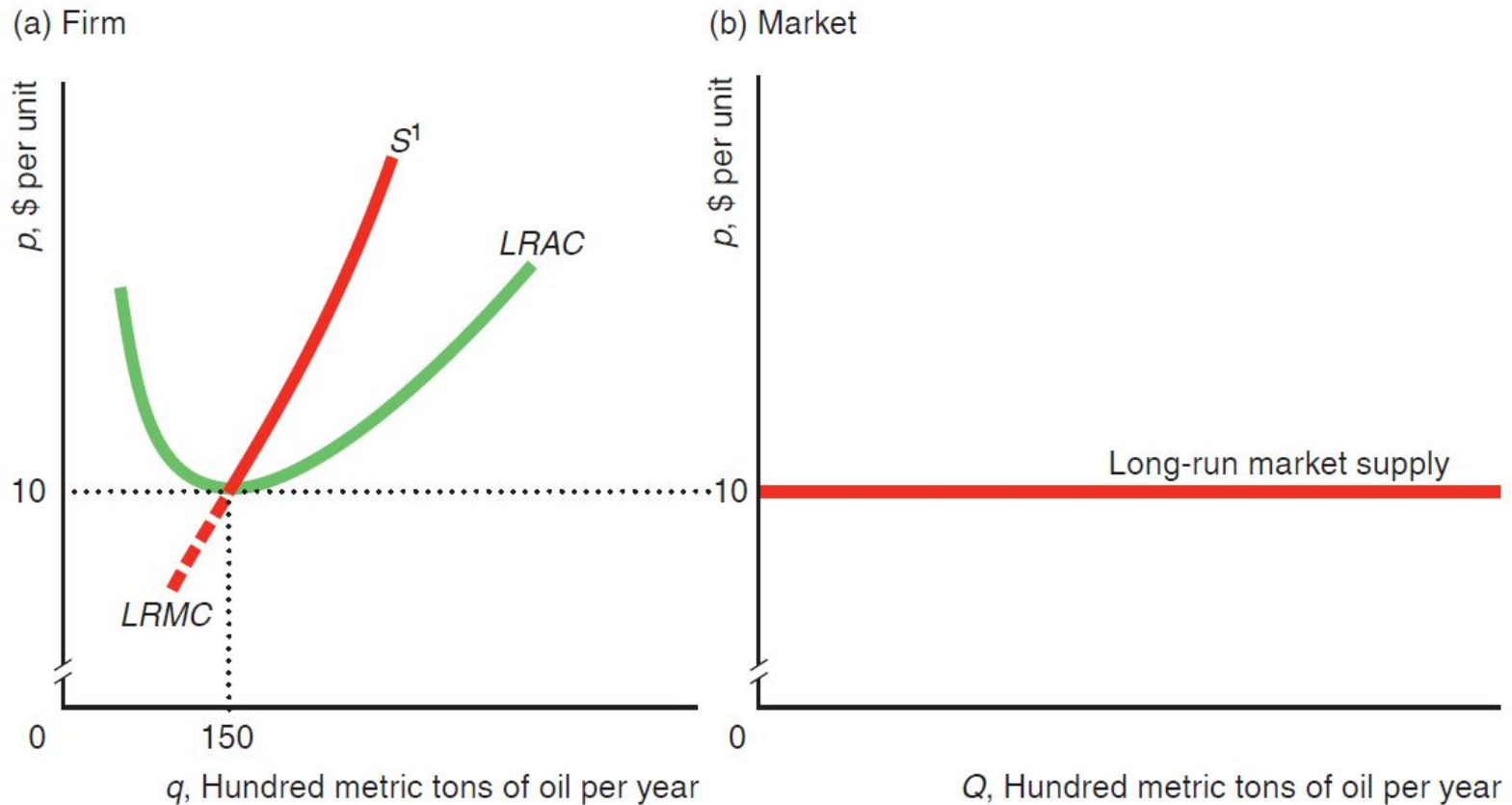
- In the long run, each firm decides whether to enter or exit depending on whether it can make a long-run profit.
- In perfectly competitive markets, firms can enter and exit freely in the long run.
 - A shift of the market demand curve to the right attracts firms to enter the market ($\pi > 0$) until the last firm makes zero long-run profit.
 - A shift of the market demand curve to the left forces firms to exit the market ($\pi < 0$) until the last firm makes zero long-run profit.

