Key Concepts

Consumption Possibilities

The budget line shows the limits to a household’s consumption. Figure 9.1 graphs a budget line. Consumption points beyond the budget line are unaffordable; consumption points on and within the budget line are affordable.

The budget equation for the budget line in Figure 9.1 is:

\[ Q_{\text{soda}} = \frac{y}{P_{\text{soda}}} - \left( \frac{P_{\text{movies}}}{P_{\text{soda}}} \right) \times Q_{\text{movies}} \]

A household’s real income is the income expressed as a quantity of goods the household can afford to buy. In terms of soda, \( \frac{y}{P_{\text{soda}}} \) is the household’s real income. An increase in income (c) shifts the budget line rightward but does not change its slope.

A relative price is the price of one good divided by the price of another. The magnitude of the slope of the budget line \( \frac{P_{\text{movies}}}{P_{\text{soda}}} \) is the relative price of a movie in terms of a soda. Changes in the relative price rotate the budget line. A fall in the price of movies, the product on the horizontal axis, rotates the budget line outward so that it becomes flatter.

Preferences and Indifference Curves

An indifference curve is a curve showing combinations of goods among which a person is indifferent. Figure 9.2 illustrates a family of indifference curves.

Indifference curves farther from the origin are preferred over those closer to the origin.

The marginal rate of substitution (MRS) is the rate at which a person is willing to give up the good on the vertical axis (soda) to get an additional unit of the good on the horizontal axis (movies) while remaining indifferent. The magnitude of the slope of the indifference curve equals the MRS.
The diminishing marginal rate of substitution is the tendency for a person to be willing to give up less of the good on the vertical axis to get one more unit of the good on the horizontal axis, while remaining indifferent (that is, on the same indifference curve) as the quantity of the good on the horizontal axis increases.

Goods that are substitutes have straighter indifference curves; goods that are complements have more bowed indifference curves.

Predicting Consumer Choices

The household chooses the best affordable point for its consumption. This point is the combination of goods on the budget line and on the highest possible indifference curve. Figure 9.3 illustrates the best affordable point, where the household consumes 2 movies and 2 six-packs of soda per month. At this optimal point:

- the budget line and indifference curve are tangent so that the marginal rate of substitution equals the relative price.

The price effect is the change in the quantity consumed of a good resulting from a change in its price. When the price of a movie falls, the budget line rotates as shown in Figure 9.4 and the consumption of movies increases from 2 per month to 2½ per month. The fall in the price of a movie increases the quantity of movies demanded, which shows how this analysis can be used to derive the demand curve for movies.

The income effect is the change in buying plans resulting from a change in income. When income increases, the budget line shifts outward and the consumer moves to a new best affordable point. For normal goods, higher income increases consumption of the good and the demand curve shifts rightward. For inferior goods, higher income decreases consumption of the good and the demand curve shifts leftward.

The price effect can be divided into the substitution effect plus the income effect.

- The substitution effect is the effect of a change in price on the quantity bought when the consumer (hypothetically) remains indifferent (on the same indifference curve) between the original situation and the new one. To keep the consumer (hypothetically on the same indifference curve after the fall in price, the consumer’s income must (hypothetically) be decreased. With this, a fall in the price results in

- The income effect restores the (hypothetical) decrease in income, thereby shifting the budget line outward. For normal goods, the substitution and income effects from a fall in price both increase consumption, so a lower price unambiguously increases consumption. For inferior goods, the substitution effect from a fall in the price increases consumption but the income effects decreases consumption.
Helpful Hints

1. **A Perspective on the Chapter**: The analysis in this chapter clarifies economists’ general view that people strive to make themselves as well off as possible. However, people face constraints. These constraints, which limit the range of possible choices, depend on income and the prices of goods and are represented graphically by the budget line. Doing the best means finding the most preferred outcome consistent with those constraints. Graphically, the problem is to find the highest indifference curve attainable given the budget line. To make graphical analysis feasible, we restrict ourselves to choices between only two goods, but the same principles apply in the real world to a broader array of choices.

