Answers to Key Questions

CHAPTER ONE APPENDIX

1-1 Use the economic perspective to explain why someone who is normally a light eater at a standard restaurant may become somewhat of a glutton at a buffet-style restaurant which charges a single price for all you can eat.

This behavior can be explained in terms of marginal costs and marginal benefits. At a standard restaurant, items are priced individually — they have a positive marginal cost. If you order more, it will cost you more. You order until the marginal benefit from the extra food no longer exceeds the marginal cost. At a buffet you pay a flat fee no matter how much you eat. Once the fee is paid, additional food items have a zero marginal cost. You therefore continue to eat until your marginal benefit becomes zero.

1-5 Explain in detail the interrelationships between economic facts, theory, and policy. Critically evaluate this statement: "The trouble with economic theory is that it is not practical. It is detached from the real world."

Economic theory consists of factually supported generalizations about economic behavior that can be used to formulate economic policies. Economic theory enables policymakers to formulate economic policies that are relevant to real-world goals and problems that are based upon carefully observed facts.

1-7 Indicate whether each of the following statements applies to microeconomics or macroeconomics:
(a), (d), and (f) are macro; (b), (c), and (e) are micro.

1-8 Identify each of the following as either a positive or a normative statement:

a. The high temperature today was 89 degrees.
b. It was too hot today.
c. Other things being equal, higher interest rates reduce the total amount of borrowing.
d. Interest rates are too high.
(a) and (c) are positive; (b) and (d) are normative.

1-9 Explain and give an illustration of (a) the fallacy of composition; and (b) the "after this, therefore because of this" fallacy. Why are cause-and-effect relationships difficult to isolate in the social sciences?

(a) The fallacy of composition is the mistake of believing that something true for an individual part is necessarily true for the whole. Example: A single auto producer can increase its profits by lowering its price and taking business away from its competitors. But matched price cuts by all auto manufacturers will not necessarily yield higher industry profits.

(b) The "after this, therefore because of this" fallacy is incorrectly reasoning that when one event precedes another, the first even necessarily caused the second. Example: Interest rates rise, followed by an increase in the rate of inflation, leading to the erroneous conclusion that the rise in interest rates caused the inflation. Actually higher interest rates slow inflation.

Cause-and-effect relationships are difficult to isolate because "other things" are continually changing.

CHAPTER TWO

2-5 Why is the problem of unemployment a part of the subject matter of economics? Distinguish between allocative efficiency and productive efficiency. Give an illustration of achieving productive, but not allocative, efficiency.

Economics deals with the "limited resources—unlimited wants" problem. Unemployment represents valuable resources that could have been used to produce more goods and services—to meet more wants and ease the economizing problem.

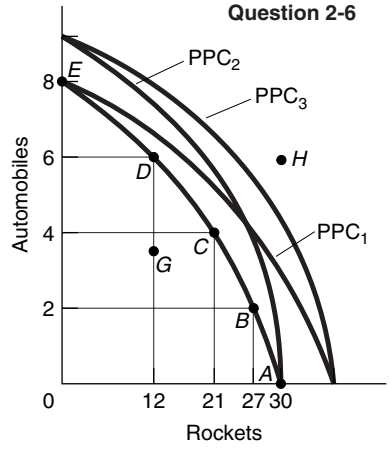
Allocative efficiency means that resources are being used to produce the goods and services most wanted by society. The economy is then located at the optimal point on its production possibilities curve where marginal benefit equals marginal cost for each good. Productive efficiency means the least costly production techniques are being used to produce wanted goods and services. Example: manual typewriters produced using the least-cost techniques but for which there is no demand.

2-6 Here is a production possibilities table for war goods and civilian goods:

Type of Production	Production Alternatives				
	A	B	C	D	E
Automobiles	0	2	4	6	8
Rockets	30	27	21	12	0

a. Show these data graphically. Upon what specific assumptions is this production possibilities curve based?
b. If the economy is at point C, what is the cost of one more automobile? One more rocket? Explain how this curve reflects increasing opportunity costs.
c. What must the economy do to operate at some point on the production possibilities curve?

(a) See curve EDCBA. The assumptions are full employment and productive efficiency, fixed supplies of resources, and fixed technology.



(b) 4.5 rockets; .33 automobiles, as determined from the table. Increasing opportunity costs are reflected in the concave-from-the-origin shape of the curve. This means the economy must give up larger and larger amounts of rockets to get constant added amounts of automobiles—and vice versa.
(c) It must obtain full employment and productive efficiency.

2-9 Specify and explain the shapes of the marginal-benefit and marginal-cost curves and use these curves to determine the optimal allocation of resources to a particular product. If current output is such that marginal cost exceeds marginal benefit, should more or less resources be allocated to this product? Explain.

The marginal benefit curve is downward sloping, MB falls as more of a product is consumed because additional units of a good yield less satisfaction than previous units. The marginal cost curve is upward sloping, MC increases as more of a product is produced since additional units require the use of increasingly unsuitable resources. The optimal amount of a particular product occurs where MB equals MC. If MC exceeds MB, fewer resources should be allocated to this use. The resources are more valuable in some alternative use (as reflected in the higher MC) than in this use (as reflected in the lower MB).

2-10 Label point G inside the production possibilities curve you have drawn for question 6. What does it indicate? Label point H outside the curve. What does this point indicate? What must occur before the economy can attain the level of production indicated by point H?

G indicated unemployment, productive inefficiency, or both. H is at present unattainable. Economic growth—through more inputs, better inputs, improved technology—must be achieved to attain H.

2-11 Referring again to question 6, suppose improvement occurs in the technology of producing rockets but not in the production of automobiles. Draw the new production possibilities curve. Now assume that a technological advance occurs in producing automobiles but not in producing rockets. Draw the new production possibilities curve. Now draw a production possibilities curve that reflects technological improvement in the production of both products.

See the graph for question 2-6. PPC_1 shows improved rocket technology. PPC_2 shows improved auto technology. PPC_3 shows improved technology in producing both products.

CHAPTER THREE

3-2 What effect will each of the following have on the demand for product B?

a. Product B becomes more fashionable.
b. The price of substitute product C falls.
c. Income declines and product B is an inferior good.
d. Consumers anticipate the price of B will be lower in the near future.
e. The price of complementary product D falls.
f. Foreign tariff barriers on B are eliminated.

Demand increases in (a), (c), (e), and (f); decreases in (b) and (d).

3-5 What effect will each of the following have on the supply of product B?

a. A technological advance in the methods of producing B.
b. A decline in the number of firms in industry B.
c. An increase in the price of resources required in the production of B.
d. The expectation that equilibrium price of B will be lower in the future than it is currently.
e. A decline in the price of product A, a good whose production requires substantially the same techniques as does the production of B.
f. The levying of a specific sales tax upon B.
g. The granting of a 50-cent per unit subsidy for each unit of B produced.

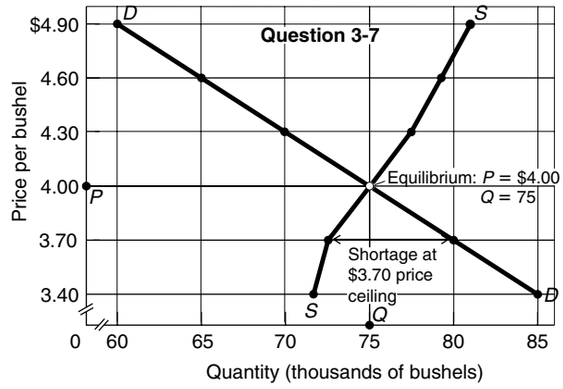
Supply increases in (a), (d), (e), and (g); decreases in (b), (c), and (f).

3-7 Suppose the total demand for wheat and the total supply of wheat per month in the Kansas City grain market are as follows:

Thousands of bushels demanded	Price per bushel	Thousand of bushels supplied	Surplus (+) or shortage (−)
85	$3.40	72	_____
80	3.70	73	_____
75	4.00	75	_____
70	4.30	77	_____
65	4.60	79	_____
60	4.90	81	_____

a. What will be the market or equilibrium price? What is the equilibrium quantity? Using the surplus-shortage column, explain why your answers are correct.
b. Graph the demand for wheat and the supply of wheat. Be sure to label the axes of your graph correctly. Label equilibrium price "P" and the equilibrium quantity "Q."
c. Why will $3.40 not be the equilibrium price in this market? Why not $4.90? "Surpluses drive prices up; shortages drive them down." Do you agree?
d. Now suppose that the government establishes a ceiling price of, say, $3.70 for wheat. Explain carefully the effects of this ceiling price. Demonstrate your answer graphically. What might prompt the government to establish a ceiling price?

Data from top to bottom: −13; −7; 0; +7; +14; and +21.



(a) P_e = $4.00; Q_e = 75,000. Equilibrium occurs where there is neither a shortage nor surplus of wheat. At the immediately lower price of $3.70, there is a shortage of 7,000 bushels. At the immediately higher price of $4.30, there is a surplus of 7,000 bushels. (See graph top of next page.)
(b) Quantity (thousands) of bushels.
(c) Because at $3.40 there will be a 13,000 bushel shortage which will drive the price up. Because at $4.90 there will be a 21,000 bushel surplus which will drive the price down. Quotation is incorrect; just the opposite is true.

(d) A $3.70 ceiling causes a persistent shortage. This product may be a necessity and the government is concerned that some consumers might not being able to afford it.

3-8 How will each of the following changes in demand and/or supply affect equilibrium price and equilibrium quantity in a competitive market; that is, do price and quantity rise, fall, remain unchanged, or are the answers indeterminate, depending on the magnitudes of the shifts in supply and demand? You should rely on a supply and demand diagram to verify answers.

a. Supply decreases and demand remains constant.
b. Demand decreases and supply remains constant.
c. Supply increases and demand is constant.
d. Demand increases and supply increases.
e. Demand increases and supply is constant.
f. Supply increases and demand decreases.
g. Demand increases and supply decreases.
h. Demand decreases and supply decreases.

(a) Price up; quantity down;
(b) Price down; quantity down;
(c) Price down; quantity up;
(d) Price indeterminate; quantity up;
(e) Price up; quantity up;
(f) Price down; quantity indeterminate;
(g) Price up, quantity indeterminate;
(h) Price indeterminate and quantity down.

CHAPTER FOUR

4-7 Assume that a business firm finds that its profits will be at maximum when it produces $40 worth of product A. Suppose also that each of the three techniques shown in the following table will produce the desired output.

		Resource Units Required		
Resource	**Price per unit of resource**	**Technique No. 1**	**Technique No. 2**	**Technique No. 3**
Labor	$3	5	2	3
Land	4	2	4	2
Capital	2	2	4	5
Entrepreneurial ability	2	4	2	4

a. With the resource prices shown, which technique will the firm choose? Why? Will production entail profits or losses? Will the industry expand or contract? When is a new equilibrium output achieved?

b. Assume now that a new technique, technique No. 4, is developed. It entails the use of 2 units of labor, 2 of land, 6 of capital, and 3 of entrepreneurial ability. Given the resource prices in the table, will the firm adopt the new technique? Explain your answers.

c. Suppose now that an increase in labor supply causes the price of labor to fall to $1.50 per unit, all other resource prices being unchanged. Which technique will the producer now choose? Explain.

d. "The market system causes the economy to conserve most in the use of those resources which are particularly scarce in supply. Resources that are scarcest relative to the demand for them have the highest prices. As a result, producers use these resources as sparingly as is possible." Evaluate this statement. Does your answer to part c, above, bear out this contention? Explain.

(a) Technique 2. Because it produces the output with least cost ($34 compared to $35 each for the other two). Economic profit will be $6 (= 40 − $34), which will cause the industry to expand. Expansion will continue until prices decline to where total revenue is $34 (equal to total cost).

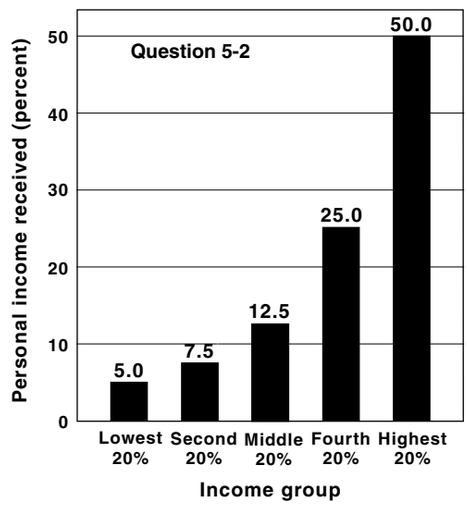
(b) Adopt technique 4 because its cost is now lowest at $32.
(c) Technique 1 because its cost is now lowest at $27.50
(d) The statement is logical. Increasing scarcity causes prices to rise. Firms ignoring higher resource prices will become high-cost producers and be competed out of business by firms switching to the less expensive inputs. The market system forces producers to conserve on the use of highly scarce resources. Question 8c confirms this: Technique 1 was adopted because labor had become less expensive.

4-9 Some large hardware stores such as Home Depot boast of carrying as many as 20,000 different products in each store. What motivated the producers of those products—everything from screwdrivers to ladders to water heaters—to make them and offer them for sale? How did producers decide on the best combinations of resources to use? Who made these resources available, and why? Who decides whether these particular hardware products should continue to get produced and offered for sale?