8.3 Competition in the Long Run (3 of 6)

Long-Run Market Supply with Identical Firms and Free Entry

- The long-run market supply curve is **flat at the minimum of long-run average cost** if firms can freely enter and exit the market, an unlimited number of firms have identical costs, and input prices are constant.
- Graphical Presentation
 - In Figure 8.7, panel a, the individual supply starts at the minimum long-run average cost (\$10) and each firm produces 150 units. The market supply curve is horizontal at \$10 (panel b), n firms will produce $150n$ units.

Figure 8.7 Long-Run Firm and Market Supply with Identical Vegetable Oil Firms



8.3 Competition in the Long Run (4 of 6)

Long-Run Market Supply When Entry Is Limited

- When entry is limited, long-run market supply curves slope upward (horizontal sum of few individual supply curves).
 - The reasoning is the same as in the short run, panel b of Figure 8.4.
 - The number of firms is limited because of government restrictions, resource scarcity, or high entry cost.

Long-Run Market Supply When Firms Differ

- When firms are not identical, long-run market supply curves slope upward.
 - Firms with relatively low minimum long-run average costs are willing to enter the market at lower prices than others.
 - The long-run supply curve is upward sloping **only** if lower cost firms cannot dominate the market because of their limited capacity and limited number.

8.3 Competition in the Long Run (5 of 6)

Long-Run Competitive Equilibrium

- Equilibrium occurs at the intersection of the long-run market supply and demand curves.
 - With identical firms, constant input prices, free entry/exit: equilibrium price equals minimum long-run average cost.
 - A shift in the demand curve affects only the equilibrium quantity and not the equilibrium price.
- Because the market supply curve is different in the short run than in the long run, the long-run competitive equilibrium differs from the short-run equilibrium.

8.3 Competition in the Long Run (6 of 6)

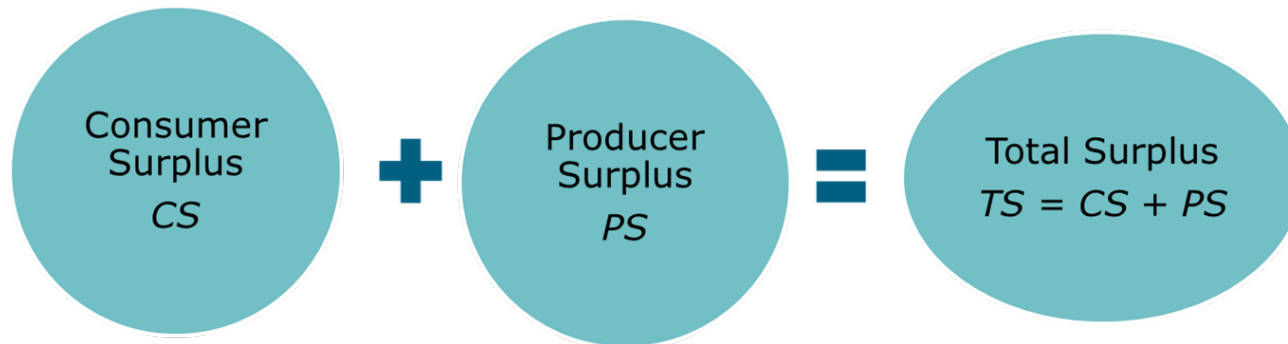
Zero Long-Run Profit with Free Entry

- The long-run supply curve is horizontal if firms are free to enter the market, firms have identical cost, and input prices are constant. All firms in the market are operating at minimum long-run average cost (cost efficient).
 - That is, they are indifferent between shutting down or not because they are earning zero economic profit.
- Any firm that does not maximize profit loses money.
 - So, **to survive in a competitive market in the long run, a firm must maximize its profit** ($P=MC$ and be cost efficient).