2. **Income, Prices, and Indifference Curves**: Indifference curves plot people’s preferences and do not depend on their incomes or the prices of the goods. For example, an indifference curve indicates how much a person likes (or dislikes) lobster without regard to the price of a lobster or the person’s income. When the price of a lobster or the individual’s income changes, the budget line changes, but the indifference curves do not change. If lobster is a normal good, higher income leads to more lobster being consumed. But the reason that more lobster is consumed is that the budget line has shifted outward, making more combinations of goods affordable, and thereby enabling the person to reach a higher indifference curve.

Questions

**True/False and Explain**

**Consumption Possibilities**

1. The budget line has a negative slope and is linear.
2. The magnitude of the slope of the budget line is a relative price.
3. An increase in income shifts the budget line outward and makes it steeper.

**Preferences and Indifference Curves**

4. A person is indifferent between any combination of goods on a particular indifference curve.

5. An indifference curve measures the same things as does a demand curve.
6. Indifference curves farther from the origin are preferred to those closer to the origin.
7. The magnitude of the slope of a person’s indifference curve is the marginal rate of substitution.
8. The marginal rate of substitution falls when moving upward along an indifference curve.
9. Goods that are perfect substitutes have L-shaped indifference curves.

**Predicting Consumer Choices**

10. The best affordable point of consumption is on the budget line and on the highest attainable indifference curve.
11. The law of demand can be derived from an indifference curve diagram by using the diagram to determine the impact changes in price have on the person’s consumption bundle.
12. The substitution effect can be divided into the price effect and the income effect.
13. For an inferior good, an increase in income shifts the budget line leftward.
14. When the price of a good falls, the income effect always leads to increased consumption of the good.
15. For a normal good, both the substitution effect and income effect from a higher price lead to a decrease in the consumption of the good.

**Multiple Choice**

**Consumption Possibilities**

1. Which of the following statements best describes a consumer’s budget line?
   a. It shows all combinations of goods among which the consumer is indifferent.
   b. It shows the limits to a consumer’s set of affordable consumption choices.
   c. It shows the desired level of consumption for the consumer.
   d. It shows the consumption choices made by a consumer.
2. The magnitude of the slope of the budget line
   a. is defined as marginal rate of substitution.
   b. equals the relative price of the good measured
      along the horizontal axis.
   c. increases when income increases.
   d. decreases when income increases.

3. The budget line can shift or rotate
   a. only when income changes.
   b. only when prices change.
   c. when either income or prices change.
   d. None of the above because changes in income
      and prices do not shift or rotate the budget line.

Use Figure 9.5 for the next two questions.

![Figure 9.5](image)

Multiple Choice Questions 4 and 5

4. Suppose that this consumer’s income increases and
   nothing else changes. As a result, the consumer’s
   budget line
   a. rotates around the vertical intercept and becomes
      steeper.
   b. rotates around the vertical axis and becomes flatter.
   c. shifts rightward and becomes steeper.
   d. shifts rightward and its slope does not change.

5. Suppose that the price of a movie rises and nothing
   else changes. This change means the budget line
   a. rotates around the vertical intercept and becomes
      steeper.
   b. rotates around the vertical axis and becomes flatter.
   c. shifts rightward and becomes steeper.
   d. shifts rightward and does not change its slope.

6. Sue consumes apples and bananas. Suppose that
   Sue’s income doubles and that the prices of apples
   and bananas also double. Sue’s budget line will
   a. shift leftward but not change slope.
   b. remain unchanged.
   c. shift rightward but not change slope.
   d. shift rightward and become steeper.

Preferences and Indifference Curves

7. As a consumer moves rightward along an indifference
   curve, the
   a. consumer remains indifferent among the different
      combinations of goods.
   b. consumer generally prefers the combinations of
      goods farther rightward along the indifference
      curve.
   c. income required to buy the combinations of the
      goods always increases.
   d. relative price of both goods falls.