The quest for profit led firms to produce these goods. Producers looked for and found the least-cost combination of resources in producing their output. Resource suppliers, seeking income, made these resources available. Consumers, through their dollar votes, ultimately decide on what will continue to be produced.

CHAPTER FIVE

5-2 Assume that the five residents of Econoville receive incomes of $50, $75, $125, $250, and $500. Present the resulting personal distribution of income as a graph similar to Figure 5-2. Compare the incomes of the lowest and highest fifth of the income receivers. The distribution of income is quite unequal. The highest 20 percent of the residents receive 10 times more income than the lowest 20 percent.



5-4 What are the major legal forms of business organization? Briefly state the advantages and disadvantages of each. How do you account for the dominant role of corporations in the U.S. economy?

The legal forms of business organizations are: sole proprietorship, partnership, and corporation.

Proprietorship advantages: easy to start and provides maximum freedom for the proprietor to do what she/he thinks best. Proprietorship disadvantages: limited financial resources; the owner must be a Jack-or-Jill-of-all-trades; unlimited liability.

Partnership advantages: easy to organize; greater specialization of management; and greater financial resources. Disadvantages: financial resources are still limited; unlimited liability;

possibility of disagreement among the partners; and precarious continuity.

Corporation advantages: can raise large amounts of money by issuing stocks and bonds; limited liability; continuity.

Corporation disadvantages: red tape and expense in incorporating; potential for abuse of stockholder and bondholder funds; double taxation of profits; separation of ownership and control.

The dominant role of corporations stems from the advantages cited, particularly unlimited liability and the ability to raise money.

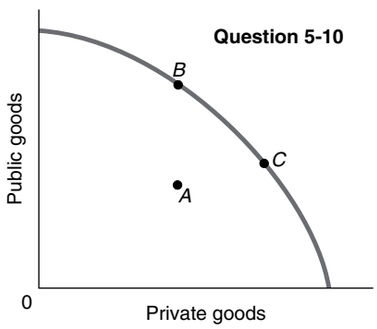
5-9 What are the basic characteristics of public goods? Explain the significance of the exclusion principle. By what means does government provide public goods?

Public goods are indivisible (they are produced in such large units that they cannot be sold to individuals) and the exclusion principle does not apply to them (once the goods are produced nobody—including free riders—can be excluded from the goods' benefits). The free-rider problem explains the significance of the exclusion principle. The exclusion principle separates goods and services which private firms will supply (because those who do not pay for them can be excluded from their benefits) and goods and services which government must supply (because people can obtain the benefits without paying). Government must levy taxes to get revenues to pay for public goods.

5-10 Draw a production possibilities curve with public goods on the vertical axis and private goods on the horizontal axis. Assuming the economy is initially operating on the curve, indicate the means by which the production of public goods might be increased. How might the output of public goods be increased if the economy is initially functioning at a point inside the curve?

On the curve, the only way to obtain more public goods is to reduce the production of private goods (from *C* to *B*).

An economy operating inside the curve can expand the production of public goods without sacrificing private goods (say, from *A* to *B*) by making use of unemployed resources.



5-15 Suppose in Fiscalville there is no tax on the first $10,000 of income, but earnings between $10,000 and $20,000 are taxed at 20 percent and income between $20,000 and $30,000 at 30 percent. Any income above $30,000 is taxed at 40 percent. If your income is $50,000, how much in taxes will you pay? Determine your marginal and average tax rates. Is this a progressive tax?

Total tax = $13,000; marginal tax rate = 40% average tax rate = 26%. This is a progressive tax; the average tax rate rises as income goes up.

CHAPTER SIX

6-4 The following are production possibilities tables for South Korea and the United States. Assume that before specialization and trade the optimal product-mix for South Korea is alternative B and for the United States alternative U.F

	South Korea's production possibilities					
Product	**A**	**B**	**C**	**D**	**E**	**F**
Radios (in 1000s)	30	24	18	12	6	0
chemicals (tons)	0	6	12	18	24	30
	U.S. production possibilities					
Product	**R**	**S**	**T**	**U**	**V**	**W**
Radios (in 1000s)	10	8	6	4	2	0
chemicals (tons)	0	4	8	12	16	20

a. Are comparative cost conditions such that the two areas should specialize? If so, what product should each produce?
b. What is the total gain in radio and chemical output that results from this specialization?
c. What are the limits of the terms of trade? Suppose actual terms of trade are 1 unit of radios for 1-1/2 units of chemicals and that 4 units of radios are exchanged for 6 units of chemicals. What are the gains from specialization and trade for each area?
d. Can you conclude from this illustration that specialization according to comparative advantage results in more efficient use of world resources? Explain.

(a) Yes, because the opportunity cost of radios is less (1R = 1C) in South Korea than in the United States (1R = 2C). South Korea should produce radios and the United States should produce chemicals.

(b) If they specialize, the United States can produce 20 tons of chemicals and South Korea can produce 30,000 radios. Before specialization South Korea produced alternative B and the United States alternative U for a total of 28,000 radios (24,000 + 4,000) and 18 tons of chemicals (6 tons + 12 tons). The gain is 2,000 radios and 2 tons of chemicals.

(c) The limits of the terms of trade are determined by the comparative cost conditions in each country before trade: 1R = 1C in South Korea and 1R = 2C in the United States. The terms of trade must be somewhere between these two ratios for trade to occur.

If the terms of trade are 1R = 1-1/2C, South Korea would end up with 26,000 radios (= 30,000 − 4,000) and 6 tons of chemicals. The United States would have 4,000 radios and 14 tons of chemicals (= 20 − 6). South Korea has gained 2,000 radios. The United States has gained 2 tons of chemicals.

(d) Yes, the world is obtaining more output from its fixed resources.

6-6 True or false? "U.S. exports create a demand for foreign currencies; foreign imports of U.S. goods generate supplies of foreign currencies." Explain. Would a decline in U.S. consumer income or a weakening of U.S. preferences for foreign products cause the dollar to depreciate or appreciate? Other things equal, what would be the effects of that depreciation or appreciation on U.S. exports and imports?

The first part of this statement is incorrect. U.S. exports create a domestic *supply* of foreign currencies, not a domestic demand for them. The second part of the statement is accurate. The foreign demand for dollars (from U.S. exports) generates a supply of foreign currencies to the United States.

A decline in U.S. incomes or a weakening of U.S. preferences for foreign goods would reduce U.S. imports, reducing U.S. demand for foreign currencies. These currencies would depreciate (the dollar would appreciate). Dollar appreciation means U.S. exports would decline and U.S. imports would increase.

6-10 Identify and state the significance of each of the following: (a) WTO; (b) EU; (c) euro; and (d) NAFTA. What commonality do they share?

(a) The WTO oversees trade agreements reached by member nations and arbitrates trade disputes among them. (b) The EU is a trading bloc of 15 European countries who have agreed to abolish tariffs and import quotas on most products and have liberalized the movement of labor and capital within the EU. (c) The euro is the common currency that will be used by 11 of the 15 EU countries. (d) NAFTA is a trade bloc made up of the United States, Canada, and Mexico whose purpose is to reduce tariffs and other trade barriers among the three countries.

All of the above have the goals of increasing international trade and leading to a better allocation of the world's resources.

CHAPTER SEVEN

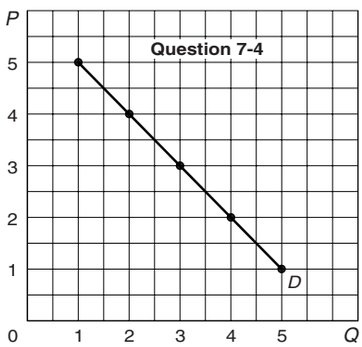
7-2 Graph the accompanying demand data and then use the midpoints formula for Ed to determine price elasticity of demand for each of the four possible $1 price changes. What can you conclude about the relationship between the slope of a curve and its elasticity? Explain in a nontechnical way why demand is elastic in the northwest segment of the demand curve and inelastic in the southeast segment.

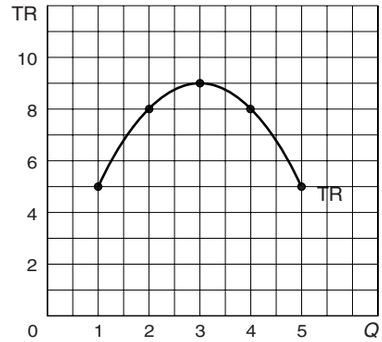
Product price	Quantity demanded
$5	1
4	2
3	3
2	4
1	5

See the graph accompanying the answer to 7-4. Elasticities, top to bottom: 3; 1.4; 714; .333. Slope does not measure elasticity. This demand curve has a constant slope of -1 ($= -1/1$), but elasticity declines as we move down the curve. When the initial price is high and initial quantity is low, a unit change in price is a *low* percentage while a unit change in quantity is a *high* percentage change. The percentage change in quantity exceeds the percentage change in price, making demand elastic. When the initial price is low and initial quantity is high, a unit change in price is a *high* percentage change while a unit change in quantity is a *low* percentage change. The percentage change in quantity is less than the percentage change in price, making demand inelastic.

7-4 Calculate total-revenue data from the demand schedule in question 2. Graph total revenue below your demand curve. Generalize on the relationship between price elasticity and total revenue.

See the graph. Total revenue data, top to bottom: $5; $8; $9; $8; $5. When demand is elastic, price and total revenue move in the opposite direction. When demand is inelastic, price and total revenue move in the same direction.





7-5 How would the following changes in price affect total revenue. That is, would total revenue increase, decline, or remain unchanged?

a. Price falls and demand is inelastic.
b. Price rises and demand is elastic.
c. Price rises and supply is elastic.
d. Price rises and supply is inelastic.
e. Price rises and demand is inelastic.
f. Price falls and demand is elastic.
g. Price falls and demand is of unit elasticity.

Total revenue would increase in (c), (d), (e), and (f); decrease in (a) and (b); and remain the same in (g).

7-6 What are the major determinants of price elasticity of demand? Use these determinants and your own reasoning in judging whether demand for each of the following products is elastic or inelastic:

(a) bottled water, (b) toothpaste; (c) Crest toothpaste; (d) ketchup, (e) diamond bracelets; (f) Microsoft Windows operating system.

Substitutability, proportion of income; luxury versus necessity, and time. Elastic: (a), (c), (e). Inelastic: (b), (d), and (f).

7-10 In November 1998 Vincent van Gogh's self-portrait sold at auction for $71.5 million. Portray this sale in a demand and supply diagram and comment on the elasticity of supply. Comedian George Carlin once mused, "If a painting can be forged well enough to fool some experts, why is the original so valuable"? Provide an answer.

The supply is perfectly inelastic—vertical—at a quantity of 1 unit. The $71.5 million price is determined where the downward sloping demand curve intersected this supply curve.

If more than one picture where available (all but one having to be a copy), the demand would likely decrease enormously.

7-12 Suppose the cross elasticity of demand for products A and B is $+3.6$ and for products C and D it is -5.4. What can you conclude about how products A and B are related? Products C and D?

A and B are substitutes; C and D are complements.

7-13 The income elasticities of demand for movies, dental services, and clothing have been estimated to be $+3.4$, $+1.0$, and $+0.5$ respectively. Interpret these coefficients. What does it mean if the income elasticity coefficient is negative?

All are normal goods—income and quantity demanded move in the same direction. These coefficients reveal that a 1 percent increase in income will increase the quantity of movies demanded by 3.4 percent, of dental services by 1.0 percent, and of clothing by 0.5 percent. A negative coefficient indicates an inferior good—income and quantity demanded move in the opposite direction.

CHAPTER EIGHT

8-2 Complete the following table and answer the questions below:

Units consumed	Total utility	Marginal utility
0	0	
1	10	10
2		8
3	25	—
4	30	
5		3
6	34	—

a. At which rate is total utility increasing: a constant rate, a decreasing rate, or an increasing rate? How do you know?
b. "A rational consumer will purchase only 1 unit of the product represented by these data, since that amount maximizes marginal utility." Do you agree? Explain why or why not.
c. "It is possible that a rational consumer will not purchase any units of the product represented by these data." Do you agree? Explain why or why not.

Missing total utility data, top to bottom: 18; 33. Missing marginal utility data, top to bottom: 7; 5; 1.
(a) A decreasing rate; because marginal utility is declining.
(b) Disagree. The marginal utility of a unit beyond the first may be sufficiently great (relative to product price) to make it a worthwhile purchase.
(c) Agree. This product's price could be so high relative to the first unit's marginal utility that the consumer would buy none of it.

8-4 Columns 1 through 4 of the accompanying table show the marginal utility, measured in terms of utils, which Ricardo would get by purchasing various amounts of products A, B, C, and D. Column 5 shows the marginal utility Ricardo gets from saving. Assume that the prices of A, B, C, and D are \$18, \$6, \$4, and \$24, respectively, and that Ricardo has a money income of \$106.

Column 1		*Column 2*		*Column 3*		*Column 4*		*Column 5*	
Units of A	MU	Units of B	MU	Units of C	MU	Units of D	MU	No. of \$ saved	MU
1	72	1	24	1	15	1	36	1	5
2	54	2	15	2	12	2	30	2	4
3	45	3	12	3	8	3	24	3	3
4	36	4	9	4	7	4	18	4	2
5	27	5	7	5	5	5	13	5	1
6	18	6	5	6	4	6	7	6	1/2
7	15	7	2	7	3.5	7	4	7	1/4
8	12	8	1	8	3	8	2	8	1/8

a. What quantities of A, B, C, and D will Ricardo purchase in maximizing his utility?
b. How many dollars will Ricardo choose to save?
c. Check your answers by substituting them into the algebraic statement of the utility-maximizing rule.
(a) 4 units of A; 3 units of B; 3 units of C, and 0 units of D.
(b) Save \$4.
(c) 36/\$18 = 12/\$6 = 8/\$4 = 2/\$1. The marginal utility per dollar of the last unit of each product purchased is 2.