8.4 Competition Maximizes Economic Well-Being (1 of 10)

- We study competition in a book on managerial economics because of two reasons:
- First
 - Many sectors of the economy are highly competitive including agriculture, parts of the construction industry, many labor markets, and much retail and wholesale trade.
- Second
 - Perfect competition serves as an ideal or benchmark for other industries.
 - Most important theoretical result in economics: a perfectly competitive market maximizes an important measure of **economic well-being** (**consumer surplus**, **producer surplus**, and **total surplus**).
 - Government intervention in a perfectly competitive market reduces a society's economic well-being. However, it may increase economic well-being in noncompetitive markets, such as in a monopoly.

8.4 Competition Maximizes Economic Well-Being (2 of 10)



- **Consumer Surplus (CS)**, monetary difference between what a consumer is **willing to pay** for the quantity of the good purchased and what the consumer actually pays. \$-gain from trade for the consumer.
- **Producer Surplus (PS)**, monetary difference between the amount a good sells for and the minimum amount necessary for the producers to be **willing to produce** the good (profit). \$-gain from trade for the firm.
- **Total Surplus (TS)**, monetary measure of the total benefit to all market participants from market transactions (gains from trade). Total surplus implicitly weights the gains to consumers and producers equally.

8.4 Competition Maximizes Economic Well-Being (3 of 10)

Consumer Surplus

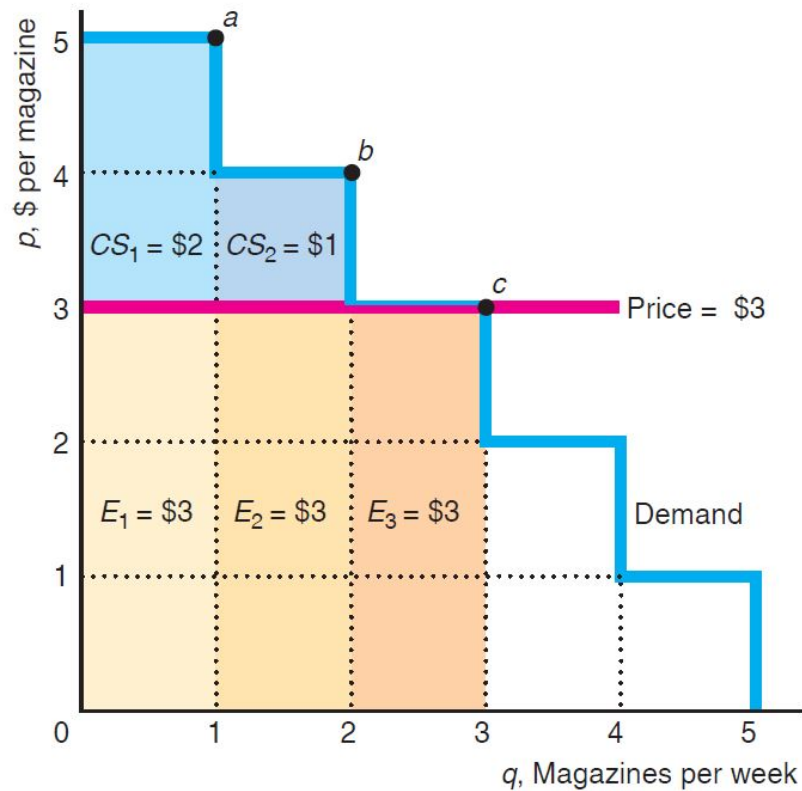
- The demand curve reflects a consumer's **marginal willingness to pay**: the maximum amount a consumer will spend for an extra unit (**marginal value** for the last unit).