8. Indifference curves shift or rotate
   a. only when income changes.
   b. only when prices change.
   c. when either income or prices change.
   d. with none of the above because changes in income
      and prices do not shift indifference curves.

9. If your local newspaper reported that wearing plaid
   clothing was a sure way to obtain good grades, stu-
   dents’
   a. budget lines would shift rightward to compensate
      for the higher price of plaid clothing.
   b. budget lines would rotate so that more plaid
      clothing would be purchased.
   c. preferences would change in favor of more plaid
      clothing.
   d. None of the above.
10. The assumption of diminishing marginal rate of substitution means that
   a. the budget line has a negative slope.
   b. the budget line does not shift when people's preferences change.
   c. indifference curves might have a positive slope.
   d. indifference curves will be concave.

11. If two goods are perfect substitutes, their
   a. indifference curves are positively sloped straight lines.
   b. indifference curves are negatively sloped straight lines.
   c. indifference curves are L-shaped.
   d. marginal rate of substitution is infinity.

12. If the indifference curves between two goods are L-shaped, the goods are
   a. complementary goods.
   b. substitute goods.
   c. normal goods.
   d. inferior goods.

Predicting Consumer Choices
Use Figure 9.6 for the next two questions.

13. Which of the following statements about Figure 9.6 is correct?
   a. Point $a$ is preferred to point $d$, but $a$ is not affordable.
   b. The consumer is indifferent between points $d$ and $c$, but $c$ is more affordable.
   c. Point $b$ is preferred to point $d$, but $b$ is not affordable.
   d. Both points $a$ and $d$ cost the same, but $a$ is preferred to $d$.

14. What is the best affordable point of consumption?
   a. $a$
   b. $b$
   c. $c$
   d. $d$

15. A consumer is in equilibrium when the consumption point is on
   a. the budget line.
   b. an indifference curve.
   c. the highest indifference curve that just touches the budget line.
   d. None of the above.

16. Which of the following is true when the consumer is at the best affordable point?
   a. The point is on the budget line and highest attainable indifference curve.
   b. The slope of the budget line equals the slope of the indifference curve.
   c. The MRS equals the relative price.
   d. All of the above are true at the best affordable point.

17. Which of the following statements is true?
   a. The law of diminishing marginal rate of substitution means that indifference curves are convex (bowed out).
   b. A demand curve can be derived from the indifference curve/budget line analysis.
   c. Demand curves and indifference curves measure the same things.
   d. Demand curves and indifference curves have negative slopes for the same reason.
18. In a budget line/indifference curve diagram between apples and oranges, when the price of an orange rises, the budget line ____ and the indifference curves ____.
   a. rotates outward; shift outward.
   b. rotates inward; do not shift
   c. rotates outward; shift inward
   d. rotates inward; shift inward.

19. When the price of an orange falls, the income effect
   a. increases the consumption of oranges if oranges are a normal good.
   b. increases the consumption of oranges if oranges are an inferior good.
   c. always increases the consumption of oranges.
   d. always decreases the consumption of oranges.

20. When oranges fall in price, the substitution effect
   a. increases the consumption of oranges if oranges are a normal good.
   b. increases the consumption of oranges if oranges are an inferior good.
   c. always increases the consumption of oranges.
   d. always decreases the consumption of oranges.

Use Figure 9.7 for the next three questions.

21. The change in the budget line is the result of a(n)
   a. fall in the price of a slice of pizza.
   b. fall in the price of a taco.
   c. increase in income.
   d. None of the above

22. With the change in the budget line, the consumer’s real income measured in units of tacos
   a. definitely increased.
   b. definitely decreased.
   c. did not change.
   d. might have changed, but it is impossible to tell from the figure.