8-5 You are choosing between two goods, X and Y, and your marginal utility from each is as shown below. If your income is \$9 and the prices of X and Y are \$2 and \$1, respectively, what quantities of each will you purchase in maximizing utility? What total utility you will realize. Assume that, other things remaining unchanged, the price of X falls to \$1. What quantities of X and Y will you now purchase? Using the two prices and quantities for X, derive a demand schedule (price-quantity-demanded table) for X.

Units of X	MU_x	Units of Y	MU_y
1	10	1	8
2	8	2	7
3	6	3	6
4	4	4	5
5	3	5	4
6	2	6	3

Buy 2 units of X and 5 units of Y. Marginal utility of last dollar spent will be equal at 4 (= 8/\$2 for X and 4/\$1 for Y) and the \$9 income will be spent. Total utility = 48 (= 10 + 8 for X plus 8 + 7 + 6 + 5 + 4 for Y). When the price of X falls to \$1, the quantity of X demanded increases from 2 to 4. Total utility is now 58 (= 10 + 8 + 6 + 4 for X plus 8 + 7 + 6 + 5 + 4 for Y).

Demand schedule: $P = \$2$; $Q = 2$. $P = \$1$; $Q = 4$.

CHAPTER EIGHT APPENDIX

8A-3 Using Figure 4, explain why the point of tangency of the budget line with an indifference curve is the consumer's equilibrium position. Explain why any point where the budget line intersects an indifference curve will not be equilibrium. Explain: "The consumer is in equilibrium where MRS = P_B/P_A."

The tangency point places the consumer on the highest attainable indifference curve; it identifies the combination of goods yielding the highest total utility. All intersection points place the consumer on a lower indifference curve. MRS is the slope of the indifference curve; PB/PA is the slope of the budge line. Only at the tangency point are these two slopes equal. If MRS $> P_B/P_A$ or MRS $< P_B/P_A$, adjustments in the combination of products can be made to increase total utility (get to a higher indifference curve).

CHAPTER NINE

9-2 Gomez runs a small pottery firm. He hires one helper at \$12,000 per year, pays annual rent of \$5,000 for his shop, and materials cost \$20,000 per year. Gomez has \$40,000 of his own funds invested in equipment (pottery wheels, kilns, and so forth) that could earn him \$4,000 per year if alternatively invested. Gomez has been offered \$15,000 per year to work as a potter for a competitor. He estimates his entrepreneurial talents are worth \$3,000 per year. Total annual revenue from pottery sales is \$72,000. Calculate accounting profits and economic profits for Gomez's pottery.

Explicit costs: \$37,000 (= \$12,000 for the helper + \$5,000 of rent + \$20,000 of materials). Implicit costs: \$22,000 (= \$4,000 of forgone interest + \$15,000 of forgone salary + \$3,000 of entreprenuership).

Accounting profit = \$35,000 (= \$72,000 of revenue − \$37,000 of explicit costs); Economic profit = \$13,000 (= \$72,000 − \$37,000 of explicit costs − \$22,000 of implicit costs).

9-4 Complete the following table by calculating marginal product and average product from the data given. Plot total, marginal, and average product and explain in detail the relationship between each pair of curves. Explain why marginal product first rises, then declines, and ultimately becomes negative. What bearing does the law of diminishing returns have on short-run costs? Be specific. "When marginal product is rising, marginal

cost is falling. And when marginal product is diminishing, marginal cost is rising." Illustrate and explain graphically.

Inputs of labor	Total product	Marginal product	Average product
0	0	____	____
1	15	____	____
2	34	____	____
3	51	____	____
4	65	____	____
5	74	____	____
6	80	____	____
7	83	____	____
8	82	____	____

Marginal product data, top to bottom: 15; 19; 17; 14; 9; 6; 3; −1. Average product data, top to bottom: 15; 17; 17; 16.25; 14.8; 13.33; 11.86; 10.25. Your diagram should have the same general characteristics as text Figure 9-2.

MP is the slope—the rate of change—of the TP curve. When TP is rising at an increasing rate, MP is positive and rising. When TP is rising at a diminishing rate, MP is positive but falling. When TP is falling, MP is negative and falling. AP rises when MP is above it; AP falls when MP is below it.

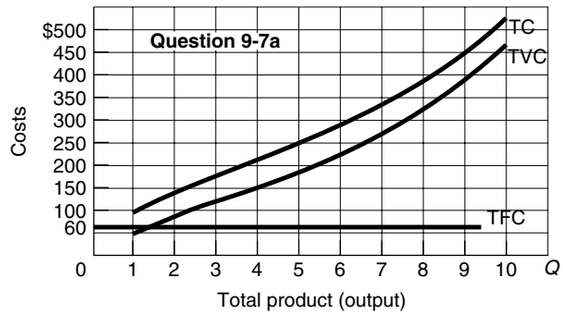
MP first rises because the fixed capital gets used more productively as added workers are employed. Each added worker contributes more to output than the previous worker because the firm is better able to use its fixed plant and equipment. As still more labor is added, the law of diminishing returns takes hold. Labor becomes so abundant relative to the fixed capital that congestion occurs and marginal product falls. At the extreme, the addition of labor so overcrowds the plant that the marginal product of still more labor is negative—total output falls.

Illustrated by Figure 9-6. Because labor is the only variable input and its price (its wage rate) is constant, MC is found by dividing the wage rate by MP. When MP is rising, MC is falling; when MP reaches its maximum, MC is at its minimum; when MP is falling, MC is rising.

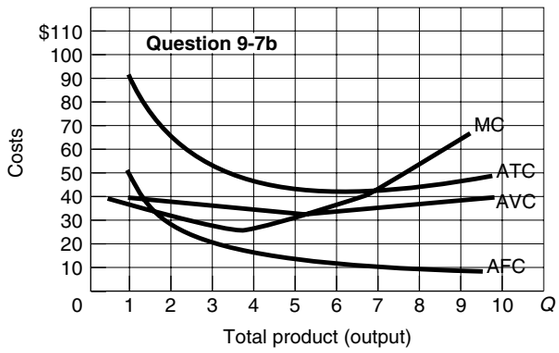
9-7 A firm has fixed costs of $60 and variable costs as indicated in the table at the bottom of the page. Complete the table. When finished, check your calculations by referring to question 4 at the end of Chapter 23.

a. Graph total fixed cost, total variable cost, and total cost. Explain how the law of diminishing returns influences the shapes of the total variable-cost and total-cost curves.
b. Graph AFC, AVC, ATC, and MC. Explain the derivation and shape of each of these four curves and their relationships to one another. Specifically, explain in nontechnical terms why the MC curve intersects both the AVC and ATC curves at their minimum points.
c. Explain how the locations of each of the four curves graphed in question 7b would be altered if (1) total fixed cost had been $100 rather than $60, and (2) total variable cost had been $10 less at each level of output.

The total fixed costs are all $60. The total costs are all $60 more than the total variable cost. The other columns are shown in Question 4 in Chapter 23.
(a) See the graph. Over the 0 to 4 range of output, the TVC and TC curves slope upward at a decreasing rate because of increasing marginal returns. The slopes of the curves then increase at an increasing rate as diminishing marginal returns occur.
(b) See the graph. AFC (= TFC/*Q*) falls continuously since a fixed amount of capital cost is spread over more units of output. The MC (= change in TC/change in *Q*), AVC (= TVC/*Q*), and ATC (= TC/*Q*) curves are U-shaped, reflecting the influence of first increasing and then diminishing returns. The ATC curve sums AFC and AVC vertically. The ATC curve falls when the MC curve is below it; the ATC curve rises when the MC curve is above it. This means the MC curve must intersect the ATC curve at its lowest point. The same logic holds for the minimum point of the AVC curve.



Total product	Total fixed cost	Total variable cost	Total cost	Average fixed cost	Average variable cost	Average total cost	Marginal cost
0	$___	$ 0	$___	$___	$___	$___	$___
1	___	45	___	___	___	___	___
2	___	85	___	___	___	___	___
3	___	120	___	___	___	___	___
4	___	150	___	___	___	___	___
5	___	185	___	___	___	___	___
6	___	225	___	___	___	___	___
7	___	270	___	___	___	___	___
8	___	325	___	___	___	___	___
9	___	390	___	___	___	___	___
10	___	465	___	___	___	___	___



(c1)If TFC has been $100 instead of $60, the AFC and ATC curves would be higher — by an amount equal to $40 divided by the specific output. Example: at 4 uni**ts, AVC** =$25.00 [=($60 + $40)/4]; and ATC = $62.50 [=($210 + $40)/4]. The AVC and MC curves are not affected by changes in fixed costs.
(c2)If TVC has been $10 less at each output, MC would be $10 lower for the first unit of output but remain the same for the remaining output. The AVC and ATC curves would also be lower—by an amount equal to $10 divided by the specific output. Example: at 4 units of output, AVC =$35.00 [=$150 − $10)/4], ATC = $50 [=($210 − $10)/4]. The AFC curve would not be affected by the change in variable costs.

9-10 Use the concepts of economies and diseconomies of scale to explain the shape of a firm's long-run ATC curve. What is the concept of minimum efficient scale? What bearing may the exact shape of the long-run ATC curve have on the structure of an industry?

The long-run ATC curve is U-shaped. At first, long-run ATC falls as the firm expands and realizes economies of scale from labor and managerial specialization and the use of more efficient capital. The long-run ATC curve later turns upward when the enlarged firm experiences diseconomies of scale, usually resulting from managerial inefficiencies.

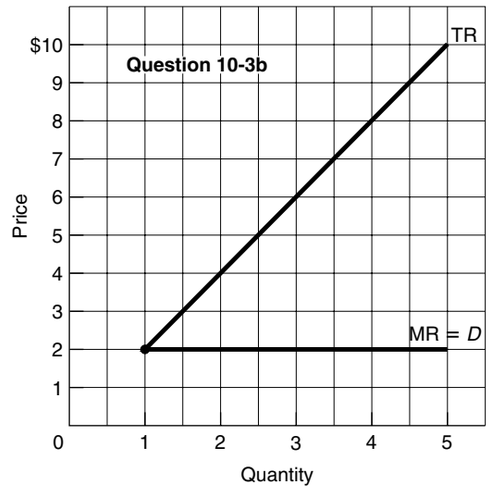
The MES (minimum efficient scale is the smallest level of output needed to attain all economies of scale and minimum long-run ATC.

If long-run ATC drops quickly to its minimum cost which then extends over a long range of output, the industry will likely be composed of both large and small firms. If long-run ATC descends slowly to its minimum cost over a long range of output, the industry will likely be composed of a few large firms. If long-run ATC drops quickly to its minimum point and then rises abruptly, the industry likely be composed of many small firms.

CHAPTER TEN

10-3 Use the following demand schedule to determine total and marginal revenues for each possible level of sales:

Product Price: $	Quantity Demanded	Total Revenue: $	Marginal Revenue: $
2	0		
2	1		
2	2		
2	3		
2	4		
2	5		



a. What can you conclude about the structure of the industry in which this firm is operating? Explain.
b. Graph the demand, total-revenue, and marginal-revenue curves for this firm.
c. Why do the demand and mariginal-revenue curves coincide?
d. "Marginal revenue is the change in total revenue." Explain verbally and graphically, using the data in the table.
Total revenue, top to bottom: 0; $2; $4; $8; $10. Marginal revenue, top to bottom: $2, throughout.
(a) The industry is purely competitive—this firm is a "price taker." The firm is so small relative to the size of the market that it can change its level of output without affecting the market price.
(b) See graph.
(c) The firm's demand curve is perfectly elastic; MR is constant and equal to *P*.
(d) Yes. Table: When output (quantity demanded) increases by 1 unit, total revenue increase by $2. This $2 increase is the marginal revenue. Figure: The change in TR is measured by the slope of the TR line, 2 (=$2/1 unit).

10-4 Assume the following unit-cost data are for a purely competitive producer:

Total Product	Average fixed cost	Average variable cost	Average total cost	Marginal cost
0				
1	$60.00	$45.00	$105.00	$45
2	30.00	42.50	72.50	$40
3	20.00	40.00	60.00	35
4	15.00	37.50	52.50	30
5	12.00	37.00	49.00	35
6	10.00	37.50	47.50	40
7	8.57	38.57	47.14	45
8	7.50	40.63	48.13	55
9	6.67	43.33	50.00	65
10	6.00	46.50	52.50	75

a. At a product price of $56, will this firm produce in the short run? Why, or why not? If it does produce, what will be the profit-maximizing or loss-minimizing ouput? Explain. What economic profit or loss will the firm realize per unit of output?
b. Answer the questions of 4a assuming that product price is $41.
c. Answer the questions of 4a assuming that product price is $32.

d. In the table below, complete the short-run supply schedule for the firm (columns 1 to 3) and indicate the profit or loss incurred at each output (column 3).