Measuring Consumer Surplus using a Demand curve

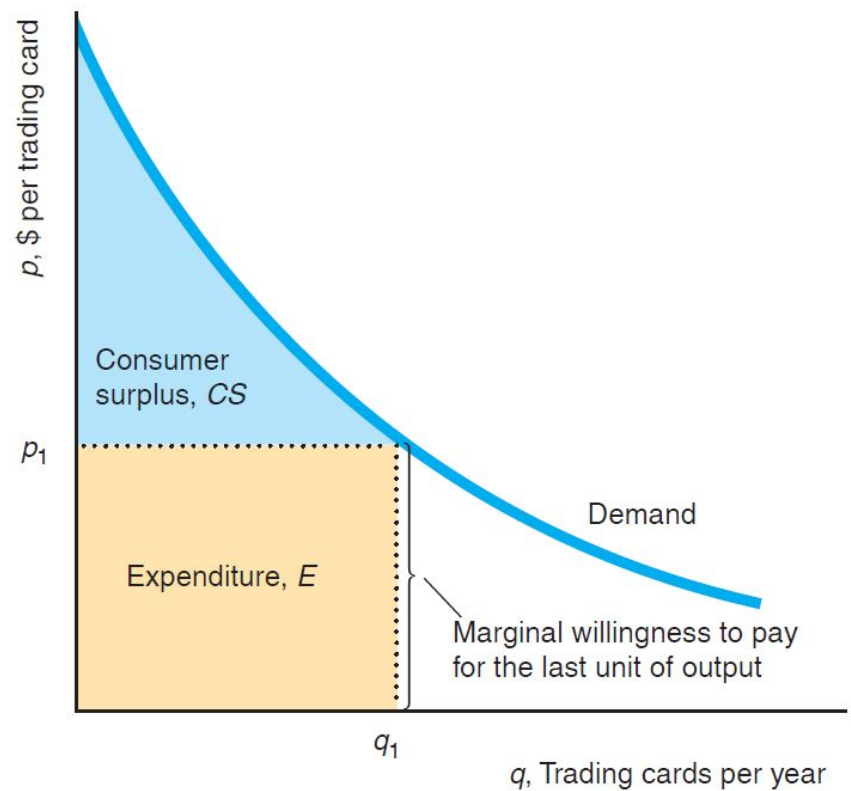
- Graphically, the consumer surplus is the area below the demand curve and above the market price up to the quantity actually consumed.
- In Figure 8.8, panel a, the consumer surplus from the 1st, 2nd, and 3rd magazines is \$3 (\$2+\$1+\$0).
- In panel b, the consumer surplus, CS, is the area under the demand curve and above the horizontal line at the price p_1 up to the quantity he or she buys, q_1 .
- CS has two advantages over utility as a measure of economic benefit:
 - It is comparable and summable among consumers
 - It is relatively easy to calculate

Figure 8.8 Consumer Surplus

(a) David's Consumer Surplus



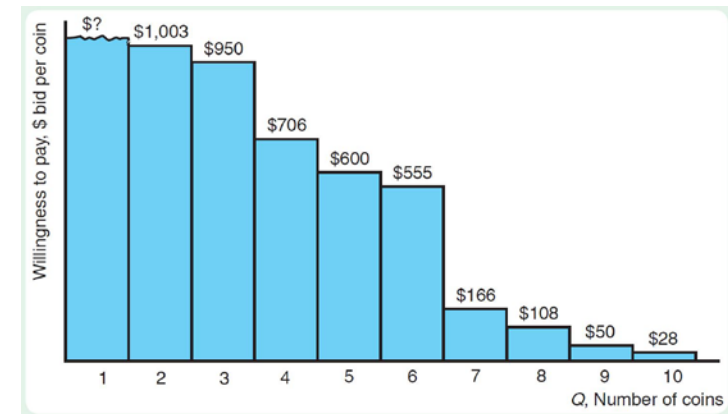
(b) Steven's Consumer Surplus



8.4 Competition Maximizes Economic Well-Being (4 of 10)

Managerial Implication: Willingness to Pay on eBay

- For a product sold on eBay, a manager can use the information that eBay reports to quickly estimate the market demand curve for the product.
 - On its website, eBay correctly argues (Chapter 12) that the best strategy for bidders is to bid their willingness to pay: the maximum value that they place on the item.
 - If bidders follow this strategy, we know the maximum bid of each person except the winner.
 - The figure arranges the bids for an A.D. 238 Roman coin from highest to lowest. Each bar indicates the bid for one coin, so, it is the market demand curve.