23. The new consumer equilibrium is at point
   a. a
   b. b
   c. c
   d. d

24. The effect from a change in price while (hypothetically) changing income to keep the consumer on the same indifference curve, is called the
   a. price effect.
   b. income effect.
   c. substitution effect.
   d. ceterus paribus effect.

25. When the price of a normal good falls, the income effect ____ the quantity demanded and the substitution effect ____ the quantity demanded.
   a. increases; increases
   b. increases; decreases
   c. decreases; increases
   d. decreases; decreases

26. An inferior good has
   a. a substitution effect opposite that of a normal good.
   b. an income effect opposite that of a normal good.
   c. a price effect opposite that of a normal good.
   d. no income effect.

**Short Answer Problems**

1. Why do indifference curves have negative slopes?

2. Jan and Dan eat bread and peanut butter and have the same income. Because they face the same prices, they have identical budget lines. Currently, Jan and Dan consume the same quantities of bread and peanut butter; they have the same best affordable consumption point. Jan views bread and peanut butter as close (though not perfect) substitutes and Dan considers bread and peanut butter to be quite (but not perfectly) complementary. On the same diagram, draw a budget line and indifference curves for Jan and Dan. (Measure the quantity of bread on the horizontal axis.)

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3. Three of Igor’s indifference curves are illustrated Figure 9.8.
   a. Suppose that the price of a snake is $10, the price of a lizard is $20, and Igor has $60 to spend on snakes and lizards. Carefully draw his budget line in Figure 9.8. How many snakes does Igor buy? How many lizards?
   b. Suppose that the price of a snake spirals to $20 while the price of a lizard does not change. If Igor’s income stays at $60, draw his new budget line in Figure 9.8. Now how many snakes does Igor buy? How many lizards? Are snakes and lizards substitutes or complements?
   c. When is Igor better off: before or after snakes go up in price? How can you tell?
4. Figure 9.9 again shows Igor’s indifference curves.
   a. Snakes cost $20, lizards cost $20, and Igor’s income is $60. Draw Igor’s budget line in Figure 9.9. How many snakes does Igor buy? How many lizards?
   b. For his superior work in finding brains, Igor’s master gives him a raise to $120. In Figure 9.9 draw Igor’s new budget line. After the raise, how many snakes does Igor buy? How many lizards? For Igor, are snakes and/or lizards a normal good?
5. Ms. Muffet consumes curds and whey. The initial price of curds is $1 per unit, and the price of whey is $1.50 per unit. Ms. Muffet’s income is $12.
   a. What is the relative price of curds?
   b. Derive Ms. Muffet’s budget equation and draw her budget line on a graph. (Measure curds on the horizontal axis.)
   c. On your graph, draw an indifference curve so that the best affordable point corresponds to 6 units of curds and 4 units of whey.
   d. What is the marginal rate of substitution of curds for whey at this point?
   e. Show that any other point on the budget line is inferior.
6. For the initial situation described in problem 5, suppose that Ms. Muffet’s income now increases.
   a. Illustrate graphically how the consumption of curds and whey are affected if both goods are normal. (Precise numerical answers are not necessary here. In your graph, just show whether consumption increases or decreases but do not worry about specific numbers.)
   b. Draw a new graph showing the effect of an increase in Ms. Muffet’s income if whey is an inferior good.
7. Return to the initial circumstances in problem 5. Now, suppose that the price of curds doubles to $2 a unit while the price of whey remains at $1.50 per unit and income remains at $12.
a. Draw the budget line before and after the price change.
b. Why is the initial best affordable point (label it point a) no longer the best affordable point?
c. Use your graph and show the new best affordable point and label it d. What has happened to the consumption of curds?
d. Use your graph to illustrate the substitution and income effects from the price change. Label the point created by the substitution effect b.

