

# Chapter 3 Consumer Behavior

Read Pindyck and Rubinfeld (2013), Chapter 3

Microeconomics, 8<sup>th</sup> Edition by  
R.S. Pindyck and D.L. Rubinfeld  
Adapted by Chairat Aemkulwat for  
Econ I: 2900111

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## CHAPTER 3 OUTLINE

- 3.1 Consumer Preferences
- 3.2 Budget Constraints
- 3.3 Consumer Choice
- 3.4 Revealed Preference
- 3.5 Marginal Utility and Consumer Choice

- **theory of consumer behavior** Description of how consumers allocate incomes among different goods and services to maximize their well-being.

Consumer behavior is best understood in three distinct steps:

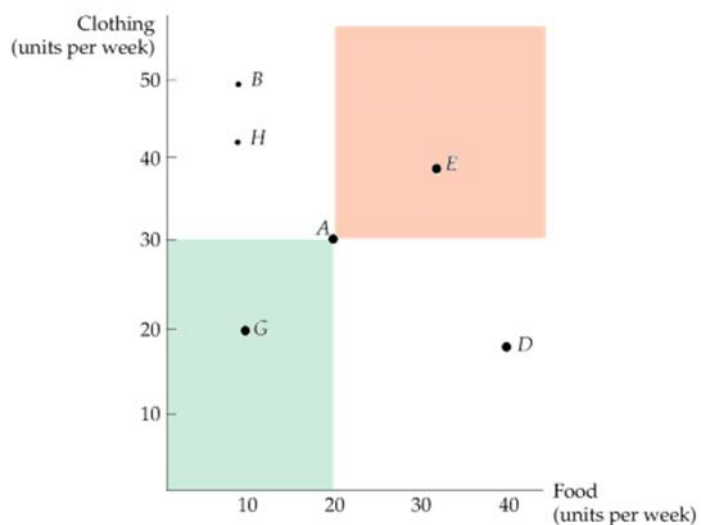
1. Consumer preferences
2. Budget constraints
3. Consumer choices

### 3.1 Consumer Preferences

- **Market Baskets**

- **market basket (or bundle)** List with specific quantities of one or more goods.

TABLE 3.1 ALTERNATIVE MARKET BASKETS		
MARKET BASKET	UNITS OF FOOD	UNITS OF CLOTHING
A	20	30
B	10	50
D	40	20
E	30	40
G	10	20
H	10	40



To explain the theory of consumer behavior, we will ask whether consumers *prefer* one market basket to another.

- **Some Basic Assumptions about Preferences**

**1. Completeness:** Preferences are assumed to be *complete*. In other words, consumers can compare and rank all possible baskets.

- Thus, for any two market baskets  $A$  and  $B$ , a consumer will prefer  $A$  to  $B$ , will prefer  $B$  to  $A$ , or will be indifferent between the two. By *indifferent* we mean that a person will be equally satisfied with either basket.
- Note that these preferences ignore costs. A consumer might prefer steak to hamburger but buy hamburger because it is cheaper.

- **Some Basic Assumptions about Preferences**

**2. Transitivity:** Preferences are *transitive*. Transitivity means that if a consumer prefers basket  $A$  to basket  $B$  and basket  $B$  to basket  $C$ , then the consumer also prefers  $A$  to  $C$ . Transitivity is normally regarded as necessary for consumer consistency.

**3. More is better than less:** Goods are assumed to be desirable—i.e., to be *good*. Consequently, *consumers always prefer more of any good to less*. In addition, consumers are never satisfied or satiated; *more is always better, even if just a little better*.

- This assumption is made for pedagogic reasons; namely, it simplifies the graphical analysis. Of course, some goods, such as air pollution, may be undesirable, and consumers will always prefer less. We ignore these “bads” in the context of our immediate discussion.

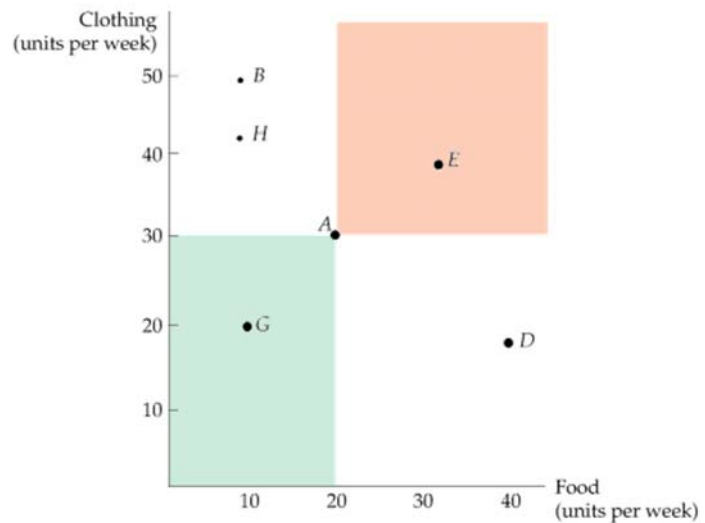
- Indifference curves

Figure 3.1

#### Describing Individual Preferences

Because more of each good is preferred to less, we can compare market baskets in the shaded areas. Basket *A* is clearly preferred to basket *G*, while *E* is clearly preferred to *A*.