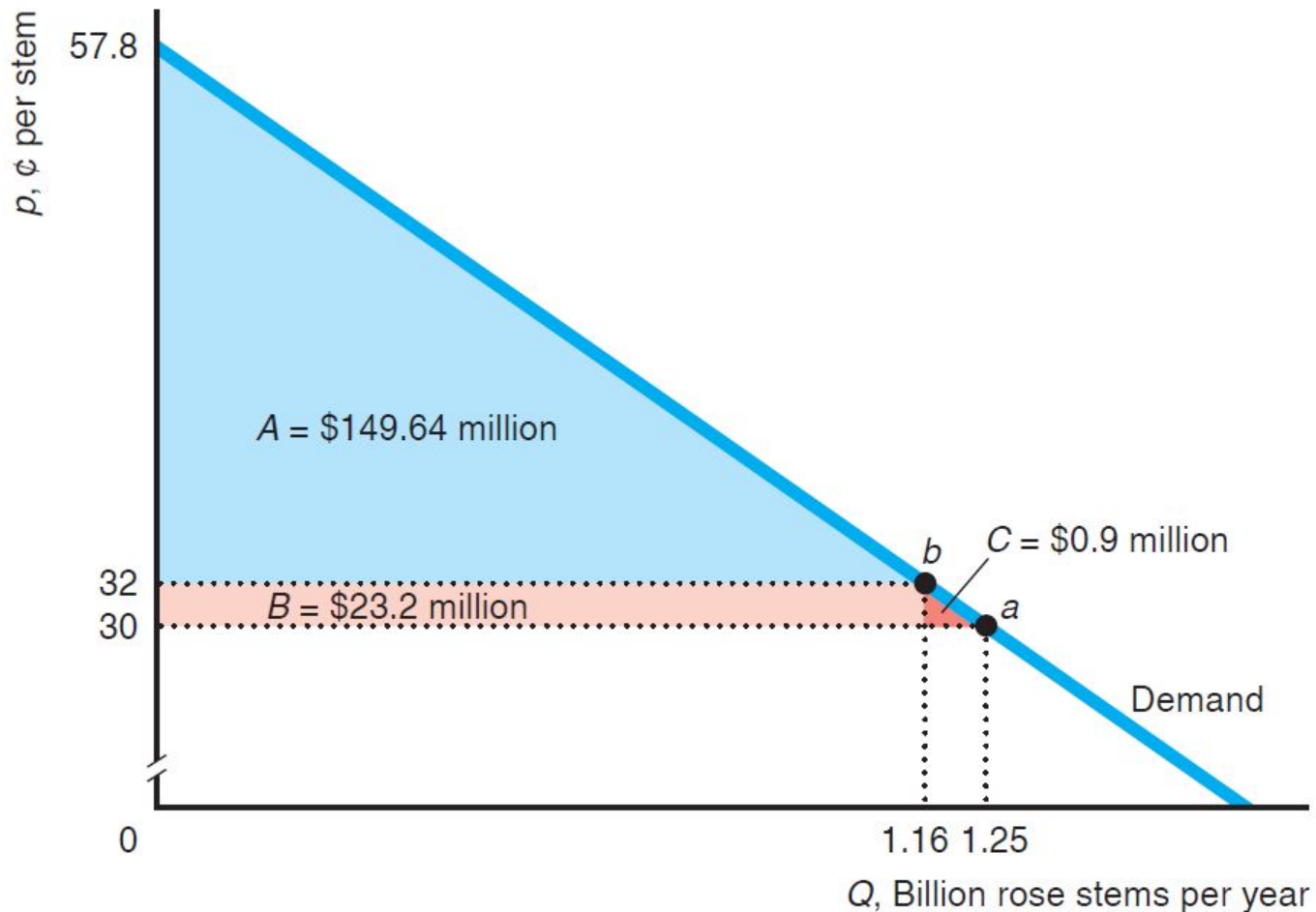


8.4 Competition Maximizes Economic Well-Being (5 of 10)

Effects of a price change on Consumer Surplus

- If the supply curve shifts upward or a government imposes a new sales tax, the equilibrium price rises, causing the consumer surplus to fall.
 - Suppose that the introduction of a new tax causes the wholesale price of roses to rise from the original equilibrium price of 30¢ to 32¢ per rose stem, a movement along the demand curve in Figure 8.9.
 - The consumer surplus at the initial price of 30¢ is area $A + B + C = \$173.74$ million per year.
 - At a higher price of 32¢, the consumer surplus falls to area $A = \$149.64$ million.
 - Thus, the loss in consumer surplus from the increase in price is $B + C = \$24.1$ million per year.

Figure 8.9 Fall in Consumer Surplus from Roses as Price Rises