8. Figure 9.10 illustrates Carolyn’s indifference map between bread and wine.

   a. The price of a bottle of wine is $2, and the price of a loaf of bread is $1. Carolyn has $6 to spend on bread and wine. In Figure 9.10 draw her budget line. How many bottles of wine does Carolyn buy?

   b. The price of a bottle of wine falls to $1. The price of a loaf of bread remains at $1, and Carolyn’s income is constant at $6. Draw her new budget line in Figure 9.10. How many bottles of wine does Carolyn now buy?

   c. Assume that Carolyn’s demand curve is linear. In Figure 9.11 draw Carolyn’s demand curve for wine.

   **You’re the Teacher**

1. “I see that we can use this indifference curve/budget line approach to derive demand curves. But why bother? I mean, after all, why not just use the demand curves like we’ve been doing all along and not worry about this other stuff?” This question is reasonable. Tell your friend why this other stuff is worth bothering about.

2. “I finally understand this chapter: Indifference curves and demand curves are the same thing! My studying is beginning to pay off.” Actually your friend is not studying enough. Help your friend by explaining why indifference curves and demand curves are not the same.
Answers

■ True/False Answers

Consumption Possibilities
1. T The budget line is straight; indifference curves are concave (bowed toward the origin).
2. T The magnitude of the slope of the budget line is the relative price of the good on the horizontal axis in terms of the good on the vertical axis.
3. F An increase in income shifts the budget line outward, but does not change its slope.

Preferences and Indifference Curves
4. T This definition is why a consumer is indifferent between points on a particular indifference curve.
5. F An indifference curve shows different combinations of two goods among which the consumer is indifferent; a demand curve shows how the quantity of one good changes when its price changes.
6. T Indifference curves farther from the origin have more potential consumption of all goods and services and so are preferred.
7. T The statement tells how to measure the marginal rate of substitution.
8. F The principle of diminishing marginal rate of substitution means that the marginal rate of substitution falls while moving downward along an indifference curve.
9. F Goods that are complements have L-shaped indifference curves.

Predicting Consumer Choices
10. T The best affordable point is best because it is on the highest indifference curve and is affordable because it is on the budget line.
11. T The question tells how a demand curve can be derived.
12. F The price effect can be divided into the substitution effect and the income effect.
13. F The budget line shifts rightward, but the equilibrium amount of the good consumed decreases.
14. F The income effect leads to increased consumption for normal goods and decreased consumption for inferior goods.
15. T For a normal good, the income effect and the substitution effect always have the same impact on consumption of the good.

■ Multiple Choice Answers

Consumption Possibilities
1. b The budget line illustrates the different combinations of goods an individual can afford. In this sense it is like a menu, showing what can be purchased. But in order to determine what will be purchased, information is needed on the consumer’s preferences about the different combinations of goods.
2. b The slope indicates how many units of the good measured on the vertical axis must be given up in order to gain another unit of the good measured on the horizontal axis.
3. c Income and price changes shift or rotate the budget line, not indifference curves.
4. d Changes in the relative price rotate the budget line; changes in income shift it in a parallel fashion.
5. a A rise in the price of a movie does not change the vertical intercept \( y/P_{soda} \), but the magnitude of the slope \( (P_{movies}/P_{soda}) \) increases.
6. b The relative price of bananas and apples does not change because both prices doubled, so the slope of the budget line is unchanged. In addition, the intercepts do not change because the higher income matches the higher prices. So, the budget line does not change.

Preferences and Indifference Curves
7. a By definition, the consumer is indifferent between any consumption combination on an indifference curve.
8. d Only changes in the individual’s preferences shift the indifference curves.
9. c Preferences change because now students “like” plaid clothing more than before.
10. d The diminishing marginal rate of substitution means that an indifference curve becomes flatter while moving rightward along it so that more of
the good measured on the horizontal axis is consumed.

11. **b** The more closely two goods substitute for each other, the more closely their indifference curves approach being straight lines.

12. **a** Perfect complements have L-shaped indifference curves.

**Predicting Consumer Choices**

13. **a** Point *a* is preferred because it is on a higher indifference curve, but it is not affordable because it lies beyond the budget line.

