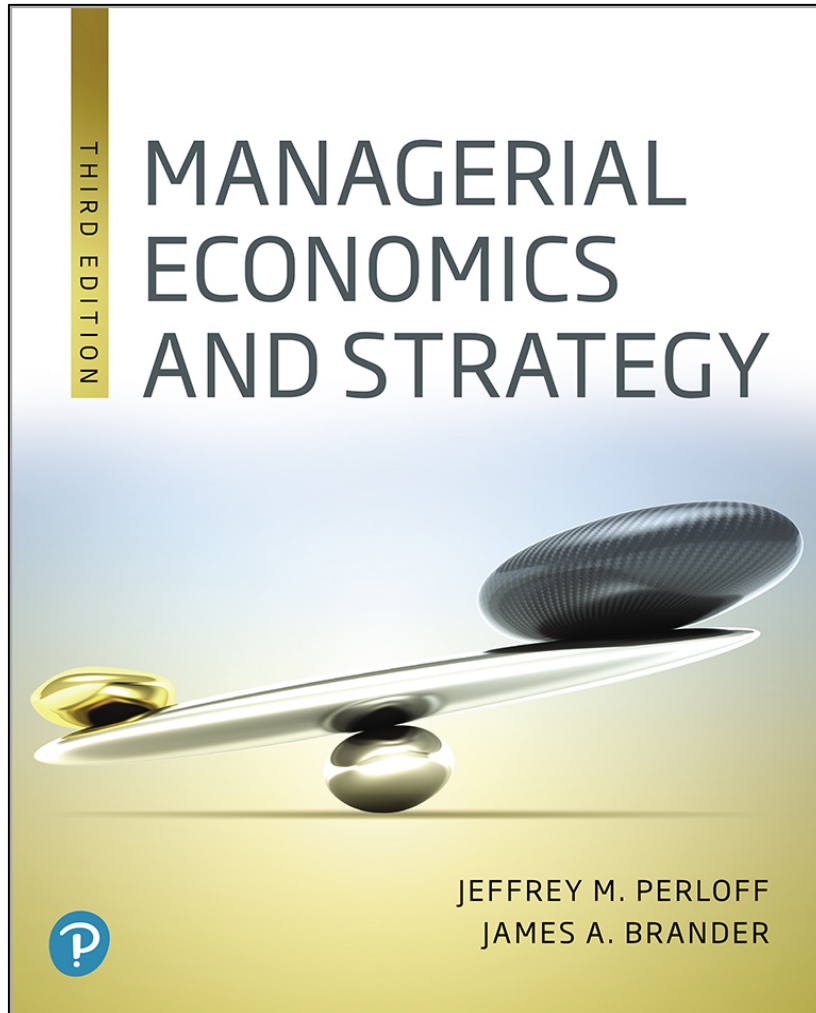


Managerial Economics and Strategy

Third Edition



Chapter 4

Consumer Choice

Managerial Problem

Paying Employees to Relocate

- How can a manager use consumer theory to optimally compensate employees who are transferred to other cities?

Solution Approach

- Managers can assess the items employees consume in the original location and entice them to relocate by offering a compensation that allows them to consume basically the same in the new location. However, these packages usually overcompensate employees. To avoid costly overcompensation, managers may use the **theory of consumer choice**.

Empirical Methods

- Individual **preferences** determine the satisfaction people derive from the goods and services they consume.
- Consumers face **constraints** or limits on their choices, particularly because their budgets limit how much they can buy.
- Consumers seek to **maximize** the level of satisfaction they obtain from consumption, subject to the constraints they face (“do the best with what they have”).

Learning Objectives (1 of 2)

4.1 Consumer Preferences

Predict consumer choices using underlying properties of consumer preferences

4.2 Utility

Summarize a consumer's preferences using a utility function

4.3 The Budget Constraint

Explain how prices and income limit what a consumer can purchase

Learning Objectives (2 of 2)

4.4 Constrained Consumer Choice

Show how consumers maximize their utility given prices and limited income

4.5 Deriving Demand Curves

Derive demand curves from underlying consumer preferences

4.6 Behavioral Economics

Discuss the role of behavioral biases in consumer choice

4.1 Consumer Preferences (1 of 6)

- A consumer faces choices involving many goods and must allocate his or her available budget to buy a **bundle** of goods.
 - Would ice cream or cake make a better dessert? Is it better to rent a large apartment or rent a single room and use the savings to pay for concerts?
- How do consumers choose the bundles of goods they buy?
 - One possibility is that consumers behave randomly and blindly choose one good or another without any thought.
 - Another is that they make systematic choices.
- To explain consumer behavior, economists assume that consumers have a **set of tastes or preferences** that they use to guide them in choosing between goods.
 - These tastes differ substantially among individuals. For example, three out of four European men prefer colored underwear, while three out of four American men prefer white underwear.

4.1 Consumer Preferences (2 of 6)

Properties of Consumer Preferences



Mackenzie and Chase are Civilization's greatest threat.

4.1 Consumer Preferences (3 of 6)

Properties of Consumer Preferences

- **Completeness**

- When a consumer faces a choice between any two bundles of goods, only one of the following is true. The consumer might prefer the first bundle to the second, or the second bundle to the first, or be indifferent between the two bundles. Indifference is allowed, but indecision is not.

- **Transitivity**

- If a is strictly preferred to b and b is strictly preferred to c , it follows that a must be strictly preferred to c . Transitivity applies also to weak preference and indifference relationships.

- **More is better**

- All else being the same, more of a good is better than less. This is a **nonsatiation** property.