8.4 Competition Maximizes Economic Well-Being (6 of 10)

Producer Surplus

- By definition, the total producer surplus is the area above the supply curve and below the market price up to the quantity actually produced.

Measuring Producer Surplus Using a Supply curve

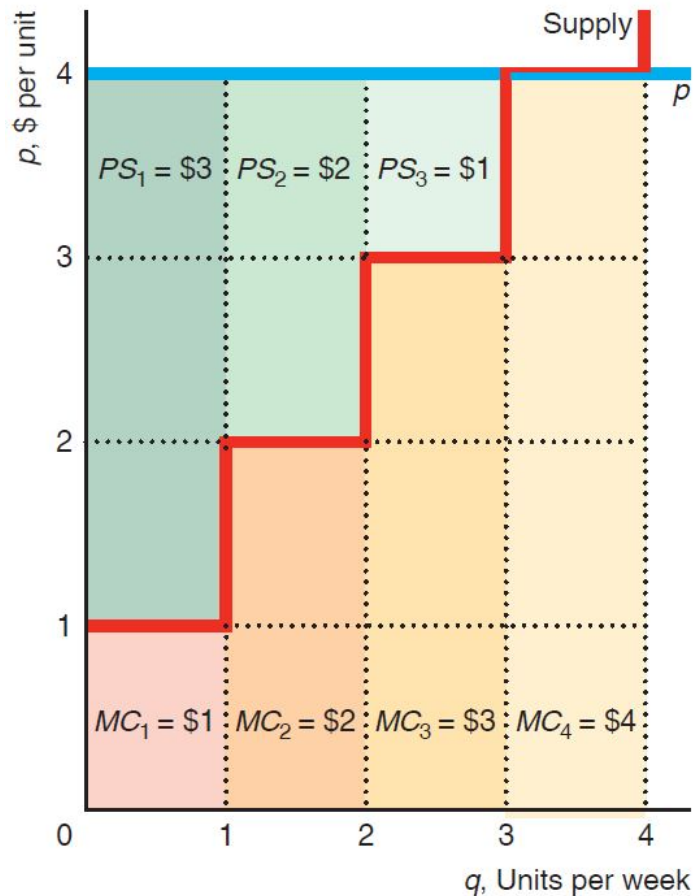
- The firm's producer surplus in panel a of Figure 8.10 is the area below the market price, \$4, and above the marginal cost (supply curve) up to the quantity sold, 4. The area under the marginal cost curve up to the number of units actually produced is the variable cost.
- The market producer surplus in panel b of Figure 8.10 is the area above the supply curve and below the market price, p^* , line up to the quantity sold, Q^* . The area below the supply curve and to the left of the quantity produced by the market, Q^* , is the variable cost.