14. **d** Point *d* is the point on the highest indifference curve that is affordable.

15. **c** The consumption bundle represented by the point on the budget line where the highest indifference curve touches the budget line is the best affordable consumption bundle.

16. **d** All the statements accurately characterize consumer equilibrium.

17. **b** In other words, demand curves are the result of people selecting the best affordable consumption combination.

18. **b** The budget line changes only when either the prices or income change; the indifference curves change only when a person’s preferences change.

19. **a** The income effect of a lower price motivates an increase in the consumption of normal goods only. The income effect motivates a decrease in the consumption of inferior goods.

20. **c** The substitution effect from a lower price always motivates an increase in the consumption of the relatively cheaper good.

21. **b** When the price of a taco falls, the maximum amount of tacos that can be purchased increases, but the maximum amount of pizza slices that can be purchased does not change.

22. **a** Real income increased because more tacos can be purchased.

23. **b** After the price change, point *b* is on the highest affordable indifference curve.

24. **c** This question defines the substitution effect.

25. **a** For normal goods, both the substitution and income effects from a lower price will increase the quantity demanded.

26. **b** Increases in income increase the demand for a normal good and decrease the demand for an inferior good.

**Answers to Short Answer Problems**

1. An indifference curve shows how much the consumption of one good must increase as the consumption of another good decreases in order to leave the consumer indifferent (no better or worse off).

   It has a negative slope because both goods are desirable. In order to not be made worse off, as the consumption of one good decreases, consumption of the other good must increase. This relationship implies a negative slope.

**FIGURE 9.12**

**Short Answer Problem 2**

2. Figure 9.12 shows Jan and Dan’s budget line and their indifference curves. Because Jan views bread and peanut butter as substitutes and Dan views them as complements, Jan’s indifference curve is more linear than Dan’s and Dan’s is more L-shaped than Jan’s.

   In general, the more the goods are viewed as substitutes, the more linear are the indifference curves. The more the goods are viewed as complements, the more L-shaped are the indifference curves.
3. a. Figure 9.13 shows the budget line. The point with the highest attainable utility is indicated by the circle, where the budget line touches the highest possible indifference curve. At this point Igor buys 4 snakes and 1 lizard.

b. Figure 9.14 illustrates Igor’s new budget line. After the price hike for snakes, Igor buys 1 snake and 2 lizards. Lizards and snakes are substitutes. The increase in the price of a snake increases the quantity of lizards that Igor buys.

c. Igor was better off before the price of a snake rose. A comparison of Figures 9.13 and 9.14 reveals that Igor was on a higher indifference curve before the price of a snake rose, so he preferred the situation before snakes rose in price.

4. a. Figure 9.15 shows that Igor buys 1 snake and 2 lizards.

b. The increase in income shifts Igor’s budget line, as indicated in Figure 9.16. After his increase in income, Igor buys 3 snakes and 3 lizards. For
Igor, both snakes and lizards are normal goods because he buys more of both when his income increases.

5.  

a. The relative price of curds is the money price of curds divided by the money price of whey: 
   \[ \frac{P_c}{P_w} = \frac{1}{1.5} \] or \( 2/3 \) whey per curd.

b. Let \( P_c \) = the price of curds, \( P_w \) = the price of whey, \( Q_c \) = quantity of curds, \( Q_w \) = quantity of whey, and \( y \) = income. The budget equation, in general form, is:
   \[ Q_w = \frac{y}{P_w} - \left( \frac{P_c}{P_w} \right) Q_c \]

Because \( P_c = $1 \), \( P_w = $1.50 \), and \( y = $12 \), Ms. Muffet’s budget equation is specifically given by:
   \[ Q_w = 8 - \frac{2}{3} Q_c \]

The graph of this budget equation, the budget line, is given in Figure 9.17.