4.1 Consumer Preferences (4 of 6)

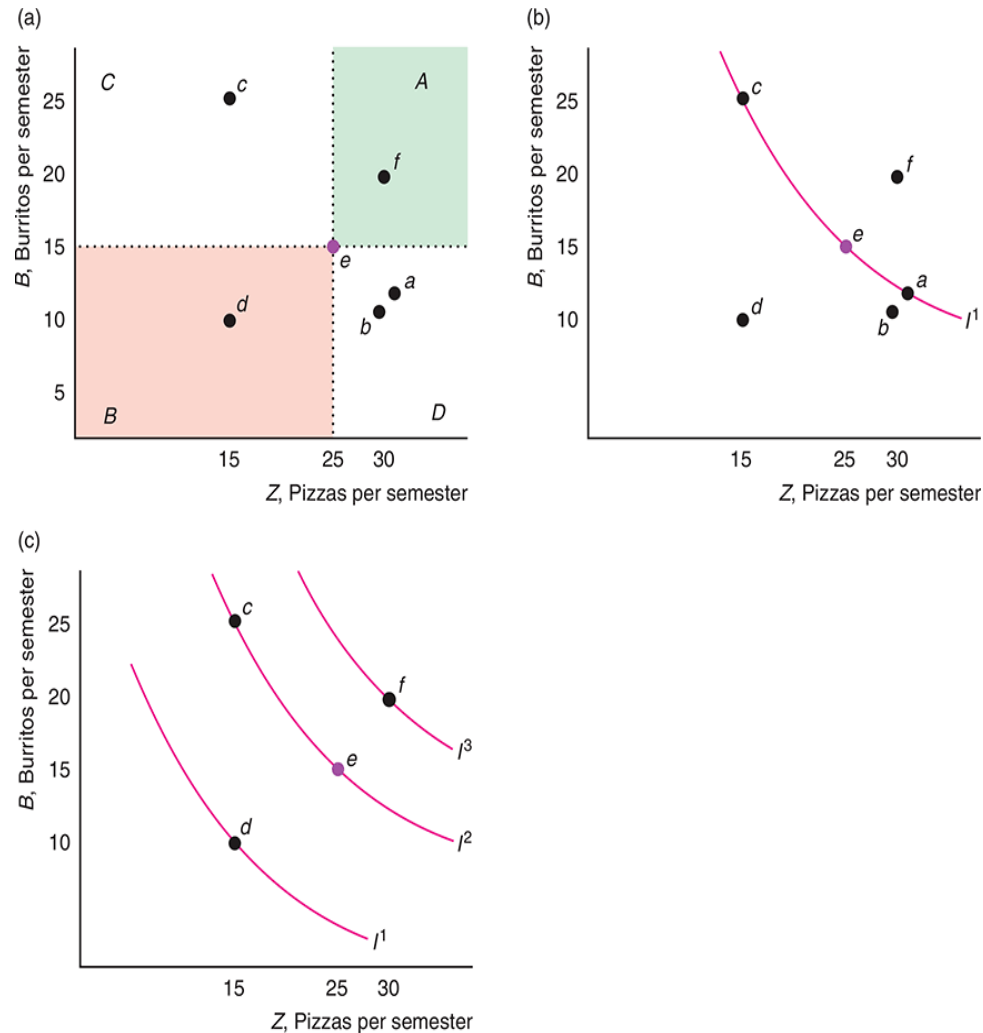
Preference Maps

- A **preference map** is a complete set of indifference curves that summarize a consumer's tastes.
 - An indifference curve is the set of all bundles of goods that a consumer views as being equally desirable.
 - Panel c of Figure 4.1 shows three of Lisa's indifference curves: I^1 , I^2 , and I^3 . In this figure, the indifference curves are parallel, but they need not be.

Preferences and Indifference Curves

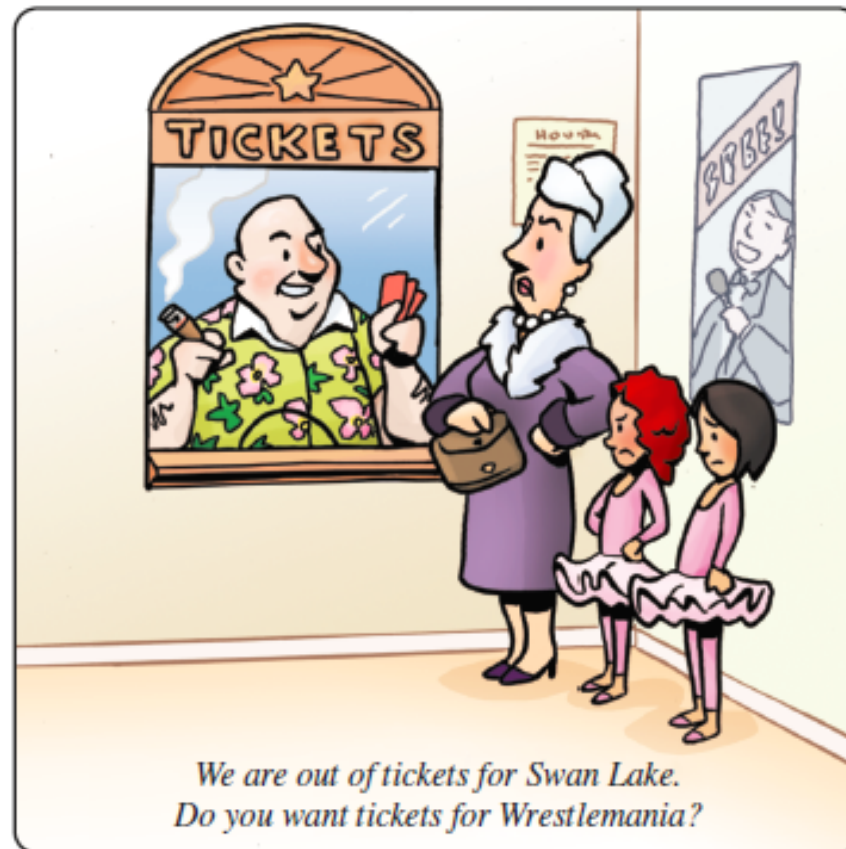
- Bundles on indifference curves farther from the origin are preferred to those on indifference curves closer to the origin.
- There is an indifference curve through every possible bundle.
- Indifference curves cannot cross.
- Indifference curves slope downward.

Figure 4.1 Bundles of Pizzas and Burritos That Lisa Might Consume



4.1 Consumer Preferences (5 of 6)

Willingness to Substitute Between Goods



4.1 Consumer Preferences (6 of 6)

Willingness to Substitute Between Goods

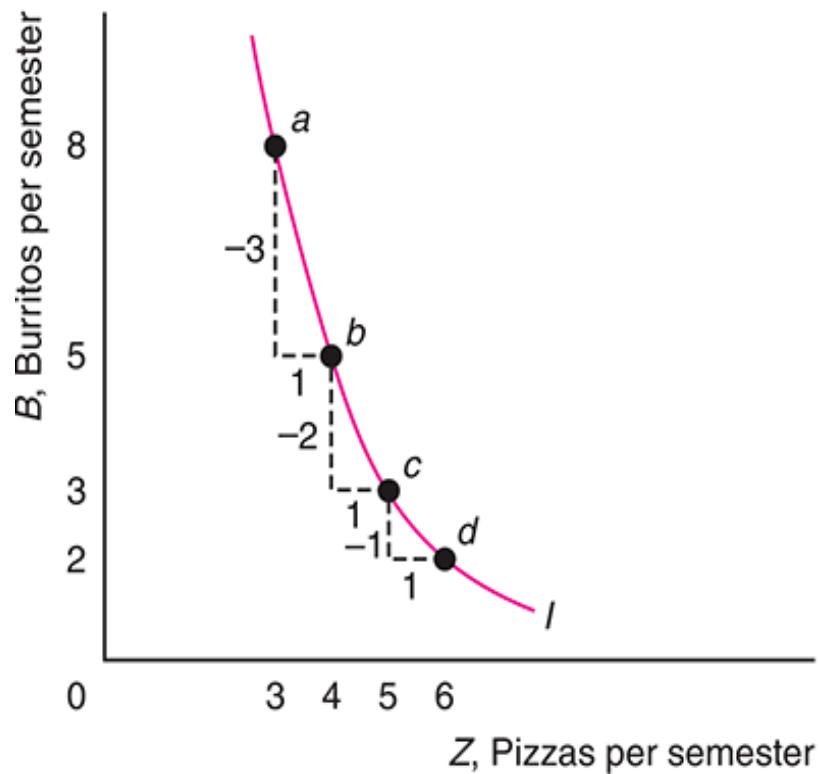
- The **Marginal Rate of Substitution (MRS)** is the rate at which a consumer can substitute one good for another while remaining on the same indifference curve.
 - If pizza is on the horizontal axis in Figure 4.3 (a), Lisa's marginal rate of substitution of burritos for pizza is **MRS** = $\Delta B / \Delta Z$, where ΔB is the number of burritos Lisa will give up to get ΔZ more pizzas while staying on the same indifference curve.
 - The indifference curves in Figure 4.3 (a) are convex or “bowed in” toward the origin. This willingness to trade fewer burritos for one more pizza reflects a **diminishing marginal rate of substitution**.

Curvature of Indifference Curves

- Convex indifference curves reflect **imperfect substitutes** (panel a in Figure 4.3 and panel c in Figure 4.4).
- Straight-line indifference curves reflect **perfect substitutes**, goods that are essentially equivalent for the consumer (Panel a, Figure 4.4).
- Right-angle indifference curves reflect **perfect complements**, goods consumed only in fixed proportions (Panel b, Figure 4.4).