(1) Price	(2) Quantity supplied, single firm	(3) Profit (+) or loss(l)	(4) Quantity supplied, 1500 firms
$26			
32	____	$____	____
38	____	____	____
41	____	____	____
46	____	____	____
56	____	____	____
66	____	____	____

e. Explain: "That segment of a competitive firm's marginal-cost curve which lies above its average- variable-cost curve constitutes the short-run supply curve for the firm." Illustrate graphically.

f. Now assume there are 1500 identical firms in this competitive industry; that is, there are 1500 firms, each of which has the same cost data as shown here. Calculate the industry supply schedule (column 4).

g. Suppose the market demand data for the product are as follows:

Price	Total quantity demanded
$26	17,000
32	15,000
38	13,500
41	12,000
41	10,500
56	9,500
66	8,000

What will equilibrium price be? What will equilibrium output be for the industry? For each firm? What will profit or loss be per unit? Per firm? Will this industry expand or contract in the long run?

(a) Yes, $56 exceeds AVC (and ATC) at the loss— minimizing output. Using the MR = MC rule it will produce 8 units. Profits per unit = $7.87(=$56 − $48.13); total profit = $62.96.

(b) Yes, $41 exceeds AVC at the loss—minimizing output. Using the MR = MC rule it will produce 6 units. Loss per unit or output is $6.50(= $41 − $47.50). Total loss = $39(= 6 □∞ $6.50), which is less than its total fixed cost of $60.

(c) No, because $32 is always less than AVC. If it did produce, its output would be 4—found by expanding output until MR no longer exceeds MC. By producing 4 units, it would lose $82 [= 4 ($32 − $52.50)]. By Not producing, it would lose only its total fixed cost of $60.

(d) Column (2) data, top to bottom: 0; 0; 5; 6; 7; 8; 9, Column (3) data, top to bottom in dollars: −60; −60; −55; −39; −8; +63; +144.

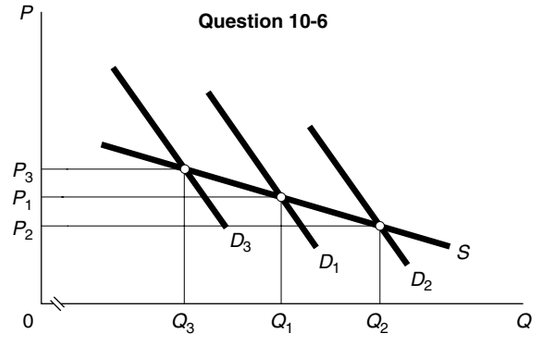
(e) The firm will not produce if $P <$ AVC. When $P >$ AVC, the firm will produce in the short run at the quantity where P (=MR) is equal to its increasing MC. Therefore, the MC curve above the AVC curve is the firm's short-run supply curve; it shows the quantity of output the firm will supply at each price level. See Figure 10-6 for a graphical illustration.

(f) Column (4) data, top to bottom: 0; 0; 7,500; 9,000; 10,500; 12,000; 13,500.

(g) Equilibrium price = $46; equilibrium output = 10,500. Each firm will produce 7 units. Loss per unit = $1.14, or $8 per firm. The industry will contract in the long run.

10-6 Using diagrams for both the industry and representative firm, illustrate competitive long-run equilibrium. Assuming constant costs, employ these diagrams to show how (a) an increase and (b) a decrease in market demand will upset this long-run equilibrium. Trace graphically and describe verbally the adjustment processes by which long-run equilibrium is restored. Now rework your analysis for increasing- and decreasing-cost industries and compare the three long-run supply curves.

See Figures 10-8 and 10-9 and their legends. See Figure 10-11 for the supply curve for an increasing cost industry. The supply curve for a decreasing cost industry is below.



10-7 In long-run equilibrium, P = minimum ATC = MC. Of what significance for economic efficiency is the equality of P and minimum ATC? The equality of P and MC? Distinguish between productive efficiency and allocative efficiency in your answer.

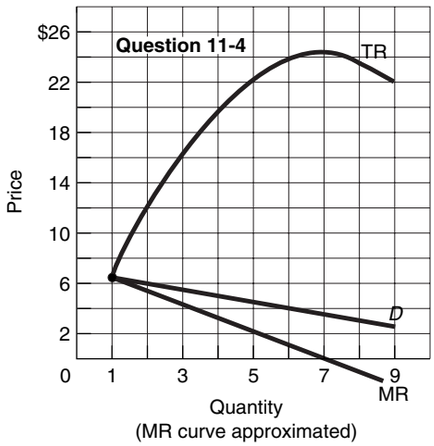
The equality of P and minimum ATC means the firm is achieving *productive efficiency;* it is using the most efficient technology and employing the least costly combination of resources. The equality of P and MC means the firm is achieving *allocative efficiency,* the industry is producing the right product in the right amount based on society's valuation of that product and other products.

CHAPTER ELEVEN

11-4 Use the demand schedule that follows to calculate total revenue and marginal revenue at each quantity. Plot the demand, total-revenue, and marginal-revenue curves and explain the relationships between them. Explain why the marginal revenue of the fourth unit of output is $3.50, even though its price is $5.00. Use Chapter 20's total-revenue test for price elasticity to designate the elastic and inelastic segments of your graphed demand curve. What generalization can you make regarding the relationship between marginal revenue and elasticity of demand? Suppose that somehow the marginal cost of successive units of output were zero. What output would the profit-seeking firm produce? Finally, use your analysis to explain why a monopolist would never produce in the inelastic region of demand.

Price	Quantity demanded	Price	Quantity demanded
$7.00	0	$4.50	5
6.50	1	4.00	6
6.00	2	3.50	7
5.50	3	3.00	8
5.00	4	2.50	9

Total revenue, in order from Q = 0: 0; $6.50; $12.00; $16.50; $20.00; $22.50; $24.00; $24.50; $24.00; $22.50. Marginal revenue in order from Q = 1: $6.50; $5.50; $4.50; $3.50; $2.50; $1.50; $.50; −$1.50. See the accompanying graph. Because TR is increasing at a diminishing rate, MR is declining. When TR turns downward, MR becomes negative. Marginal revenue is below D because to sell an extra unit, the monopolist must lower the price on the marginal unit as well as on each of the preceding units sold. Four units sell for $5.00 each, but three of these four could have been sold for $5.50 had the monopolist been satisfied to sell only three. Having decided to sell four, the monopolist has to lower the price of the first three from $5.50 to $5.00, sacrificing $.50 on each for a total of $1.50. This "loss" of $1.50 explains the difference between the $5.00 price obtained on the fourth unit of output and its marginal revenue of $3.50. Demand is elastic from P = $6.50 to P = $3.50, a range where TR is rising. The curve is of unitary elasticity at P = $3.50, where TR is at its maximum. The curve is inelastic from then on as the price continues to decrease and TR is falling. When MR is positive, demand is elastic. When MR is zero, demand is of unitary elasticity. When MR is negative, demand is inelastic. If MC is zero, the monopolist should produce 7 units where MR is also zero. It would never produce where demand is inelastic because MR is negative there while MC is positive.



(MR curve approximated)

11-5 Suppose a pure monopolist is faced with the demand schedule shown below and the same cost data as the competitive producer discussed in question 4 at the end of Chapter 10. Calculate the missing total- and marginal-revenue amounts, and determine the profit-maximizing price and output for this monopolist. What is the monopolist's profit? Verify your answer graphically and by comparing total revenue and total cost.

Price	Quantity demanded	total revenue	Marginal revenue
$115	0	$____	$____
100	1	$____	$____
83	2	$____	$____
71	3	$____	$____
63	4	$____	$____
55	5	$____	$____
48	6	$____	$____
42	7	$____	$____
37	8	$____	$____
33	9	$____	$____
29	10	$____	$____

Total revenue data, top to bottom, in dollars: 0: 100; 166; 213; 252; 275; 288; 294; 296; 297; 290. Marginal revenue data, top to bottom, in dollars: 100; 66; 47; 39; 23; 6; 2; 1; -7.

Price = $63; output = 4; profit = $42 [= 4($63 − 52.50)]. Your graph should have the same general appearance as Figure 11-4. At Q = 4, TR = $252 and TC = $210 [= 4($52.50)].

11-6 If the firm described in question 5 could engage in perfect price discrimination, what would be the level of output? Of profits? Draw a diagram showing the relevant demand, marginal-revenue, average-total-cost, and marginal-cost curves and the equilibrium price and output for a nondiscriminating monopolist. Use the same diagram to show the equilibrium position of a monopolist that is able to practice perfect price discrimination. Compare equilibrium outputs, total revenues, economic profits, and consumer prices in the two cases. Comment on the economic desirability of price discrimination.

Perfect price discrimination: Output = 6. TR would be $420 (= $100 + $83 + $71 + $63 + $55 + $48). TC would be $285 [= 6(47.50)]. Profit would be $135 (= $420 − $285).

Your single diagram should combine Figure 11-8a and 11-b in the chapter. The discriminating monopolist faces a demand curve that is also its MR curve. It will sell the first unit at f in Figure 11-8b and then sell each successive unit at lower prices (as shown on the demand curve) as it moves to Q_2 units, where D (= MR) = MC. Discriminating monopolist: Greater output; total revenue, and profits. Some consumers will pay a higher price under discriminating monopoly than with nondiscriminating monopoly; others, a lower price. Good features: greater output and improved allocative efficiency. Bad feature: more income is transferred from consumers to the monopolist.

11-11 It has been proposed that natural monopolists should be allowed to determine their profit-maximizing outputs and prices and then government should tax their profits away and distribute them to consumers in proportion to their purchases from the monopoly. Is this proposal as socially desirable as requiring monopolists to equate price with marginal cost or average total cost?

No, the proposal does not consider that the output of the natural monopolist would still be at the suboptimal level where $P >$ MC. Too little would be produced and there would be an underallocation of resources. Theoretically, it would be more desirable to force the natural monopolist to charge a price equal to marginal cost and subsidize any losses. Even setting price equal to ATC would be an improvement over this proposal. This fair-return pricing would allow for a normal profit and ensure greater production than the proposal would.

CHAPTER TWELVE

12-2 Compare the elasticity of the monopolistically competitor's demand curve with that of a pure competitor and a pure monopolist. Assuming identical long-run costs, compare graphically the prices and output that would result in the long run under pure competition and under monopolistic competition. Contrast the two market structures in terms of productive and allocative efficiency. Explain: "Monopolistically competitive industries are characterized by too many firms, each of which produces too little."

Less elastic than a pure competitor and more elastic than a pure monopolist. Your graphs should look like Figures 10-12 and 12-1 in the chapters. Price is higher and output lower for the monopolistic competitor. Pure competition: P = MC (allocative efficiency); P = minimum ATC (productive efficiency). Monopolistic competition: $P >$ MC (allocative efficiency) and $P >$ minimum ATC (productive inefficiency). Monopolistic competitors have excess capacity; meaning that fewer firms operating at capacity (where P = minimum ATC) could supply the industry output.

12-7 Answer the following questions, which relate to measures of concentration:.

a. What is the meaning of a four-firm concentration ratio of 60 percent? 90 percent? What are the shortcomings of concentration ratios as measures of monopoly power?

b. Suppose that the five firms in industry A have annual sales of 30, 30, 20, 10, and 10 percent of total industry sales. For the five firms in industry B the figures are 60, 25, 5, 5, and 5 percent. Calculate the Herfindahl index for each industry and compare their likely competitiveness.

A four-firm concentration ration of 60 percent means the largest four firms in the industry account for 60 percent of sales; a four-firm concentration ratio of 90 percent means the largest four firms account for 90 percent of sales. Shortcomings: (1) they pertain to the nation as a whole, although relevant markets may be localized; (2) they do not account for interindustry competition; (3) the data are for U.S. products—imports are excluded; and (4) they don't reveal the dispersion of size among the top four firms.

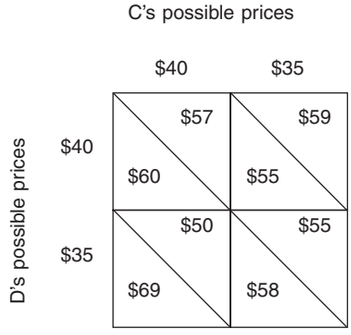
Herfindahl index for A: 2,400 (= 900 + 900 + 400 + 100 + 100). For B: 4,300 (= 3,600 + 625 + 25 + 25 +25). We would expect industry A to be more competitive than industry B, where one firm dominates and two firms control 85 percent of the market.

12-8 Explain the general meaning of the following profit payoff matrix for oligopolists C and D. All profit figures are in thousands.

a. Use the payoff matrix to explain the mutual interdependence that characterizes oligopolistic industries.

b. Assuming no collusion between C and D, what is the likely pricing outcome?

c. In view of your answer to 8b, explain why price collusion is mutually profitable. Why might there be a temptation to chat on the collusive agreement?



The matrix shows the four possible profit outcomes for each of two firms, depending on which of the two price strategies each follows. Example: If C sets price at $35 and D at $40, C's profits will be $59,000, and D's $55,000.

(a) C and D are interdependent because their profits depend not just on their own price, but also on the other firm's price.

(b) Likely outcome: Both firms will set price at $35. If either charged $40, it would be concerned the other would undercut the price and its profit by charging $35. At $35 for both; C's profit is $55,000, D's, $58,000.