6.  

c. Indifference curve \( I_2 \) is the indifference curve tangent to the budget line so that Ms. Muffet’s best affordable point — that is, her equilibrium point — is point \( a \), with consumption of 6 units of curds and 4 units of whey.

d. The marginal rate of substitution is the magnitude of the slope of the indifference curve at point \( a \). We do not know the slope of the indifference curve directly, but we can easily compute the slope of the budget line and thereby calculate the marginal rate of substitution. At the best affordable point \( a \), the indifference curve and the budget line have the same slope. (The fact that the slope of the indifference curve equals that of the budget line at the best affordable point is the hallmark of the best affordable point.) So we can obtain the marginal rate of substitution of curds for whey by using the slope of the budget line. Because the slope of the budget line is \(-2/3\) the marginal rate of substitution is \(2/3\). For example, Ms. Muffet is willing to give up 2 units of whey in order to receive 3 additional units of curds.

e. Because indifference curve \( I_2 \) lies above the budget line (except at point \( a \)), every other point on the budget line is on a lower indifference curve. For example, take point \( b \). Point \( b \) lies on indifference curve \( I_1 \), which is less preferred than indifference curve \( I_2 \). Just like point \( b \), every other point on the budget line lies on a less preferred indifference curve and so every other point is inferior to point \( a \). As a result, point \( a \) is the equilibrium point.

6.  

a. An increase in income causes a parallel rightward shift of the budget line, as shown in Figure 9.18. If both curds and whey are normal goods, Ms. Muffet moves to a point such as \( e \), at which the consumption of both goods has increased.
b. If whey is an inferior good, its consumption decreases as income increases, as illustrated in Figure 9.19. Again, the budget line shifts rightward, as in part (a), but Ms. Muffet’s preferences are such that her new consumption point is given by a point such as \( d \), on indifference curve \( I_3 \), where the consumption of whey has declined.

7. a. Ms. Muffet’s initial budget line and her initial best affordable point, \( a \), are illustrated in Figure 9.20. (The best affordable point is the same point as in Figure 9.17.) Here the new budget line following a rise in the price of curds to $2 is illustrated.

b. After the price rise, point \( a \) is no longer the best affordable point because now it is no longer affordable.

c. The new best affordable point (labeled \( d \) in Figure 9.20) indicates a decrease in the consumption of curds. That is as expected because the price of curds rose.

d. The substitution effect is the movement from point \( a \) to point \( b \), and the income effect is the movement from point \( b \) to point \( d \). The key to the substitution effect is that point \( b \) is on the same indifference curve as point \( a \). The hypothetical budget line that determines point \( b \) has the same slope as the actual new budget line, however Ms. Muffet’s income has been (hypothetically) increased along the hypothetical budget line to keep her on the same indifference curve.

The substitution effect always leads to a decrease in the consumption of the good whose relative price has risen and an increase in the consumption of a good whose relative price has fallen. In the case at hand, the substitution effect leads to a decrease in the consumption of curds and an increase in the consumption of whey.
8. a. Figure 9.22 shows Carolyn’s budget line. In this figure Carolyn’s best attainable point is labeled \( a \). She consumes 2 bottles of wine per month.

b. The fall in the price of a bottle of wine rotates Carolyn’s budget line higher, as illustrated in Figure 9.23. Here her best attainable point is \( b \) and she consumes 4 bottles of wine per month. Note that indifference curve \( I_3 \) continues to remain unaffordable.

c. When the price of wine is $2 a bottle, part (a) indicates that Carolyn buys 2 bottles of wine. When the price of wine falls to $1 a bottle, part (b) shows that Carolyn buys 4 bottles of wine. These two points on her demand curve are illustrated in Figure 9.24, and her (assumed linear) demand curve is drawn through these points.

**You’re the Teacher**

1. “It’s certainly true that one of the main goals of budget line/indifference curve analysis is deriving the demand curve. There are a couple of reasons for doing so. First, it’s ‘nice’ to see that we can derive a demand curve by just assuming that people consume the best combination of goods and services they can afford. The idea that people make themselves as well off as possible is the hallmark of economics. This idea represents the basic world view of an economist; if you think it’s a reasonable assumption, maybe you ought to major in economics!”