Figure 4.3 Marginal Rate of Substitution

(a) Indifference Curve Convex to the Origin



(b) Indifference Curve Concave to the Origin

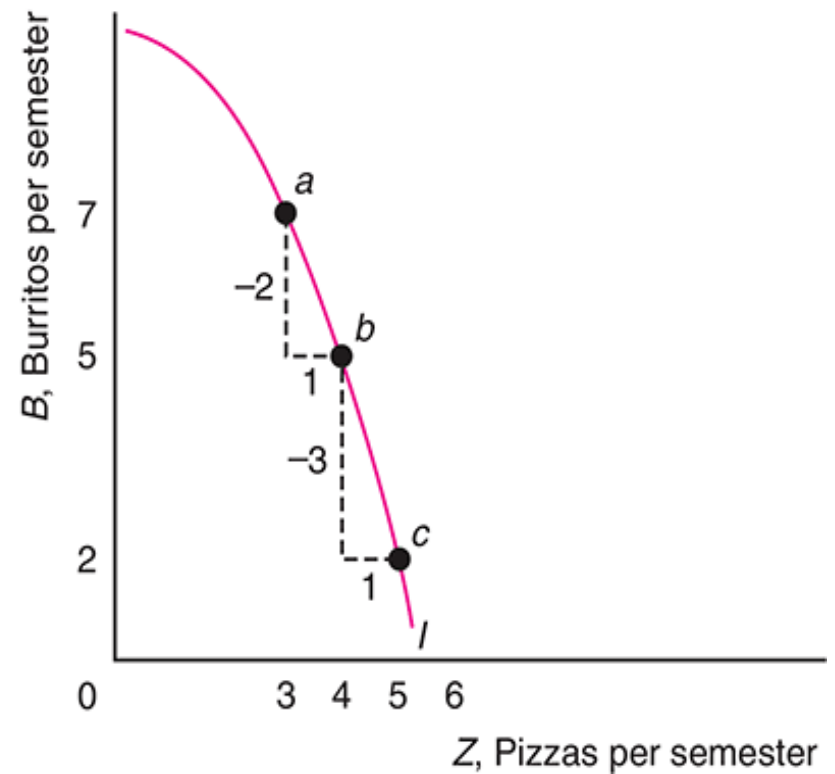
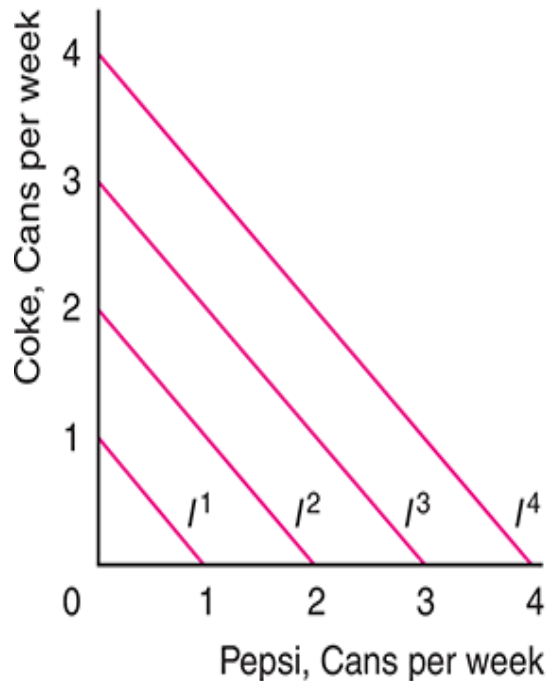
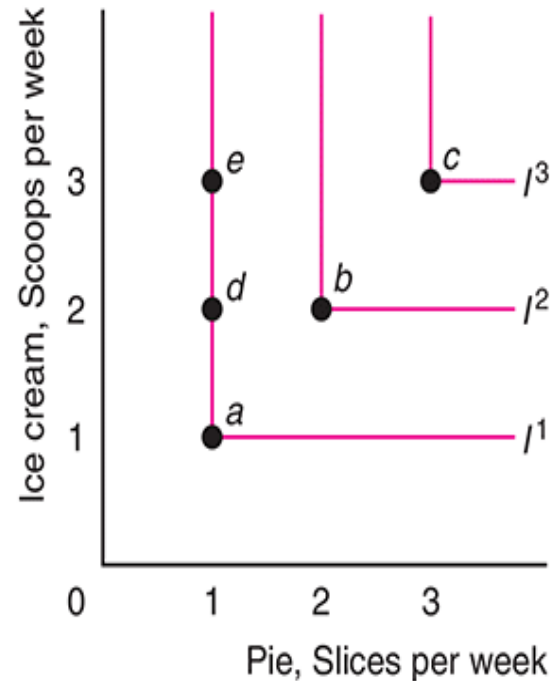


Figure 4.4 Perfect Substitutes, Perfect Complements, and Imperfect Substitutes

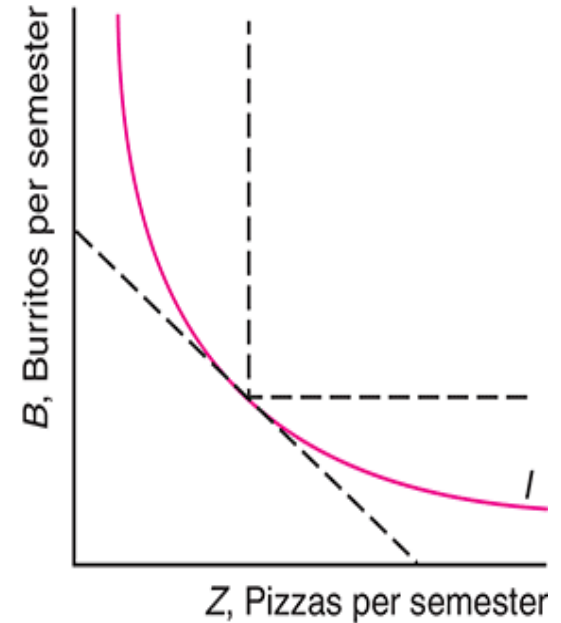
(a) Perfect Substitutes



(b) Perfect Complements



(c) Imperfect Substitutes



4.2 Utility (1 of 2)

Utility Functions

- Our consumer behavior model assumes that consumers can compare bundles of goods and take the one with the greatest satisfaction.
- If we knew the **utility function**—the relationship between utility measures and every possible bundle of goods—we could summarize the information in indifference maps succinctly. Lisa's utility function $U(B, Z) = \sqrt{B Z}$
- Utility functions do not exist in any fundamental sense.
 - If you ask your mother what her utility function is, she would be puzzled. However, she could easily answer: “Do you want one scoop of ice cream with two pieces of cake or two scoops of ice cream with one piece of cake?” Also, she may not know how much more she prefers one bundle to the other.

Ordinal and Cardinal Utility

- **Ordinal utility** if we know only a consumer's relative rankings of bundles.
- **Cardinal utility** if we know absolute numerical comparisons.
- Most of our discussion of consumer choice in this chapter holds if utility has only ordinal properties. We care only about the relative utility or ranking of the two bundles.