(c) Through price collusion—agreeing to charge $40—each firm would achieve higher profits (C = $57,000; D = $60,000). But once both firms agree on $40, each sees it can increase its profit even more by secretly charging $35 while its rival charges $40.

12-9 What assumptions about a rival's response to price changes underlie the kinked-demand curve for oligopolists? Why is there a gap in the oligopolist's marginal-revenue curve? How does the kinked demand curve explain price rigidity in oligopoly? What are the shortcomings of the kinked-demand model?

Assumptions: (1) Rivals will match price cuts: (2) Rivals will ignore price increases. The gap in the MR curve results from the abrupt change in the slope of the demand curve at the going price. Firms will not change their price because they fear that if they do their total revenue and profits will fall. Shortcomings of the model: (1) It does not explain how the going price evolved in the first place; (2) it does not allow for price leadership and other forms of collusion.

12-11 Why is there so much advertising in monopolistic competition and oligopoly? How does such advertising help consumers and promote efficiency? Why might it be excessive at times?

Two ways for monopolistically competitive firms to maintain economic profits are through product development and advertising. Also, advertising will increase the demand for the firm's product. The oligopolist would rather not compete on a basis of price. Oligopolists can increase their market share through advertising that is financed with economic profits from past advertising campaigns. Advertising can operate as a barrier to entry.

Advertising provides information about new products and product improvements to the consumer. Advertising may result in an increase in competition by promoting new products and product improvements.

Advertising may result in manipulation and persuasion rather than information. An increase in brand loyalty through advertising will increase the producer's monopoly power. Excessive advertising may create barriers to entry into the industry.

CHAPTER THIRTEEN

13-4 Suppose a firm expects that a $20 million expenditure on R&D will result in a new product which will increase its revenue by a total of $30 million 1 year from now. The firm estimates that the production cost of the new product will be $29 million.

a. What is the expected rate of return on this R&D expenditure?

b. Suppose the firm can get a bank loan at 6 percent interest to finance its $20 million R&D project. Will the firm undertake the project? Explain why or why not.

c. Now suppose the interest-rate cost of borrowing, in effect, falls to 4 percent because the firm decides to use its own retained earnings to finance the R&D. Will this lower interest rate change the firm's R&D decision? Explain.

(a) 5 percent;

(b) No, because the 5 percent rate of return is less than the 6 percent interest rate;

(c) Yes, because the 5 percent the rate of return is now greater than the 4 percent interest rate.

13-5 Answer the lettered questions below on the basis of the information in this table:

Amount of R&D, millions	Expected rate of return on R&D, %
$10	16
20	14
30	12
40	10
50	8
60	6

a. If the interest-rate cost of funds is 8 percent, what will be the optimal amount of R&D spending for this firm?

b. Explain why $20 million of R&D spending will not be optimal.

c. Why won't $60 million be optimal either?

(a) $50 million, where the interest-rate cost of funds (i) equals the expected rate of return (r);

(b) at $20 million in R&D, *r* of 14 percent exceeds i of 8 percent, thus there would be an underallocation of R&D funds;

(c) at $60 million, *r* of 6 percent is less than i of 8 percent, thus there would be an overallocation of R&D funds.

13-6 Refer to Table 13-1 and suppose the price of new product C is $2 instead of $4. How does this affect the optimal combination of products A, B, and C for the person represented by the data? Explain: "The success of a new product depends not only on its marginal utility but also on its price."

(a) The person would now buy 5 units of product C and zero units of A and B;

(b) The MU/price ratio is what counts; a new product can be successful by having a high MU, a low price, or both relative to existing products.

13-8 Answer the following questions on the basis of this information for a single firm: total cost of capital = $1,000; price paid for labor = $12 per labor unit; price paid for raw materials = $4 per raw-material unit.

a. Suppose the firm can produce 5,000 units of output by combining its fixed capital with 100 units of labor and 450 units of raw materials. What are the total cost and average total cost of producing the 5,000 units of output?

b. Now assume the firm improves its production process so that it can produce 6,000 units of output by combining its fixed capital with 100 units of labor and 45 units of raw materials. What are the total cost and average cost of producing the 6,000 units of output?

c. In view of your answers to 8a and 8b, explain how process innovation can improve economic efficiency.

(a) Total cost = $4,000; average total cost = $.80 (= $4,000/5,000 units);

(b) Total cost = $4,000, average total cost = $.667 (= $4,000/6,000 units);

(c) Process innovation can lower the average total cost of producing a particular output, meaning that society uses fewer resources in producing that output. Resources are freed from this production to produce more of other desirable goods. Society realizes extra output through a gain in efficiency.

CHAPTER FOURTEEN

14-2 Complete the following labor demand table for a firm that is hiring labor competitively and selling its product in a competitive market.

Units of labor	Total product	Marginal product	Product price	Total revenue	Marginal revenue product
0	0	_____	$2	$_____	$_____
1	17	_____	2	_____	_____
2	31	_____	2	_____	_____
3	43	_____	2	_____	_____
4	53	_____	2	_____	_____
5	60	_____	2	_____	_____
6	65	_____	2	_____	_____

a. How many workers will the firm hire if the going wage rate is $27.95? $19.95? Explain why the firm will not hire a larger or smaller number of workers at each of these wage rates.

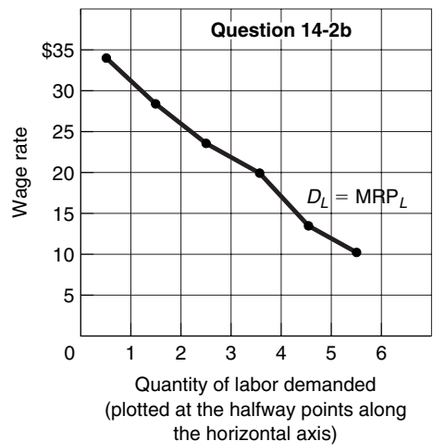
b. Show in schedule form and graphically the labor demand curve of this firm.

c. Now again determine the firm's demand curve for labor, assuming that it is selling in an imperfectly competitive market and that, although it can sell 17 units at $2.20 per unit, it must lower product price by 5 cents in order to sell the marginal product of each successive worker. Compare this demand curve with that derived in question 2b. Which curve is more elastic? Explain.

Marginal product data, top to bottom: 17; 14; 12; 10; 7; 5. Total revenue data, top to bottom: $0, $34; $62; $86; $106; $120; $130. Marginal revenue product data, top to bottom: $34; $28; $24; $20; $14; $10.

(a) Two workers at $27.95 because the MRP of the first worker is $34 and the MRP of the second worker is $28, both exceeding the $27.985 wage. Four workers at $19.95 because workers 1 through 4 have MRPs exceeding the $19.95 wage. The fifth worker's MRP is only $14 so he or she will not be hired.

(b) The demand schedule consists of the first and last columns of the table:



(c) Reconstruct the table. New product price data, top to bottom: $2.20; $2.15; $2.10; $2.05; $2.00; $1.95. New total revenue data, top to bottom: $0; $37.40; $66.65; $90.30; $108.65; $120.00; $126.75. New marginal revenue product data, top to bottom: $37.40; $29.25; $23.65; $18.35; $11.35; $6.75. The new labor demand is less elastic. Here, MRP falls because of diminishing returns *and* because product price declines as output increases. A decrease in the wage rate will produce less of an increase in the quantity of labor demanded, because the output from the added labor will reduce product price and thus MRP.

14-3 What factors determine the elasticity of resource demand? What effect will each of the following have on the elasticity or location of the demand for resource C, which is being used to produce product X? Where there is any uncertainty as to the outcome, specify the causes of the uncertainty.

a. An increase in the demand for product X.

b. An increase in the price of substitute resource D.

c. An increase in the number of resources substitutable for C in producing X.

d. A technological improvement in the capital equipment with which resource C is combined.

e. A decrease in the price of complementary resource E.

f. A decline in the elasticity of demand for product X due to a decline in the competitiveness of the product market.

Elasticity of demand for a resource is determined by: (1) the rate of decline of MP; (2) ease of resource substitutability; (3) elasticity of product demand; and (4) ratio of resource costs to total costs.

(a) Increase in the demand for resource C.
(b) Uncertainty relative to the change in demand for resource C; answer depends upon which is larger – the substitution effect or the output effect.
(c) Increase in the elasticity of resource C.
(d) Increase in the demand for resource C.
(e) Increase in the demand for resource C.
(f) Decrease in the elasticity of resource C.

14-4 Suppose the productivity of labor and capital are as shown in the accompanying table. The output of these resources sells in a purely competitive market for $1 per unit. Both labor and capital are hired under purely competitive conditions at $1 and $3, respectively.

Units of capital	MP of capital	Units of labor	MP of labor
1	24	1	11
2	21	2	9
3	18	3	8
4	15	4	7
5	9	5	6
6	6	6	4
7	3	7	1
8	1	8	1/2

a. What is the least-cost combination of labor and capital to employ in producing 80 units of output? Explain.
b. What is the profit-maximizing combination of labor and capital the firm should use? Explain. What is the resulting level of output? What is the economic profit? Is this the least costly way of producing the profit-maximizing output?

(a) 2 capital; 4 labor $MP_L/P_L = 7/1$; $MP_C/P_C = 21/3 = 7/1$.
(b) 7 capital and 7 labor. $MRP_L/P_L = 1\ (= 1/1) = MRP_C/P_C = 1 (= 3/3)$. Output is 142 (= 96 from capital + 46 from labor). Economic profit is $114 (= $142 − $38). Yes, least-cost production is part of maximizing profits. The profit-maximizing rule includes the least-cost rule.

14-5 In each of the following four cases MRP_L and MRP_C refer to the marginal revenue products of labor and capital, respectively, and P_L and P_C refer to their prices. Indicate in each case whether the conditions are consistent with maximum profits for the firm. If not, state which resource(s) should be used in larger amounts and which resource(s) should be used in smaller amounts.

a. $MRP_L = \$8$; $P_L = \$4$; $MRP_C = \$8$; $P_C = \$4$.
b. $MRP_L = \$10$; $P_L = \$12$; $MRP_C = \$14$; $P_C = \$9$.
c. $MRP_L = \$6$; $P_L = \$6$; $MRP_C = \$12$; $P_C = \$12$.
d. $MRP_L = \$22$; $P_L = \$26$; $MRP_C = \$16$; $P_C = \$19$.

(a) Use more of both;
(b) Use less labor and more capital;
(c) Maximum profits obtained;
(d) Use less of both.

CHAPTER FIFTEEN

15-3 Describe wage determination in a labor market in which workers are unorganized and many firms actively compete for the services of labor. Show this situation graphically, using W_1 to indicate the equilibrium wage rate and Q_1 to show the number of workers hired by the firms as a group. Show the labor supply curve of the individual firm, and compare it with that of the total market. Why the difference? In the diagram representing the firm, identify total revenue, total wage cost, and revenue available for the payment of nonlabor resources

The labor market is made up of many firms desiring to purchase a particular labor service and of many workers with that labor service. The market demand curve is downward sloping because of diminishing returns and the market supply curve is upward sloping because a higher wage will be necessary to attract additional workers into the market. Whereas the individual firm's supply curve in perfectly elastic because it can hire any number of workers at the going wage, the market supply curve is upward sloping.

For the graphs, see Figure 15-3 and its legend.

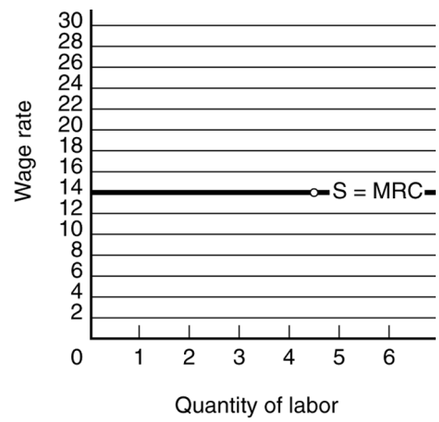
15-4 Complete the accompanying labor supply table for a firm hiring labor competitively.

Units of labor	Wage rate	Total labor cost (wage bill)	Marginal resource (labor) cost
0	$14	$_____	$_____
1	14	_____	_____
2	14	_____	_____
3	14	_____	_____
4	14	_____	_____
5	14	_____	_____
6	14	_____	_____

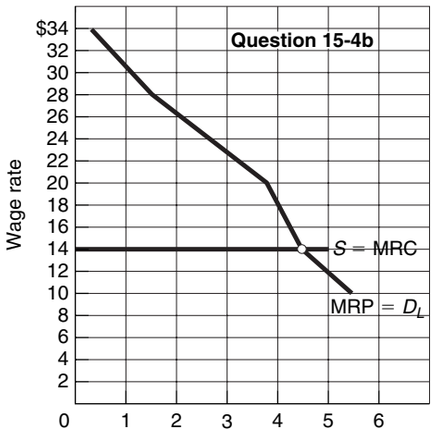
a. Show graphically the labor supply and marginal resource (labor) cost curves for this firm. Explain the relationships of these curves to one another.
b. Plot the labor demand data of question 2 in Chapter 14 on the graph in part a above. What are the equilibrium wage rate and level of employment? Explain.

Total labor cost data, top to bottom: $0; $14; $28; $42; $56; $70; $84. Marginal resource cost data: $14, throughout.

(a) The labor supply curve and MRC curve coincide as a single horizontal line at the market wage rate of $14. The firm can employ as much labor as it wants, each unit costing $14; wage rate = MRC because the wage rate is constant to the firm.