“Second, the indifference curve/budget line approach allows us to think about income and substitution effects. These concepts help clarify some important household choices. For instance, without these ideas, understanding why the quantity of labor people supply has declined as wages rose would be difficult. If we didn’t know about the income effect, we’d probably think that people were either irrational or stupid for decreasing the quantity of their labor supplied when wage rates rose. So this
approach gives us some new insights into how economists view the world and the factors that affect the choices that people make."

2. “Look, you’re wrong about this. I know that both indifference curves and demand curves slope downward, but indifference curves and demand curves really are different. In fact, we use indifference curves to help derive demand curves. But, to see the difference, think about a demand curve. It shows us how the price of a good affects how much we will buy. For instance, your demand curve for frozen yogurt cones tells us how much frozen yogurt you’ll buy if a cone is $1.50 or how much you’ll buy if one is $2.00. Indifference curves are different. They don’t give us the relationship between a good’s price and how much you’ll buy. Indifference curves show us different combinations of two goods that leave you indifferent. You have indifference curves between frozen yogurt cones and ice cream cones. This type of indifference curve shows us all the combinations of yogurt and ice cream cones such that you don’t care which combination you get. So, you see, indifference curves and demand curves aren’t the same, so don’t make this mistake.”
Chapter Quiz

1. Tommy’s monthly budget line for street hockey balls and books is plotted with books on the horizontal axis. His budget line shifts rightward and its slope does not change. Hence
   a. the price of a street hockey ball has fallen.
   b. the price of a book has fallen.
   c. Tommy’s income has risen.
   d. the price of a street hockey ball has fallen and the price of a book has risen.

2. A household’s budget line is determined by
   a. prices and preferences.
   b. income and preferences.
   c. prices and income.
   d. prices, income, and preferences.

3. Emma has weekly income of $200. A textbook costs $50 and a pad of paper $1. When Emma’s budget line is drawn with textbooks on the horizontal axis,
   a. the horizontal intercept is 200 pads of paper.
   b. the slope of the budget line is $200.
   c. the horizontal intercept is 4 textbooks.
   d. the budget line shows that Emma cannot buy 3 textbooks.

4. Preferences
   a. do not depend on what the person can afford.
   b. are shown graphically as a budget line.
   c. change when relative prices change.
   d. show feasible consumption combinations.

5. An indifference curve shows all combinations of two goods that
   a. can be purchased with a given income.
   b. have the same marginal rate of substitution.
   c. are preferred to any other combination of the goods.
   d. among which the consumer is indifferent.

6. Right-hand and left-hand gloves are perfect complements. As a result, the corresponding indifference curves
   a. are L-shaped.
   b. intersect each other.
   c. are straight lines.
   d. are vertical.

7. At the best affordable point, the
   a. indifference curve crosses the budget line.
   b. marginal rate of substitution exceeds the relative price of the goods by as much as possible.
   c. consumer is on the highest attainable indifference curve.
   d. None of the above.

8. The income effect from a price change
   a. is always greater than the price effect.
   b. is always greater than the substitution effect.
   c. always leads to an increase in the purchase of the good whose relative price has fallen.
   d. None of the above.

9. When the relative price of a normal good falls, the substitution effect results in ____ in the quantity purchased and the income effect results in ____ in the quantity purchased.
   a. an increase; an increase
   b. an increase; a decrease
   c. a decrease; an increase
   d. a decrease; a decrease

10. An increase in the price of any type of food, such as pizza, has
    a. a substitution effect and an income effect.
    b. a substitution effect but does not have an income effect.
    c. an income effect but does not have a substitution effect.
    d. neither a substitution effect nor an income effect.

The answers for this Chapter Quiz are on page 343