4.2 Utility (2 of 2)

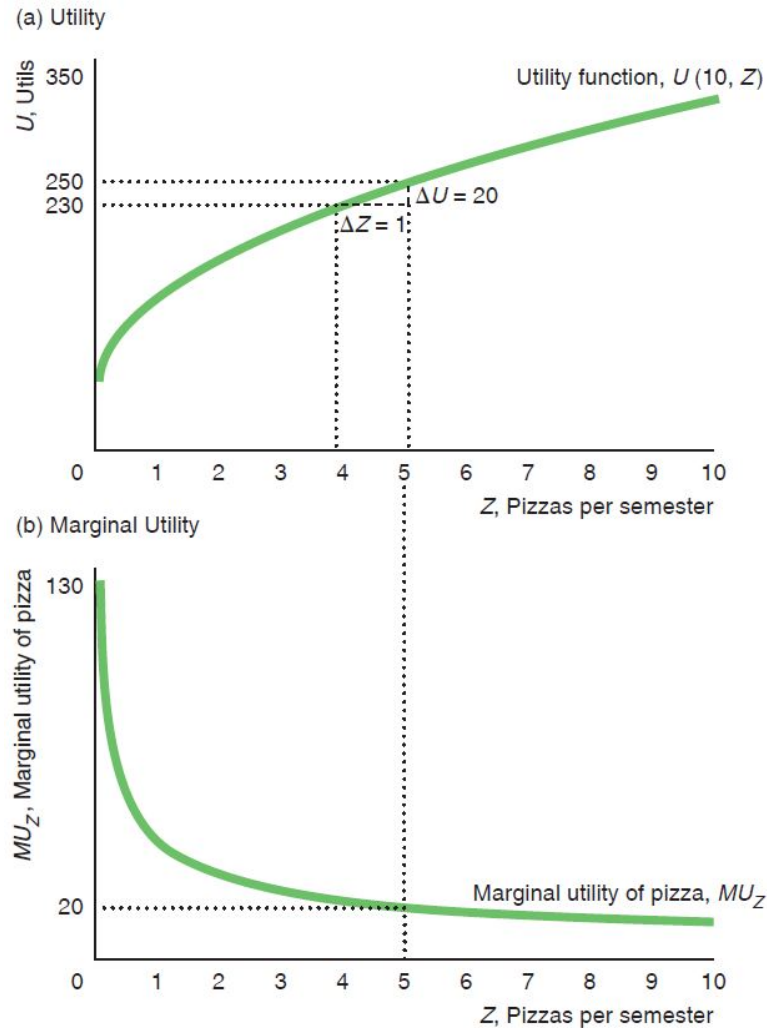
Marginal Utility (MU)

- Marginal utility is the slope of the utility function as we hold the quantity of the other good constant, $MU_Z = \Delta U / \Delta Z$.
 - Given Lisa's utility function $U(B,Z) = U(10,Z)$, Lisa's marginal utility from increasing her consumption of pizza from 4 to 5 in Figure 4.5 is $MU_Z = \Delta U / \Delta Z = 20 / 1 = 20$.
 - **Using calculus:** If $U(B,Z)$, then $MU_Z = \partial U(B,Z) / \partial Z$.

Marginal Rates of Substitution (MRS)

- The **MRS** depends on the negative of the ratio of the marginal utility of one good to the marginal utility of another good.
 - Lisa's **MRS** depends on the negative of the ratio of the *MU* of pizza to the *MU* of burritos, $MRS = -MU_Z / MU_B$.

Figure 4.5 Utility and Marginal Utility



4.3 The Budget Constraint (1 of 3)

- Consumers maximize their well-being subject to constraints, and the most important is the **budget constraint**.
 - The **budget constraint** or **budget line** shows the bundles of goods that can be bought if the entire budget is spent on those goods at given prices.
 - In Figure 4.6, Lisa's budget constraint is $p_B B + p_Z Z = Y$, where $p_B B$ and $p_Z Z$ are the amounts she spends on burritos and pizzas.
 - How many burritos can Liza buy?

$$B = \frac{Y}{p_B} - \frac{p_Z}{p_B} Z$$

Lisa can afford to buy more burritos B only if her income Y increases, the prices of burritos and pizza (p_B, p_Z) falls, or she buys fewer pizzas Z .

- In Figure 4.6, $p_B = \$2$, $p_Z = \$1$, $Y = \$50$. So, $B = 25 - \frac{1}{2} Z$.

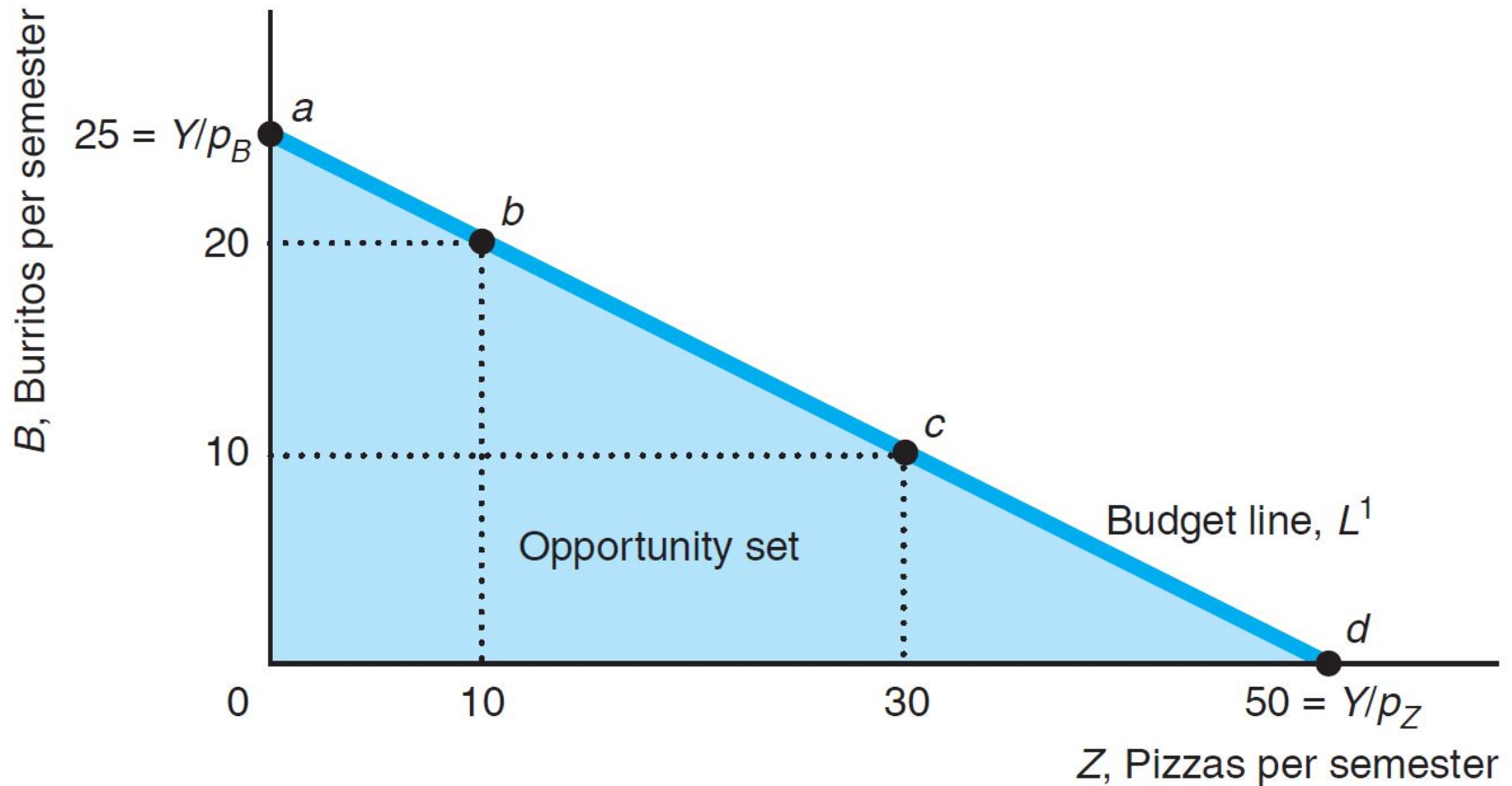
4.3 The Budget Constraint (2 of 3)

- The **opportunity set** is all the bundles a consumer can buy, including all the bundles inside the budget constraint and on the budget constraint.
 - In Figure 4.6, the opportunity set is all those bundles of positive Z and B such that $p_B B + p_Z Z \leq Y$.