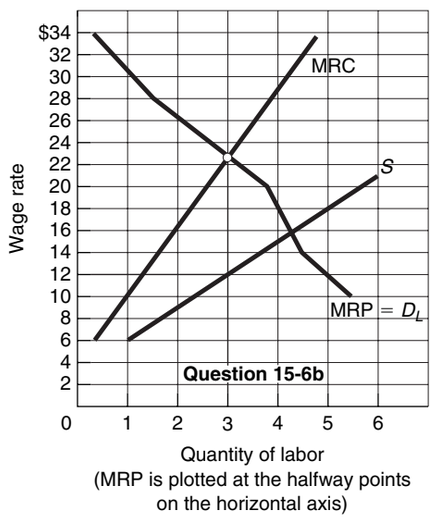


(b) Graph: equilibrium is at the intersection of the MRP and MRC curves. Equilibrium wage rate = $14; equilibrium level of employment = 4 units of labor. Explanation: From the tables: MRP exceeds MRC for each of the first four units of labor, but MRP is less than MRC for the fifth unit.



15-6 Assume a firm is a monopsonist that can hire the first worker for $6 but must increase the wage rate by $3 to attract each successive worker. Draw the firm's labor supply and marginal resource cost curves and explain their relationships to one another. On the same graph, plot the labor demand data of question 2 in Chapter 14. What are the equilibrium wage rate and level of employment? What will be the equilibrium wage rate and the level of employment? Why do these differ from your answer to question 4?

The monopsonist faces the market labor supply curve *S*—it is the only firm hiring this labor. MRC lies above S and rises more rapidly than S because all workers get the higher wage rate that is needed to attract each added worker. Equilibrium wage/rate = $12; equilibrium employment = 3 (where MRP = MRC). The monopsonist can pay a below-competitive wage rate by restricting its employment.



15-7 Assume a monopsonistic employer is paying a wage rate of W_m and hiring Q_m workers, as indicated in Figure 15.8. Now suppose that an industrial union is formed and that it forces the employer to accept a wage rate of W_c. Explain verbally and graphically why in this instance the higher wage rate will be accompanied by an increase in the number of workers hired.

The union wage rate Wc becomes the firm's MRC, which would be shown as a horizontal line to the left of the labor supply curve. Each unit of labor now adds only its own wage rate to the firm's costs. The firm will employ Q_c workers, the quantity of labor where MRP = MRC (= W_c); Q_c is greater than the Q_m workers it would employ if there were no union and if the employer did not have any monopsonistic power, i.e. more workers are will to offer their labor services when the wage is Wc than Wm.

CHAPTER SIXTEEN

16-2 Explain why economic rent is a surplus to the economy as a whole but a cost of production from the standpoint of individual firms and industries. Explain: "Rent performs no incentive function in the economy."

Land is completely fixed in total supply. As population expands and the demand for land increases, rent first appears and then grows. From society's perspective this rent is a surplus payment unnecessary for ensuring that the land is available to the economy as a whole. If rent declined or disappeared, the same amount of land would be available. If it increased, no more land would be forthcoming. Thus, rent does not function as an incentive for adding land to the economy.

But land does have alternative uses. To get it to its most productive use, individuals and firms compete and the winners are those who pay the highest rent. To the high bidders, rent is a cost of production that must be covered by the revenue gained through the sale of the commodities produced on that land.

16-4 Why is the supply of loanable funds upsloping? Why is the demand for loanable funds downsloping? Explain the equilibrium interest rate. List some factors that might cause it to change.

(a) The supply of loanable funds is upsloping because savers will make more funds available at higher interest rates than lower interest.

(b) The demand of loanable funds is downsloping because there are few investment and R&D projects that will yield a very high rate of return and many more that will yield a lower rate of return.

(c) The equilibrium interest rate is determined where the interest rate (cost of borrowing the funds) is equal to the expected rate of return (the expected benefit from borrowing the funds and engaging in the investment or R&D project). The supply of loanable fund may change because of a change in households' attitudes about saving (tax policies, macroeconomic conditions) or changes in Federal Reserve policies relative to the money supply. The demand for loanable funds could change as a result a change in technology or a change in the demand for the final product. If there is either a change in supply of or demand for loanable, the interest rate will change.

16-6 Distinguish between nominal and real interest rates. Which is more relevant in making investment and R&D decisions? If the nominal interest rate is 12 percent and the inflation rate is 8 percent, what is the real rate of interest?

The nominal interest rate is the interest rate stated in dollars of current value (unadjusted for inflation). The real interest rate

is the nominal interest rate adjusted for inflation (or deflation). The real interest rate is more relevant for making investment decisions—it reflects the true cost of borrowing money. It is compared to the expected return on the investment in the decision process. Real interest rate = 4 percent (= 12 percent −8 percent).

16-8 How do the concepts of accounting profits and economic profits differ? Why are economic profits smaller than accounting profits? What are the three basic sources of economic profits? Classify each of the following in accordance with these sources:

a. A firm's profits from developing and patenting a new medication that greatly reduces cholesterol and thus diminishes the likelihood of heart disease and stroke.

b. A restaurant's profit that results from construction of a new highway past its door.

c. The profit received by a firm benefiting from an unanticipated change in consumer tastes.

Accounting profit is what remains of a firm's total revenues after it has paid for all the factors of production employed by the firm (its explicit costs) but not for the use of the resources owned by the business itself. Economists also take into consideration implicit costs—the payment the owners could have received by using the resources they own in some other way. The economist adds these implicit costs to the accountant's explicit costs to arrive at total cost. Subtracting the total cost from total revenue results in a smaller profit (the economic profit) than the accountant's profit.

Sources of economic profit: (1) uninsurable risks; (2) innovations; and (3) monopoly.

(a) Profit from assuming the uncertainities of innovation, as well as monopoly profit from the patent.

(b) Monopoly profit arising from its locational advantage.

(c) Profit from bearing the uninsurable risk of a change in demand (the change could have been unfavorable).

CHAPTER SEVENTEEN

17-1 On the basis of the three individual demand schedules below, and assuming these three people are the only ones in the society, determine (a) the market demand schedule on the assumption that the good is a private good, and (b) the collective demand schedule on the assumption that the good is a public good. Explain the differences, if any, in your schedules.

Individual #1		Individual #2		Individual #3	
Price	Q_d	*Price*	Q_d	*Price*	Q_d
$8	0	$8	1	$8	0
7	0	7	2	7	0
6	0	6	3	6	1
5	1	5	4	5	2
4	2	4	5	4	3
3	3	3	6	3	4
2	4	2	7	2	5
1	5	1	8	1	6

(a) Private good, top to bottom: P = $8, Q = 1; P = $7, Q = 2; P = $6, Q = 4; P = $5, Q = 7; P = $4, Q = 10; P = $3, Q = 13; P = $2, Q = 16; P = $1, Q = 19. (b) Public good, top to bottom; P = $19, Q = 1; P = $16, Q = 2; P = $13, Q = 3; P = $10, Q = 4; P = $7, Q = 5; P = $4, Q = 6; P = $2, Q = 7; P = $1, Q = 8. The first schedule represents a horizontal summation of the individual demand curves; the second schedule represents a vertical summation of these curves. The market demand curve for the private good will determine—in combination with market supply—an actual price-quantity outcome in the marketplace. Because potential buyers of public goods do not reveal their individual preferences in the market, the collective demand curve for the public good is hypothetical or needs to be determined through "willingness to pay" studies.

17-2 Use your demand schedule for a public good determined in question 1 and the following supply schedule to ascertain the optimal quantity of this public good. Why is this the optimal quantity?

Optimal quantity = 4. It is optimal because at 4 units the collective willingness to pay for the final unit of the good (= $10) matches the marginal cost of production (= $10).

P	Q_S
$19	10
16	8
13	6
10	4
7	2
4	0

17-3 The following table shows the total costs and total benefits in billions for four different antipollution programs of increasing scope. Which program should be undertaken? Why?

Program	Total Cost	Total Benefit
A	$ 3	$ 7
B	7	12
C	12	16
D	18	19

Program B since the marginal benefit no longer exceeds marginal cost for programs that are larger in scope. Plan B is where net benefits—the excess of total benefits over total costs—are maximized.

17-4 Why are spillover costs and spillover benefits also called negative and positive externalities? Show graphically how a tax can correct for a spillover cost and a subsidy to producers can correct for a spillover benefit. How does a subsidy to consumers differ from a subsidy to producers in correcting for a spillover benefit?

Spillover costs are called negative externalities because they are *external* to the participants in the transaction and *reduce* the utility of affected third parties (thus "negative"). Spillover benefits are called positive externalities because they are *external* to the participants in the transaction and *increase* the utility of affected third parties (thus "positive"). See Figures 17-3 and 17-4. Compare (b) and (c) in Figure 17-4.

17-7 Explain the following statement, using the MB curve in Figure 17-6 to illustrate: "The optimal amount of pollution abatement for some substances, say, water from storm drains, is very low; the optimal amount of abatement for other substances, say, cyanide poison, is close to 100 percent."

Reducing water flow from storm drains has a low marginal benefit, meaning the MB curve would be located far to the left of where it is in the text diagram. It will intersect the MC curve at a low amount of pollution abatement, indicating the optimal amount of pollution abatement (where MB = MC) is low. Any cyanide in public water sources could be deadly. Therefore, the marginal benefit of reducing cyanide is extremely high and the MB curve in the figure would be located to the extreme right where it would intersect the MC curve at or near 100 percent.

17-13 Place an M beside items in the following list which describe a moral hazard problem; place an A beside those that describe an adverse selection problem.

a. A person with a terminal illness buys several life insurance policies through the mail.

b. A person drives carelessly because he or she has insurance.

c. A person who intends to "torch" his warehouse takes out a large fire insurance policy.

d. A professional athlete who has a guaranteed contract fails to stay in shape during the off-season.

e. A woman anticipating having a large family takes a job with a firm that offers exceptional child-care benefits.

Moral hazard problem: (b) and (d). Adverse selection problem: (a), (c), and (e).

CHAPTER EIGHTEEN

18-2 Explain the paradox of voting through reference to the accompanying table which shows the ranking of three public goods by voters Larry, Curley, and Moe.

Public Good	Larry	Curley	Moe
Courthouse	2d choice	1st choice	3d choice
School	3d choice	2d choice	1st choice
Park	1st choice	3d choice	2d choice

The paradox is that majority voting does not always provide a clear and consistent picture of the public's preferences. Here the courthouse is preferred to the school and the park is preferred to the courthouse, so we would surmise that the park is preferred to the school. But paired-choice voting would show that the school is preferred to the park.

18-3 Suppose that there are only five people in a society and that each favors one of the five flood-control options shown in Table 18-2 (include no protection as one of the options). Explain which of these flood control options will be selected using a majority rule. Will this option be the optimal size of the project from an economic perspective?

Project B (small reservoir wins) using a paired-choice vote. There is no "paradox of voting" problem here and B is the preference of the median voter. The two voters favoring No reservoir and Levees, respectively, will prefer Small reservoir—project B—to Medium or Large reservoir. The two voters preferring Large reservoir or Medium reservoir will prefer Small reservoir to Levees or No reservoir. The median voter's preference for B will prevail. However, the optimal size of the project from an economic perspective is C—it would provide a greater net benefit to society than B.

18-4 How does the problem of limited and bundled choice in the public sector relate to economic efficiency? Why are public bureaucracies alleged to be less efficient than private enterprises?

The electorate is faced with a small number of candidates, each of whom offers a broad range or "bundle" of proposed policies. Voters are then forced to choose the individual candidate whose bundle of policies most resembles their own. The chances of a perfect identity between a particular candidate's preferences and those of any voter are quite slim. As a result, the voter must purchase some unwanted public goods and services. This represents an inefficient allocation of resources.

Government bureaucracies do not function on the basis of profit, so the incentive for holding down costs is less than in the private sector. Also, because there is no profit-and-loss test of efficiency, it is difficult to determine whether public agencies are operating efficiently. Nor is there entry of competing entities to stimulate efficiency and develop improved public goods and services. Furthermore, wasteful expenditures can be maintained through the self-seeking lobbying of bureaucrats themselves, and the public budgetary process can reward rather than penalize inefficiency.

18-7 Suppose a tax is such that an individual with an income of $10,000 pays $2,000 of tax, a person with an income of $20,000 pays $3,000 of tax, a person with an income of $30,000 pays $4,000 of tax, and so forth. What is each person's average tax rate? Is this tax regressive, proportional, or progressive?

Average tax rates: 20; 15; and 13.3 percent. Regressive.

18-9 What is the incidence of an excise tax when demand is highly inelastic? Elastic? What effect does the elasticity of supply have on the incidence of an excise tax? What is the efficiency loss of a tax, and how does it relate to elasticity of demand and supply?

The incidence of an excise tax is likely to be primarily on consumers when demand is highly inelastic and primarily on producers when demand is elastic. The more elastic the supply, the greater the incidence of an excise tax on consumers and the less on producers.

The efficiency loss of a sales or excise tax is the net benefit society sacrifices because consumption and production of the taxed product are reduced below the level of allocative efficiency which would occur without the tax. Other things equal, the greater the elasticities of demand and supply, the greater the efficiency loss of a particular tax.