Using Producer Surplus

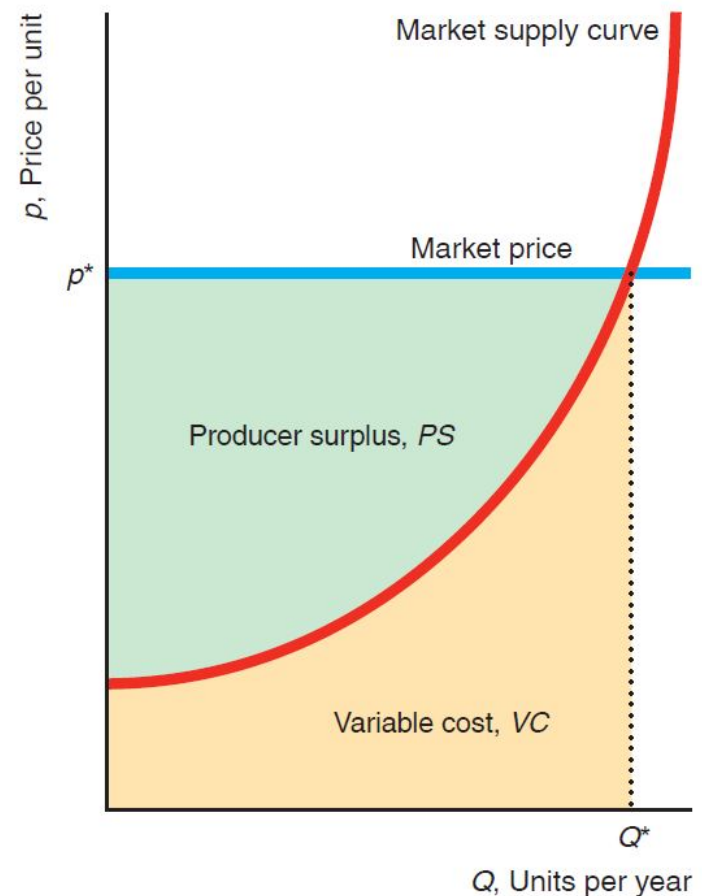
- We can use PS to study the effects of variable cost changes in profits for **all** the firms in a market.