Slope of the Budget Line

- It is determined by the relative prices of the two goods and is called the **marginal rate of transformation** ($\text{MRT} = -p_Z / p_B$).
 - In Figure 4.6, Lisa's $\text{MRT} = -1/2$. She can “trade” an extra pizza for half a burrito or give up two pizzas to obtain an extra burrito.
- **Using calculus**, If $B = \frac{Y}{p_B} - \frac{p_Z}{p_B} Z$, then $\text{MRT} = dB / dZ = -p_Z / p_B$.

Figure 4.6 The Budget Line



4.3 The Budget Constraint (3 of 3)

Effects of a Change in Price on the Opportunity Set

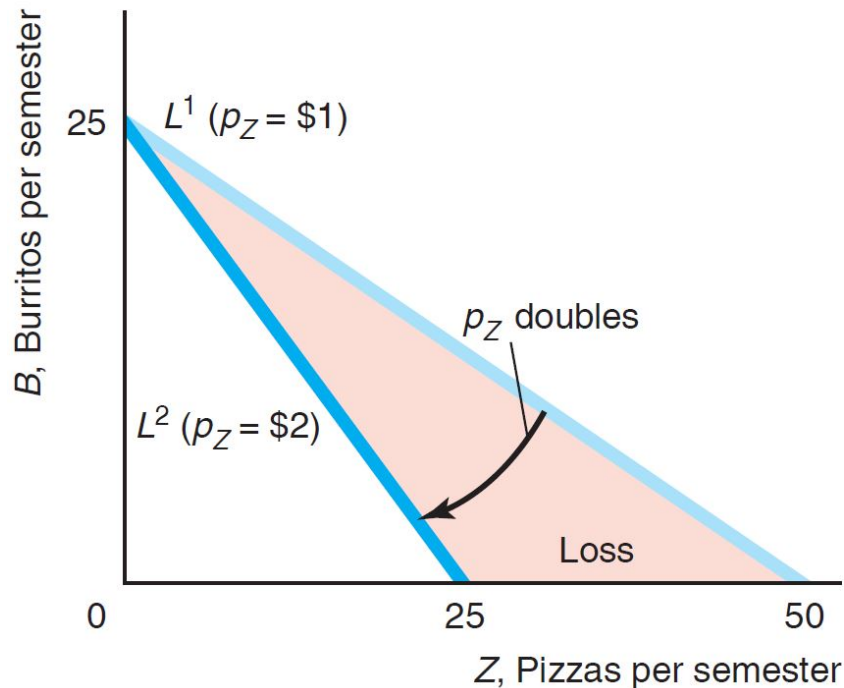
- If the price of pizza doubles but the price of burritos is unchanged, the budget line swings in toward the origin (Figure 4.7a).
- The new budget line is steeper and lies inside the original one. Unless Lisa only wants to eat burritos, she is unambiguously worse off, she can no longer afford the combinations of pizza and burritos in the shaded “Loss” area.

Effects of a Change in Income on the Opportunity Set

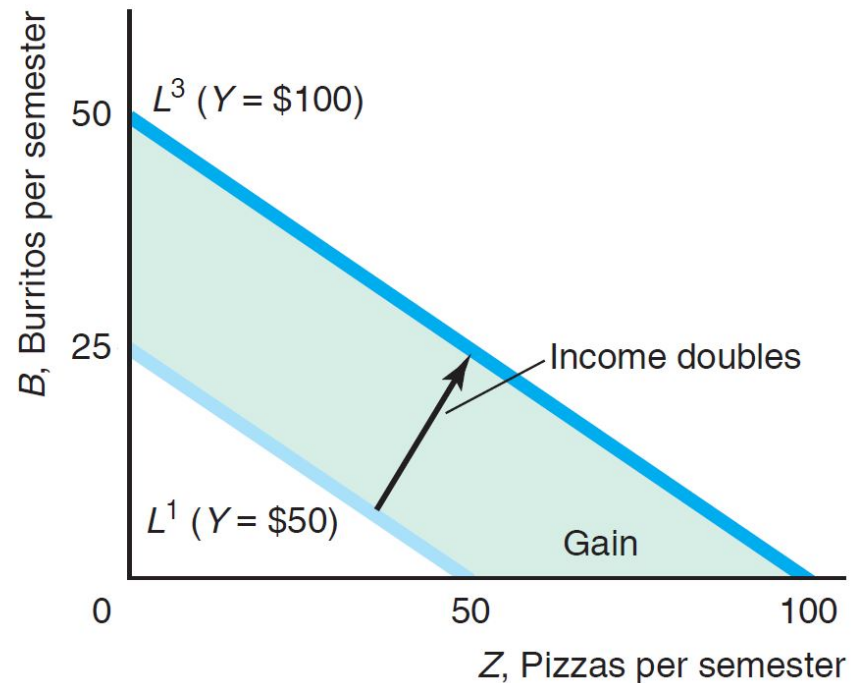
- If the consumer's income increases, the consumer can buy more of all goods.
- A change in income affects only the position and not the slope of the budget line.
- If Lisa's income increases and relative prices do not change, her budget line shifts outward (away from the origin) and is parallel to the original constraint (Figure 4.7b)

Figure 4.7 Changes in the Budget Line

(a) Price of Pizza Doubles



(b) Income Doubles



4.4 Constrained Consumer Choice (1 of 4)

The Consumer's Optimal Bundle

- The optimal bundle must lie on an indifference curve that touches the budget line but does not cross it.
 - So, **MRS = MRT**
 - For the case of Lisa that only consumes pizza Z and burritos B , **MRS = MRT** becomes $-MU_Z / MU_B = -p_Z / p_B$.
 - Rearranging terms, $MU_Z / p_Z = MU_B / p_B$.

In words, the marginal utility per dollar spent on pizza is equal to the marginal utility per dollar spent on burritos.

- Thus, Lisa maximizes her utility if the last dollar she spends on pizza gets her as much extra utility as the last dollar she spends on burritos. If the last dollar spent on pizza gave Lisa more extra utility than the last dollar spent on burritos, Lisa could increase her happiness by spending more on pizza and less on burritos.

4.4 Constrained Consumer Choice (2 of 4)

- There are two ways to reach an optimal bundle, **interior** and **corner** solutions.

Interior Solutions

- An **interior solution** occurs when the optimal bundle has positive quantities of both goods and lies between the ends of the budget line.
 - In Figure 4.8, bundle e with 30 pizzas and 10 burritos per semester is on indifference curve I^2 . It is an optimum interior solution.

Corner Solutions

- A **corner solution** occurs when the optimal bundle is at one end of the budget line, where the budget line forms a corner with one of the axes.
 - In Figure 4.9, bundle e with 0 pizzas and 25 burritos per semester is on indifference curve I^2 . It is an optimum corner solution.