CHAPTER NINETEEN

19-2 Describe the major provisions of the Sherman and Clayton acts. What government entities are responsible for enforcing those laws? Are firms permitted to initiate antitrust suits on their own against other firms?

Sherman Act: Section 1 prohibits conspiracies to restrain trade; Section 2 outlaws monopolization. Clayton Act (as amended by Celler-Kefauver Act of 1950): Section 2 outlaws price discrimination; Section 3 forbids tying contracts; Section 7 prohibits mergers which substantially lessen competition; Section 8 prohibits interlocking directorates. The acts are enforced by the Department of Justice, Federal Trade Commission, and state attorney generals. Private firms can bring suit against other firms under these laws.

19-5 How would you expect antitrust authorities to react to (a) a proposed merger of Ford and General Motors; (b) evidence of secret meetings by contractors to rig bids for highway construction projects; (c) a proposed merger of a large shoe manufacturer and a chain of retail shoe stores; and (d) a proposed merger of a small life insurance company and a regional candy manufacturer.

(a) They would block this horizontal merger (violation of Section 7 of the Clayton Act). (b) They would charge these firms with price fixing (violation of Section 1 of the Sherman Act). (c) They would allow this vertical merger, unless both firms had very large market shares and the resultant merger substantially lessens competition. (d) They would allow this conglomerate merger.

19-10 What types of industries, if any, should be subjected to industrial regulation? What specific problems does industrial regulation entail?

Industries composed of firms with natural monopolies conditions are most likely to be subjected to industrial regulation. Regulation based on "fair-return" prices creates disincentives for firms

to minimize costs since cost reductions lead regulators to force firms to change a lower price. Regulated firms may also use "creative" accounting to boost costs and hide profits. Because regulatory commissions depend on information provided by the firms themselves and commission members are often recruited from the industry, the agencies may in effect be controlled by the firms they are supposed to oversee. Also, industrial regulation sometimes is applied to industries that are not, or no longer are, natural monopolies. Regulation may lead to the conditions of a cartel, conditions that are illegal in an unregulated industry.

19-12 How does social regulation differ from industrial regulation? What types of costs and benefits are associated with social regulation?

Industrial regulation is concerned with prices, output, and profits specific industries whereas social regulation deals with the broader impact of business on consumers, workers, and third parties. Benefits: increased worker and product safety, less environmental damage, reduced economic discrimination. Two types of costs: administrative costs, because regulations must be administered by costly government agencies, compliance costs, because firms must increase spending to comply with regulations.

CHAPTER TWENTY

20-1 Carefully evaluate: "The supply and demand for agricultural products are such that small changes in agricultural supply will result in drastic changes in prices. However, large changes in farm prices have modest effects on agricultural output." (*Hint:* A brief review of the distinction between supply and quantity supplied may be of assistance.) Do exports increase or reduce the instability of demand for farm products? Explain.

First sentence: Shifts in the supply curve of agricultural goods (*changes in supply*) relative to fixed inelastic demand curves produce large changes in equilibrium prices. Second sentence: But these drastic changes in prices produce only small changes in equilibrium outputs (where *quantities demanded* equals *quantities supplied*) because demands are inelastic.

Because exports are volatile from one year to the next, they increase the instability of demand for farm products.

20-3 Explain how each of the following contributes to the farm problem: (a) the inelasticity of the demand for farm products, (b) rapid technological progress in farming, (c) the modest long-run growth in the demand for farm commodities, and (d) the volatility of export demand.

(a) Because the demand for most farm products is inelastic, the frequent fluctuations in supply brought about by weather and other factors have relatively small effects on quantity demanded, but large effects on equilibrium prices of farm products. Farmers' sales revenues and incomes therefore are unstable. (b) Technological innovations have decreased production costs, increased long-run supply for most agricultural goods, and reduced the prices of farm output. These declines in prices have put a downward pressure on farm income. (c) The modest long-run growth in the demand for farm products has not been sufficient to offset the expansion of supply, resulting in stagnant farm income. (d) Foreign demand has been unpredictable. Any change in demand will affect farm prices but farmers cannot easily adjust production.

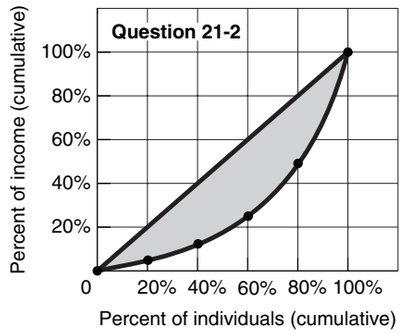
20-8 Explain the economic effects of price supports. Explicitly include environmental and global impacts in your answer. On what grounds do economists contend that price supports cause a misallocation of resources?

Price supports benefit farmers, harm consumers, impose costs on society, and contribute to problems in world agriculture. Farmers benefit because the prices they receive and the output they produce both increase, expanding their gross incomes. Consumers lose because the prices they pay for farm products rise and quantities purchased decline. Society as a whole bears several costs. Surpluses of farm products will have to be bought and stored, leading to a greater burden on taxpayers. Domestic economic efficiency is lessened as the artificially high prices of farm products lead to an overallocation of resources to agriculture. The environment suffers: the greater use of pesticides and fertilizers contributes to water pollution; farm policies discourage crop rotation; and price supports encourage farming of environmentally sensitive land. The efficient use of world resources is also distorted because of the import tariffs or quotas which such programs often require. Finally, domestic overproduction leads to supply increases in international markets, decreasing prices and causing a declined in the gross incomes of foreign producers.

CHAPTER TWENTY-ONE

21-2 Assume Al, Beth, Carol, David, and Ed receive incomes of $500, $250, $125, $75, and $50 respectively. Construct and interpret a Lorenz curve for this five-person economy. What percentage of total income is received by the richest and by the poorest quintiles?

See the Figure in the next Key Question. In this simple economy each person represents a complete income quintile—20 percent of the total population. The richest quintile (Al) receives 50 percent of total income; the poorest quintile (Ed) receives 5 percent.



21-4 Briefly discuss the major causes of income inequality. With respect to income inequality, is there any difference between inheriting property and inheriting a high IQ? Explain.

The reasons for income inequality are: differences in abilities and talents among individuals, differences in the amount of education and training an individual obtains, labor market discrimination, differences in tastes and preferences toward work and job attributes, inequality in the distribution of wealth, the ability to use market power to transfer income to oneself, luck, connections, and misfortune.

A high IQ normally does not lead to high income unless it is combined with personal initiative and favorable social circumstances. Inherited property—as long as it is competently managed—provides income irrespective of one's character and personal attributes. Both factors are largely a matter of the luck of being born into a family with good ability genes and/or wealth. What one does with the genes or wealth, is up to the recipient.

CHAPTER TWENTY-TWO

22-4 What is the estimated size of the union wage advantage? How might this advantage diminish the efficiency with which labor resources are allocated?

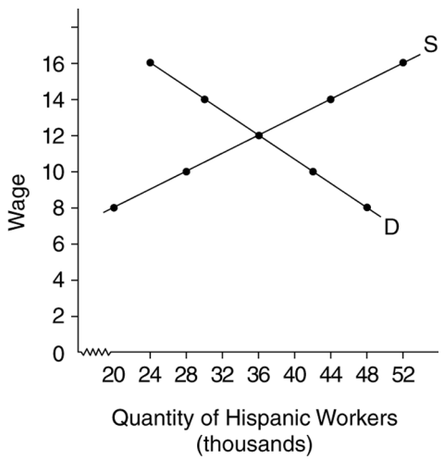
Fifteen percent. The higher wages that unions achieve reduce employment, displace workers, and increase the marginal revenue product in the union sector. Labor supply increases in the nonunionized sector, reducing wages and decreasing marginal revenue production there. Because of the lower nonunion marginal revenue product, the workers added in the nonunion sector contribute less to GDP than they would have in the unionized sector. The gain of GDP in the nonunionized sector does not offset the loss of GDP in the unionized sector so there is an overall efficiency loss.

22-7 The labor demand and supply data in the following table relate to a single occupation. Use them to answer the questions that follow. Base your answers on the taste-for-discrimination model.

Quantity of Hispanic labor demanded, thousands	Hispanic wage rate	Quantity of Hispanic labor supplied, thousands
24	$16	52
30	14	44
36	12	36
42	10	28
48	8	20

a. Plot the labor demand and supply curves for Hispanic workers in this occupation.
b. What are the equilibrium Hispanic wage rate and quantity of Hispanic employment?
c. Suppose the white wage rate in this occupation is $16. What is the Hispanic-to-white wage ratio?
d. Suppose a particular employer has a discrimination coefficient d of $5 per hour. Will that employer hire Hispanic or white workers at the Hispanic-white wage ratio indicated by part c? Explain.
e. Suppose employers as a group become less prejudiced against Hispanics and demand 14 more units of Hispanic labor at each Hispanic wage rate in the table. What are the new equilibrium Hispanic wage rate and level of Hispanic employment? Does the Hispanic-white wage ratio rise or fall? Explain.
f. Suppose Hispanics as a group increase their labor services in this occupation, collectively offering 14 more units of labor at each Hispanic wage rate. Disregarding the changes indicated in part e, what are the new equilibrium Hispanic wage rate and level of Hispanic employment? Does the Hispanic-white wage ratio rise, or does it fall?

(a)



(b) The equilibrium Hispanic wage rate is $12; the equilibrium quantity of Hispanic employment is 36,000 workers.
(c) The Hispanic-to-white wage ratio is .75 (= $12/$16).
(d) The employer will hire only white workers because the $5 discrimination coefficient exceeds the $4 difference between the wage rates of whites and Hispanics.
(e) The new equilibrium Hispanic wage rate is $14 and the new equilibrium quantity of Hispanic employment is 44,000 workers. The Hispanic-white wage ratio rises to .875 (= $16/$14) because of the increased demand for Hispanic labor in relation to the unchanging supply of Hispanic labor.
(f) The new equilibrium Hispanic wage rate is $10 and the new equilibrium quantity of Hispanic employment is 20,000. This Hispanic-white wage ratio falls to .625 (= $10/$16).

22-9 Use a demand and supply model to explain the impact of occupational segregation or "crowding" on the relative wage rates and earnings of men and women. Who gains and who loses from the elimination of occupational segregation? Is there a net gain or net loss to society? Explain.

See Figure 22-5. Discrimination against women in two of the three occupations will crowd women into the third occupation. Labor supply in the "men's occupations" (*X* and *Y*) decreases, making them high-wage occupations. Labor supply in the "women's occupation" (*Z*) increases creating a low-wage occupation.

Eliminating occupational segregation would entice women into the high-wage occupations, increasing labor supply there and reducing it in the low-wage occupation. The wage rates in the three occupations would converge to *B*. Women would gain, men would lose. Society would gain because the increase in output in the expanding occupations would exceed the loss of output in the contracting occupation.

22-12 Use graphical analysis to show the gains and losses resulting from the migration of population from a low-income country to a high-income country. Explain how your conclusions are affected by (a) unemployment, (b) remittances to the home country, (c) backflows of migrants to their home country, and (d) the personal characteristics of the migrants. If the migrants are highly skilled workers, is there any justification for the sending country to levy a "brain drain" tax on emigrants?

See Figure 22-6. Migration of labor from the low- to high-income country increases labor supply in the high-income country and decreases it in the low-income country. Wages are equalized at *We*. Output and business income increase in the receiving country; decline in the sending country. World output increases: the output gain in the receiving country exceeds the output loss in the sending country.

(a) The gains to the receiving country will not materialize if the migrants are unemployed after they arrive; there may be gains in the low-income country if the immigrant had been unemployed prior to moving. (b) Remittances to the home country will decrease the income gain in the receiving country and reduce the income loss in the sending country. (c) If migrants who return to their home country have enhanced their skills, their temporary departure might be to the long-run advantage of the home country. (d) Young, skilled migrants will increase output and likely be the net taxpayers in the receiving country, but the sending country will experience a "brain drain." Older or less skilled workers who are not so easily assimilated could be net recipients of government services.

In view of the sometimes large investments which sending countries have made in providing education and skills, there is a justification for levying a departure tax on such migrants. But if this tax were too high, it would infringe on a basic human right: the right to emigrate.

CHAPTER TWENTY-THREE

23-2 What are the "twin problems" of the health care industry? How are they related?

The "twin problems" are rising prices for all and limited access (lack of insurance) for about 16 percent of the population. The problems are related since rising costs make insurance unaffordable for many individuals and families and make it difficult for some businesses to insure their workers.

23-7 What are the estimates of the income and price elasticities of demand for health care? How does each relate to rising health care costs?

Income elasticity is 1.0 suggesting that health care spending will rise proportionately with income. Some studies indicate it might be 1.5 in the U.S. Price elasticity is only 0.2, meaning higher prices for health care services will increase total health care spending.

23-10 Using the concepts in Chapter 8's discussion of consumer behavior, explain how health care insurance results in an overallocation of resources to the health care industry. Use a demand and supply diagram to specify the resulting efficiency loss.

Health care insurance removes or greatly lessens a person's budget restraint at the time health care is purchased, raising health care utility per dollar spent and causing an overconsumption of health care. In Figure 22-3b, insurance reduces the price of health care at the time of purchase from P_u to P_i, increasing the quantity consumed from Q_u to Q_i. At Q_i the marginal cost of health care is represented by point *b* and exceeds the marginal benefit represented by *c*, indicating an overallocation of resources. The efficiency loss is area *cab*.