Figure 8.10 Producer Surplus

(a) A Firm's Producer Surplus



(b) A Market's Producer Surplus

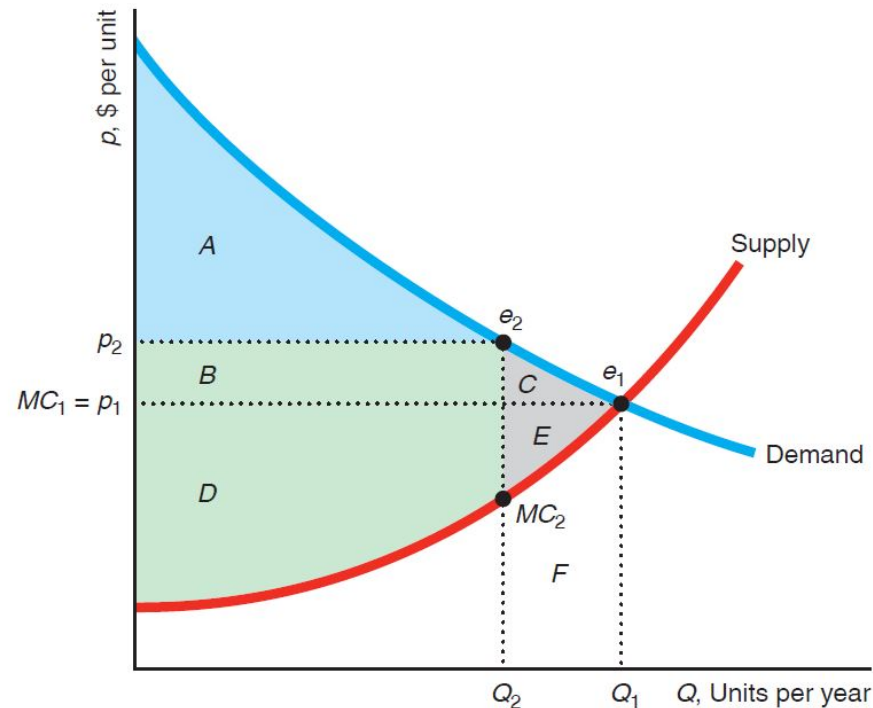


8.4 Competition Maximizes Economic Well-Being (7 of 10)

Competition Maximizes Total Surplus

- By definition, total surplus is the sum of the areas of CS and PS.
- **Perfect competition maximizes total surplus. Producing less or more than the competitive output lowers total surplus.**
- Graphical Presentation
 - In Figure 8.11, at the competitive equilibrium e_1 , with Q_1 and p_1 , $TS_1 = A + B + C + D + E$.
 - Producing less at e_2 , Q_2 and p_2 , $TS_2 = A + B + D$. $TS_2 < TS_1$.
 - As a consequence of producing less, $C + E$ are lost.
 - $C + E$ is the **deadweight loss (DWL)**

Figure 8.11 Reducing Output from the Competitive Level Lowers Total Surplus



	Competitive Output, Q_1 (1)	Smaller Output, Q_2 (2)	Change (2) - (1)
Consumer Surplus, CS	$A + B + C$	A	$-B - C = \Delta CS$
Producer Surplus, PS	$D + E$	$B + D$	$B - E = \Delta PS$
Total Surplus, $TS = CS + PS$	$A + B + C + D + E$	$A + B + D$	$-C - E = \Delta TS = -DWL$

8.4 Competition Maximizes Economic Well-Being (8 of 10)

Deadweight Loss (**DWL**)

- **DWL** is the net reduction in total surplus from a loss of surplus by one group that is not offset by a gain to another group from an action that alters a market equilibrium.
 - The deadweight loss results because consumers value extra output by more than the marginal cost of producing it. In Figure 8.11, between Q_2 and Q_1 , consumers value the extra output by $C + E$ more than it costs to produce it.
 - Society would be better off producing and consuming extra units of this good than spending this amount on other goods.
 - In short, the **deadweight loss is the opportunity cost of giving up some of this good to buy more of another good.**

8.4 Competition Maximizes Economic Well-Being (9 of 10)

The Deadweight Loss of Holiday Gifts

- Waldfogel (2005), found that consumers value their own purchases at 10% to 18% more, per dollar spent, than items received as gifts.
- He concluded that a conservative estimate of the deadweight loss of holidays with gift-giving rituals is about \$12 billion. And that's not counting about 2.8 billion hours spent shopping.



8.4 Competition Maximizes Economic Well-Being (10 of 10)

Effects of Government Intervention

- A government policy that limits trade in a competitive market reduces total surplus.
- Effects of Government Intervention: Price Ceiling
 - A price ceiling sets a limit on the highest price a firm can legally charge.
 - If the government sets the ceiling below the precontrol competitive price, consumers want to buy more than the precontrol equilibrium quantity but firms supply less than that quantity.
- Price Ceiling and Deadweight Loss
 - Fewer units are sold with a price ceiling than at the precontrol equilibrium.
 - Deadweight loss: Consumers value the good more than the marginal cost of producing extra units. Producer surplus must fall because firms receive a lower price and sell fewer units.

Managerial Solution

The Rising Cost of Keeping on Truckin'

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

Solution

- The trucking industry is a very competitive industry, trucks of certain size are identical and higher fees increase average but not marginal costs.
- An increase in fixed cost causes the market price and quantity to rise and the number of trucking firms to fall, as expected.
- In addition, it has the surprising effect that it causes producing firms to increase the amount of services that they provide.

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