Figure 4.8 Consumer Maximization, Interior Solution

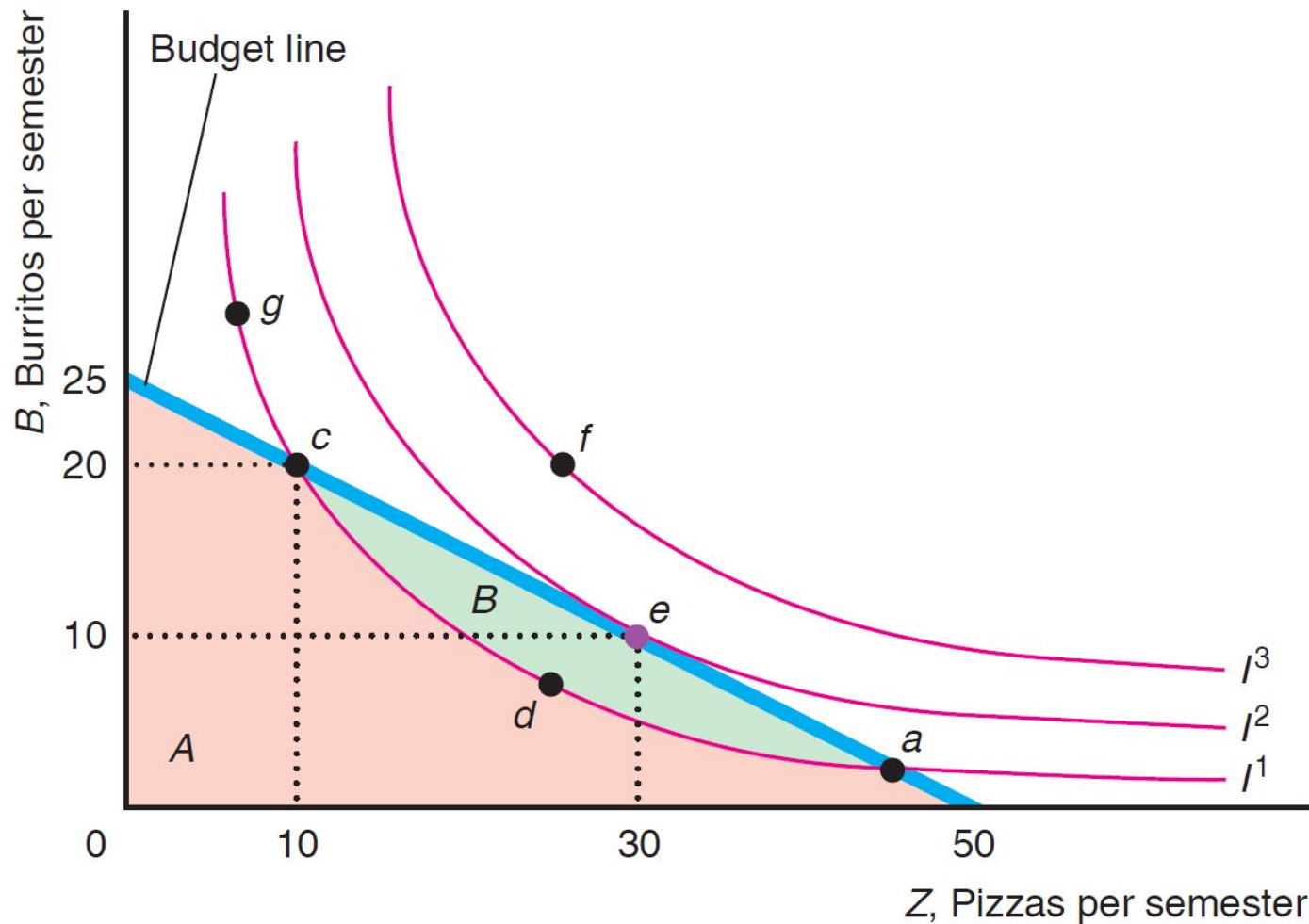
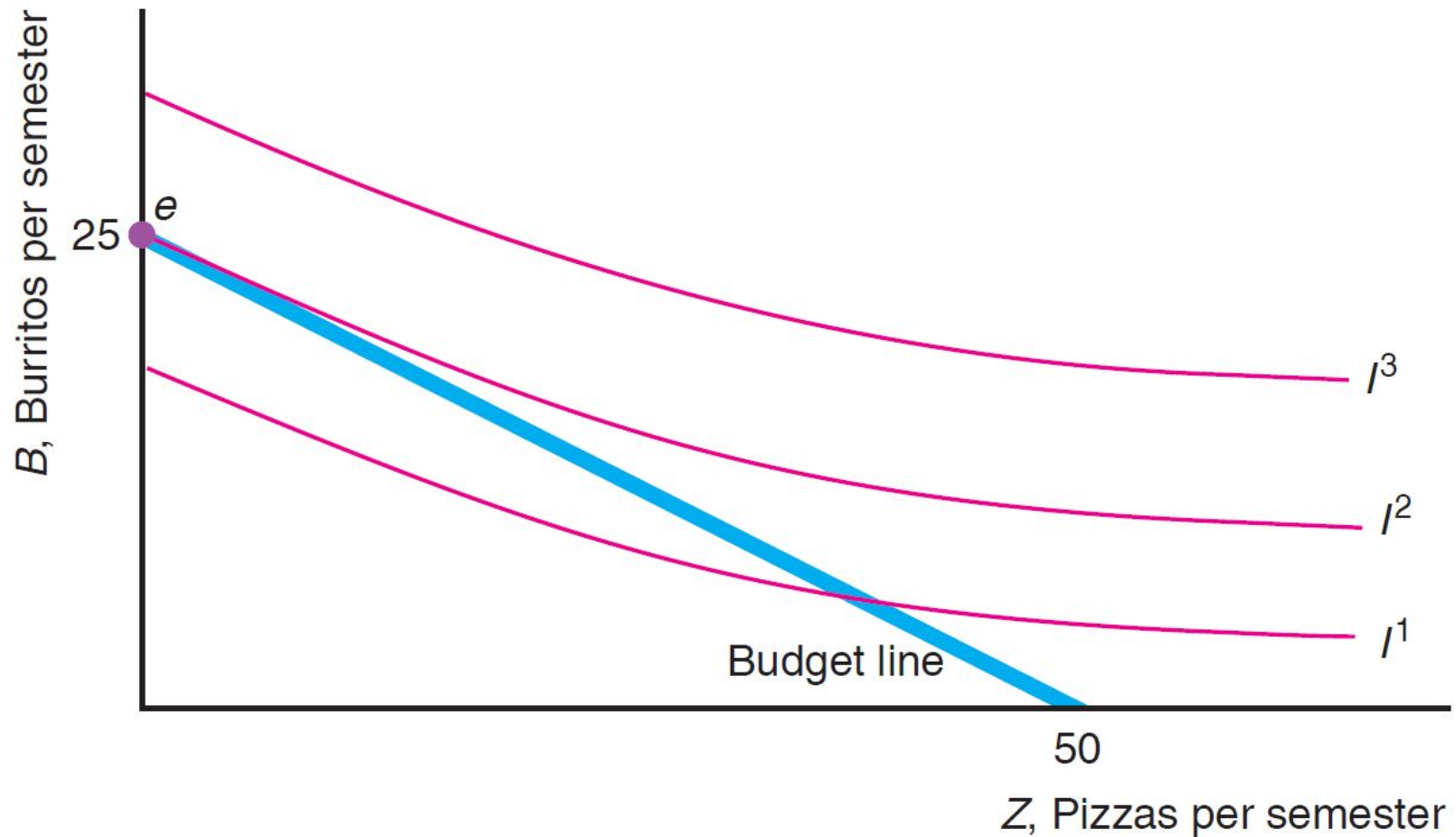