CHAPTER TWENTY-FOUR

24-4 Below are the hypothetical production possibilities tables for New Zealand and Spain.

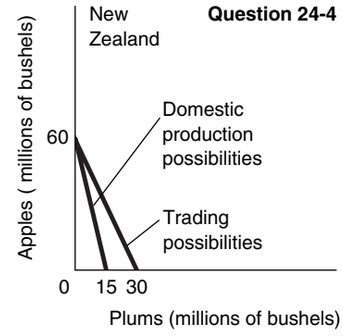
New Zealand's production possibilities table (millions of bushels)

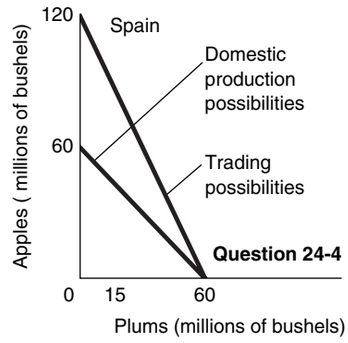
Product	Production alternatives			
	A	**B**	**C**	**D**
Apples	0	20	40	60
Plums	15	10	5	0

Spain's production possibilities table (millions of bushels)

Product	Production alternatives			
	R	**S**	**T**	**U**
Apples	0	20	40	60
Plums	60	40	20	0

Plot the production possibilities data for each of the two countries separately. Referring to your graphs, answer the following: (a) What is each country's cost ratio of producing plums and apples. (b) Which nation should specialize in which product? (c) Show the trading possibilities lines for each nation if the actual terms of trade are 1 plum for 2 apples. (d) Suppose the optimum product mixes before specialization and trade were alternative B in New Zealand and S in Spain. What would be gains from specialization and trade?



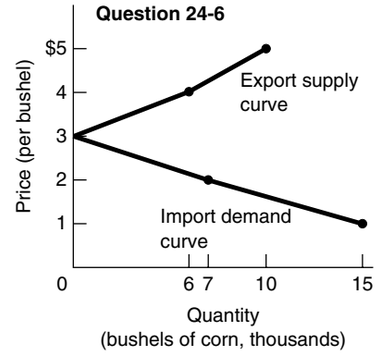


(a) New Zealand's cost ratio is 1 plum = 4 apples (or 1 apple = 1/4 plum). Spain's cost ratio is 1 plum = 1 apple (or 1 apple = 1 plum). See the graphs.
(b) New Zealand should specialize in apples, Spain in plums.
(c) See the graphs.
(d) Total production before specialization and trade: 40 apples (20 + 20) and 50 plums (10 + 40). After specialization and trade: 60 apples and 60 plums. Gain = 20 apples and 10 plums.

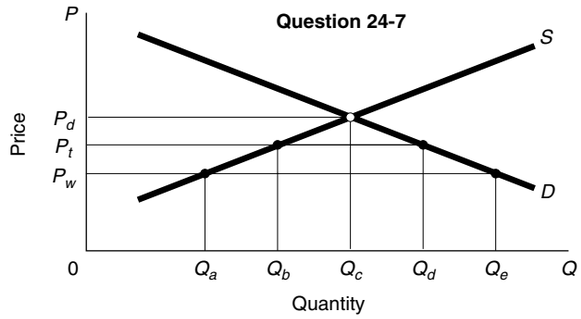
24-6 Refer to Figure 3-5 (Chapter 3). Assume the graph depicts the U.S. domestic market for corn. How many bushels of corn, if any, will the United States export or import at a world price of $1, $2, $3, $4, and $5? Use this information to construct the U.S. export supply curve and import demand curve for corn. Suppose the only other corn-producing nation is France, where the domestic price is $4. Which country will export corn; which will import it?

At $1: import 15,000. At $2: import 7,000. At $3: no imports or exports. At $4: export 6,000. At $5: export 10,000.

The United States will export corn, France will import it.



24-7 Draw a domestic supply and demand diagram for a product in which the United States does not have a comparative advantage. What impact do foreign imports have on domestic price and quantity? On your diagram show a protective tariff which eliminates approximately one-fourth the assumed imports. What are the price-quantity effects of this tariff to (a) domestic consumers, (b) domestic producers, and (c) foreign exporters? How would the effects of a quota which creates the same amount of imports differ?



See the graph. The United States does not have a comparative advantage in this product so the world price *Pw* is below the U.S. domestic price of *Pd.* Imports will reduce the domestic price, increasing consumption from nontrade *Qc* to *Qe* and decreasing domestic production from *Qc* to *Qa.* See the graph. A tariff of *PwPt* (a) harms domestic consumers by increasing price from *Pw* to *Pt* and decreasing consumption from *Qe* to *Qd*; (b) aids domestic producers through the increase in price from *Pw* to *Pt* and the expansion of domestic production from *Qa* to *Qb*; (c) harms foreign exporters by decreasing exports from *QaQe* to *QbQd.*

An import quota of *QbQd* would have the same effects as the tariff, but there would be no tariff revenues to government from these imports; this revenue would effectively go to foreign producers.

24-11 What is the WTO, and how does it relate to international trade? What problems, if any, arise when too many extraneous efforts are tied to efforts to liberalize trade?

The WTO is the World Trade Organization with 138 member nations in 2000. It was established in 1994 by some 120 nations who had been supporters of GATT (General Agreement on Trade and Tariffs) which preceded WTO. The organization promotes reduction in trade barriers and helps to enforce the agreement signed by its nation members.

If too many extraneous issues are tied to efforts to liberalize trade, the liberalization process is slowed down. For example, tying human rights protection to free trade policies might be a very difficult political process which could take much longer to change than trade policy.

CHAPTER TWENTY-FIVE

25-2 Indicate whether each of the following creates a demand for, or a supply of, European euros in foreign exchange markets:

a. A U.S. airline firm purchases several Airbus planes assembled in France.

b. A German automobile firm decides to build an assembly plant in South Carolina.

c. A U.S. college student decides to spend a year studying at the Sorbonne.

d. An Italian manufacturer ships machinery from one Italian port to another on a Liberian freighter.

e. The United States economy grows faster than the French economy.

f. A United States government bond held by a Spanish citizen matures, and the loan is paid back to that person.

g. It is widely believed that the Swiss franc will fall in the near future.

A demand for euros is created in (a),(c),(e),(f), and (g) but see note below for e and g. A supply of francs is created in (b) and (d).

Note: Answer for (e) assumes U.S. demand for French goods will grow faster than French imports of U.S. goods, (g) assumes some holders of francs will buy euros instead (Switzerland is not in the EU).

25-3 Alpha's balance of payments data for 2001 are shown below. All figures are in billions of dollars. What are (a) the balance of trade, (b) the balance on goods and services, (c) the balance on current account, and (d) the balance on capital account? Does Alpha have a balance of payments deficit or surplus? Explain.

Merchandise exports	+$40
Merchandise imports	− 30
Service exports	+ 15
Service imports	− 10
Net investment income	− 5
Net transfers	+$10
Foreign purchases of U.S. assets	+ 10
U.S. purchases of foreign assets	− 40
Official reserves	+ 10

Balance of trade = $10 billion surplus (= exports of goods of $40 billion minus imports of goods of $30 billion). Note: This is goods balance only-uses harrow definition of trade balance. Balance on goods and services = $15 billion surplus (= $55 billion of exports of goods and services minus $40 billion of imports of goods and services). Balance on current account = $20 billion surplus (= credits of $65 billion minus debits of $45 billion). Balance on capital account = $30 billion deficit (= Foreign purchases of assets in the United States of $10 billion minus U.S. purchases of assets abroad of $40 billion). Balance of payments = $10 billion deficit. Therefore, U.S. must export official reserves = $10 billion.

25-6 Explain why the U.S. demand for Mexican pesos is downsloping and the supply of pesos to Americans is upsloping. Assuming a system of floating exchange rates between Mexico and the United States, indicate whether each of the following would cause the Mexican peso to appreciate or depreciate:

a. The United States unilaterally reduces tariffs on Mexican products.

b. Mexico encounters severe inflation.

c. Deteriorating political relations reduce American tourism in Mexico.

d. The United States' economy moves into a severe recession.

e. The U.S. engages in a high interest rate monetary policy.

f. Mexican products become more fashionable to U.S. consumers.

g. The Mexican government encourages U.S. firms to invest in Mexican oil fields.

h. The rate of productivity growth in the United States diminishes sharply.

The U.S. demand for pesos is downsloping: When the peso depreciates in value (relative to the dollar) the United States finds that Mexican goods and services are less expensive in dollar terms and purchases more of them, demanding a greater quantity of pesos in the process. The supply of pesos

to the United States is upsloping: As the peso appreciates in value (relative to the dollar), U.S. goods and services become cheaper to Mexicans in peso terms. Mexicans buy more dollars to obtain more U.S. goods, supplying a larger quantity of pesos.

The peso appreciates in (a), (f), (g), and (h) and depreciates in (b), (c), (d), and (e).

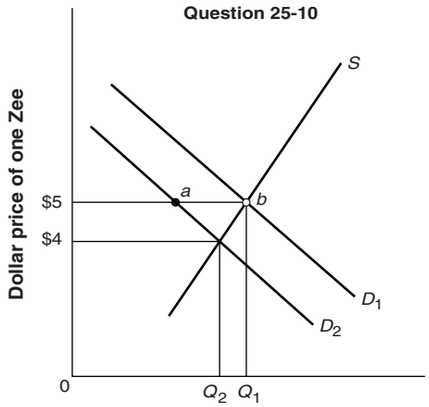
25-9 Diagram a market in which the equilibrium dollar price of one unit of fictitious currency Zee is $5 (the exchange rate is $5 = Z1). Then show on your diagram a decline in the demand for Zee.

a. Referring to your diagram, discuss the adjustment options the United States would have in maintaining the exchange rate at $5 = Z1 under a fixed exchange-rate system.

b. How would the U.S. balance of payments surplus that is created (by the decline in demand) get resolved under a system of flexible exchange rates?

See the graph illustrating the market for Zees.

Question 25-10



(a) The decrease in demand for Zees from D_1 to D_2 will create a surplus (*ab*) of Zees at the $5 price. To maintain the $5 to Z1 exchange rate, the United States must undertake policies to shift the demand-for-Zee curve rightward or shift the-supply-of Zee curve leftward. To increase the demand for Zees, the United States could use dollars or gold to buy Zees in the foreign exchange market; employ trade policies to increase imports to U.S. from Zeeonia; or enact expansionary fiscal and monetary policies to increase U.S. domestic output and income, thus increasing imports from Zeeonia and elsewhere. Expansionary monetary policy could also reduce the *supply* of Zees: Zeeons could respond to the lower U.S. interest rates by reducing their investing in the United States. Therefore, they would not supply as many Zees to the foreign exchange market.

(b) Under a system of flexible exchange rates, the *ab* surplus of Zees (the U.S. balance of payments surplus) will cause the Zee to depreciate and the dollar to appreciate until the surplus is eliminated (at the $4 = Z1 exchange rate shown in the figure) because U.S. would import more from Zeeonia and they would buy less from U.S. since Zee's lost value

WEB BONUS CHAPTER

Note: Find this chapter at http://www.mhhe.com/economics/mcconnell15.

Web-5 Use a supply and demand diagram to explain why persistent shortages of many consumer goods occurred under central planning in the Soviet Union and in prereform China. Why were black markets common in each country?

See Figure Web-1. Because Russia and China set prices and did not allow them to change as supply or demand shifted, prices were below the equilibrium price for most goods and services. When the fixed price, *Pf,* is below the equilibrium price, *Pe,* there will be a shortage since the quantity demanded will exceed the quantity supplied.

Black markets are common where prices are fixed below equilibrium levels. People can buy goods at the fixed government prices (or pay off clerks to save such goods to sell to them), and because of the shortages at the low fixed price, resell these goods at a much higher price to those unable to find the goods in government stores at the controlled prices. This reselling is said to occur on the black market.

Web-6 What have been the major components of economic reform in Russia? What is meant when these reforms are described as "shock therapy"? How successful has Russia been thus far in its reforms?

Privatization of state-owned businesses; market-determined prices; promotion of competition; integration with the world economy; and price-level stabilization. These reforms are referred to as shock therapy because they were dramatic and quick rather than phased in over many years or decades. Russia's reform has nominally privatized much of the economy (but property rights are still not clearly defined), establishing market-determined prices, and setting the stage for future prosperity. But the transition has resulted in declining living standards for many and increasing income inequality. Also, the government still does not have a successful program for collecting taxes.

Web-8 Relate each of the following items to the success of market reform in China: (a) leasing farm land, (b) price reform, (c) private rural and urban enterprises, (d) special economic zones, and (e) corporatization of state-owned enterprises.

(a) Leasing of land resulted in individually operated rather than collectivized farms; this greatly increased production incentives and boosted farm output.

(b) Price reform established market-based prices. These higher-than-government prices provided incentives for enterprises to expand output; they also enabled market-determined allocation of resources to replace inefficient central planning.

(c) Private rural and urban enterprises absorbed workers released by greater productivity in China's agricultural sector and established competition for China's state-owned enterprises.

(d) The special economic zones—with their private corporations, free trade, and foreign investment—established the workability and benefits of "near-capitalism."

(e) Corporatization focused the goals of state-owned enterprises on providing high-quality, minimum per-unit cost goods desired by consumers.