Figure 4.9 Consumer Maximization, Corner Solution



4.4 Constrained Consumer Choice (3 of 4)

Promotions

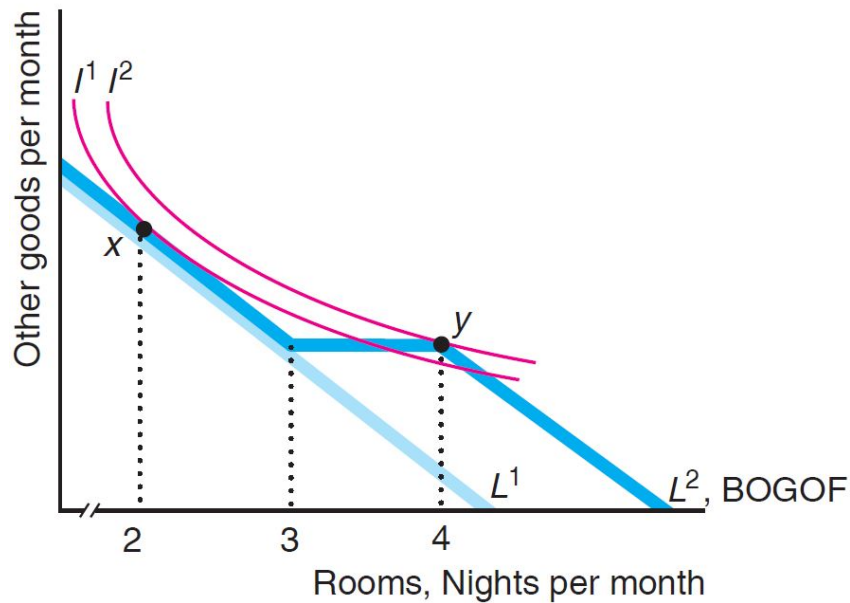
- Managers induce consumers to buy more units with promotions. The two most used are **buy one, get one free (BOGO)** and **buy one, get the second at a half price**.

Buy One, Get One Free (BOGO)

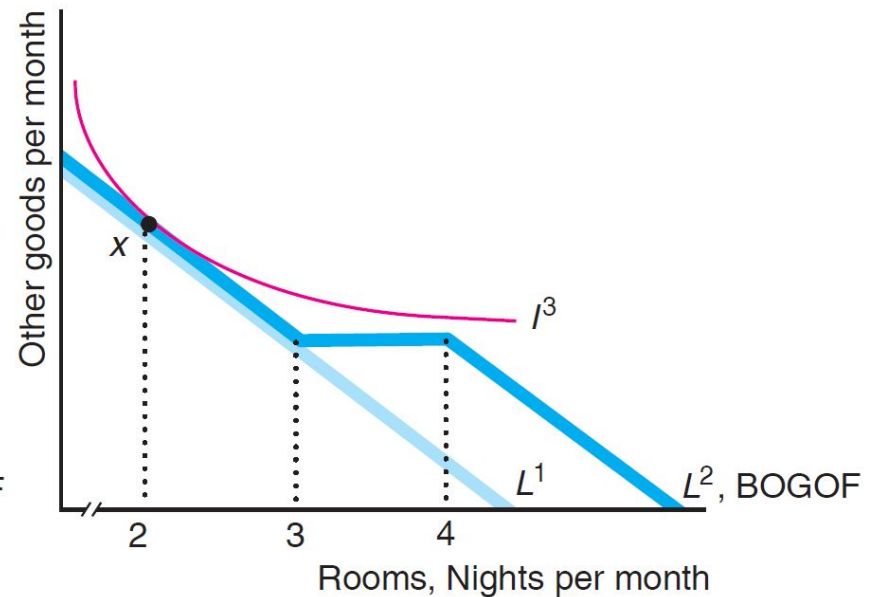
- The BOGO promotion creates a kink in the budget line and its acceptance depends on the shape of the indifference curves.
 - In Figure 4.10, with the BOGO promotion “buy 3 nights, get the 4th free” the new budget line is L^2 for both Angela and Betty.
 - In panel a, without the promotion, Angela’s indifference curve I^1 is tangent to L^1 at point x, so she chooses to spend two nights at the resort. With the BOGO promotion, her indifference curve I^1 cuts the new budget line L^2 . There’s a higher indifference curve, I^2 , that touches L^2 at point y, where she chooses to stay four nights.
 - In panel b, without the promotion, Betty chooses to stay two nights at x where her indifference curve I^3 is tangent to L^1 . Because I^3 does not cut the new budget line L^2 , no higher indifference curve can touch L^2 , so Betty stays only two nights, at x, and does not take advantage of the BOGO promotion.

Figure 4.10 BOGO Promotions

(a) Angela



(b) Betty



4.4 Constrained Consumer Choice (4 of 4)

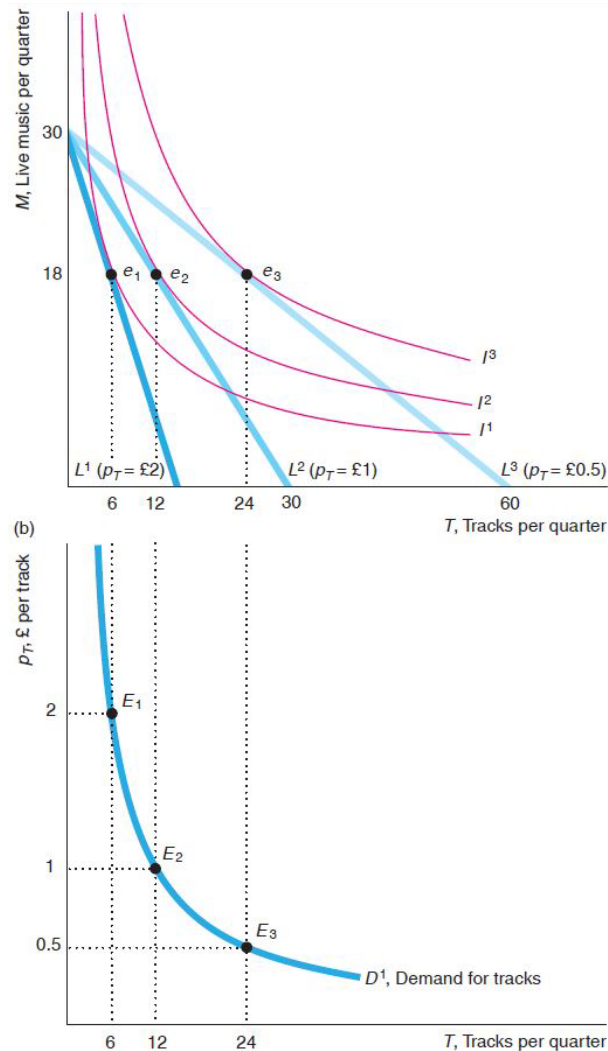
Managerial Implication: Designing Promotions

- When deciding whether to use a BOGO promotion, a manager should compare the benefit to the cost.
 - For example, offering such a promotion is more likely to raise the hotel's profit if it has excess capacity, so that the cost of providing a room for an extra night's stay is very low.
- To design an effective promotion, a manager should use experiments to learn about customers' preferences.
 - For example, a manager could offer each promotion for a short period and keep track of how many customers respond to each promotion, how many nights they choose to stay, and by how much the promotion increases the firm's profit.

4.5 Deriving Demand Curves

- We use consumer theory to show how much the quantity demanded of a good falls as its price rises.
- An individual chooses an optimal bundle of goods by picking the point on the highest indifference curve that touches the budget line.
 - In panel a of Figure 4.11, e_1 is the highest indifference curve that touches L^1 .
- A change in price causes the budget line to rotate, so that the consumer chooses a new optimal bundle.
 - In panel a of Figure 4.11, a price change from £2 to £1 makes the budget line to rotate from L^1 to L^2 . The new optimal bundle is e_2 .
- By varying one price and holding other prices and income constant, we determine how the quantity demanded changes as the price changes, which is the information we need to draw the demand curve.
 - In panel b of Figure 4.11, E_1 , E_2 , and E_3 are the points of the demand curve derived from price changes, budget lines, and indifference curves in panel a.

Figure 4.11 Deriving an Individual's Demand Curve



4.6 Behavioral Economics (1 of 3)

- So far, we have assumed that consumers are rational, maximizing individuals.
- Behavioral economics adds insights from psychology and empirical research on human cognitive and emotional biases to the rational economic model to better predict economic decision making.
 - We discuss three applications of behavioral economics: tests of transitivity, endowment effects, and salience.

Tests of Transitivity

- It is appropriate to assume that adults exhibit transitivity for most economic decisions. But, it is not appropriate for children or when novel goods are introduced.
 - Some argue that children need some form of protection because they lack of transitivity to maximize their well-being.

4.6 Behavioral Economics (2 of 3)

Endowment Effects

- People place a higher value on a good if they own it than they do if they are considering buying it.
 - One implication of the endowment effect is that consumer's behavior may differ depending on how a choice is posed.
 - However, the common belief (**common confusion**) is that people respond the same way to equivalent questions.

Salience

- People are more likely to consider information if it is presented in a way that grabs their attention or if it takes relatively little thought or calculation to understand.
 - If tax requires calculations, buyers may just ignore it because of costly calculations (bounded rationality).

4.6 Behavioral Economics (3 of 3)

Managerial Implication: Simplifying Consumer Choices

- Today's consumers often feel overwhelmed by choices, for instance, hundreds of channels in Cable TV subscriptions. Because consumers have bounded rationality, most dislike considering all the possibilities and making decisions. At the end, many consumers do not buy these services just to avoid this problem.
- Good managers can make decision making easier for consumers. They may offer default bundles so consumers don't have to make difficult decisions.
 - For example, Cable TV companies package groups of channels by content, sports, or movie packages. Rather than thinking through each option, the customer can make a much easier decision, such as “I like sports” or “I like movies,” and is more likely to make a purchase.

Managerial Solution

Paying Employees to Relocate

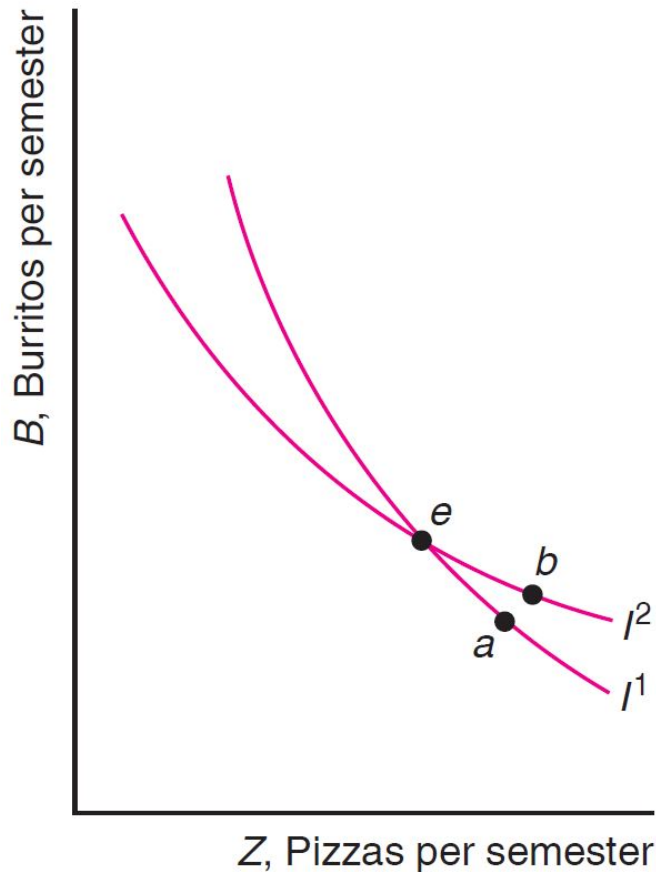
- How can a manager use consumer theory to optimally compensate employees who are transferred to other cities?

Solution

- Managers collect information about the cost of living in various cities. They know that it is more expensive to buy the same bundle of goods in one city than another and that relative prices differ across cities.
- Typical relocation: Alex's firm wants to transfer him from Seattle to London, where he will face different prices and cost of living. Alex spends his money on housing and entertainment and gets a bundle s that maximizes his satisfaction in Seattle. The firm offers him enough money to buy bundle s in London.
 - Alex may be better off: entertainment is relatively cheaper in London, but Alex is paid enough to buy bundle s . **So**, he can substitute housing with entertainment and reach a higher indifference curve.
- The firm may offer him less income: There is a lower budget constraint that can put Alex in London at the same indifference curve as in Seattle with less income than the previous solution.

Figure 4.2 Impossible Indifference Curves

(a) Crossing



(b) Upward Sloping

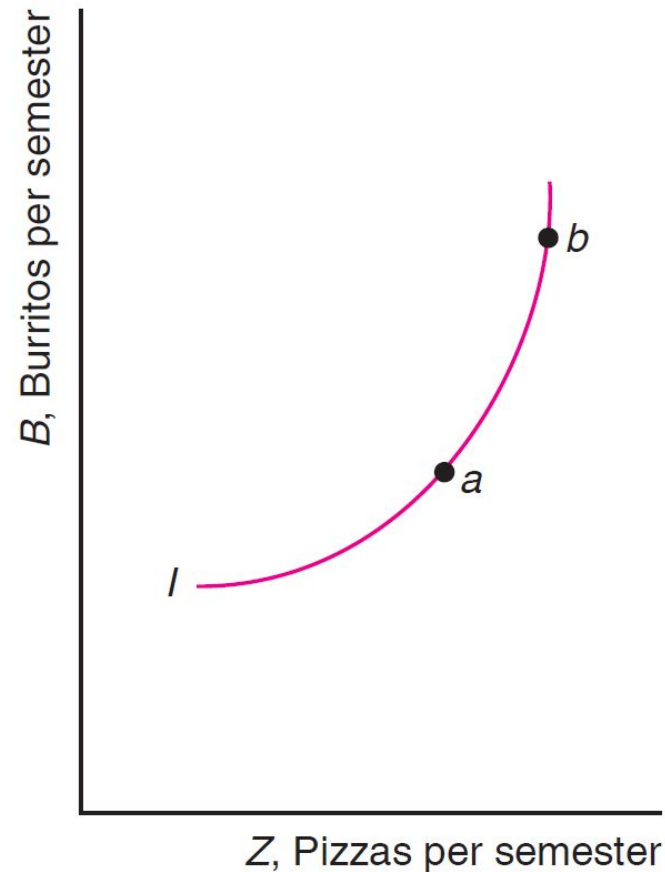


Table 4.1 Allocations of a \$50 Budget Between Burritos and Pizza

Bundle	Burritos, \$2 each	Pizza, \$1 each
<i>a</i>	25	0
<i>b</i>	20	10
<i>c</i>	10	30
<i>d</i>	0	50

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