However, *A* cannot be compared with *B*, *D*, or *H* without additional information.



- Indifference curves

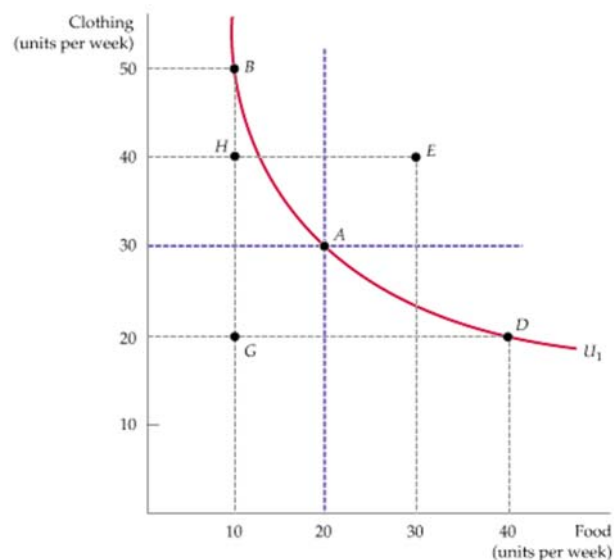
- **indifference curve** Curve representing all combinations of market baskets that provide a consumer with the same level of satisfaction.

Figure 3.2

#### An Indifference Curve

The indifference curve  $U_1$  that passes through market basket *A* shows all baskets that give the consumer the same level of satisfaction as does market basket *A*; these include baskets *B* and *D*.

Our consumer prefers basket *E*, which lies above  $U_1$ , to *A*, but prefers *A* to *H* or *G*, which lie below  $U_1$ .



- **Indifference Maps**

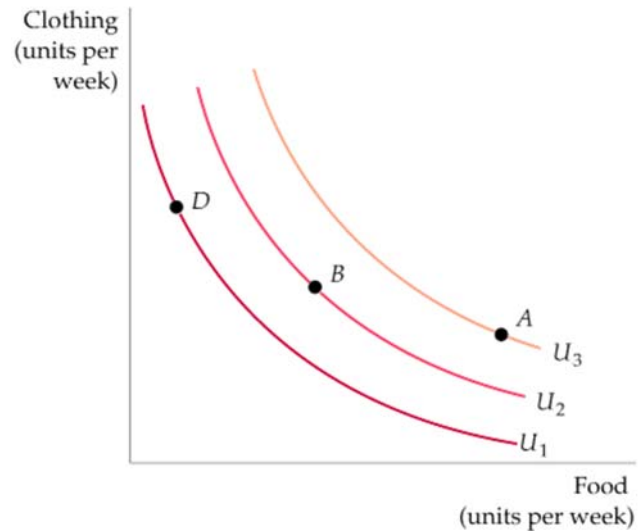
- **indifference map** Graph containing a set of indifference curves showing the market baskets among which a consumer is indifferent.

Figure 3.3

#### An Indifference Map

An indifference map is a set of indifference curves that describes a person's preferences.

Any market basket on indifference curve  $U_3$ , such as basket  $A$ , is preferred to any basket on curve  $U_2$  (e.g., basket  $B$ ), which in turn is preferred to any basket on  $U_1$ , such as  $D$ .



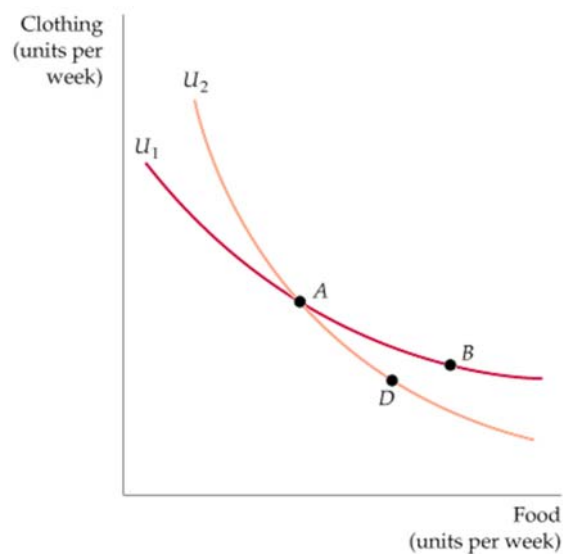
- **Indifference Maps**

Figure 3.4

#### Indifference Curves Cannot Intersect

If indifference curves  $U_1$  and  $U_2$  intersect, one of the assumptions of consumer theory is violated.

According to this diagram, the consumer should be indifferent among market baskets  $A$ ,  $B$ , and  $D$ . Yet  $B$  should be preferred to  $D$  because  $B$  has more of both goods



### •The Marginal Rate of Substitution

- **marginal rate of substitution** Maximum amount of a good that a consumer is willing to give up in order to obtain one additional unit of another good.

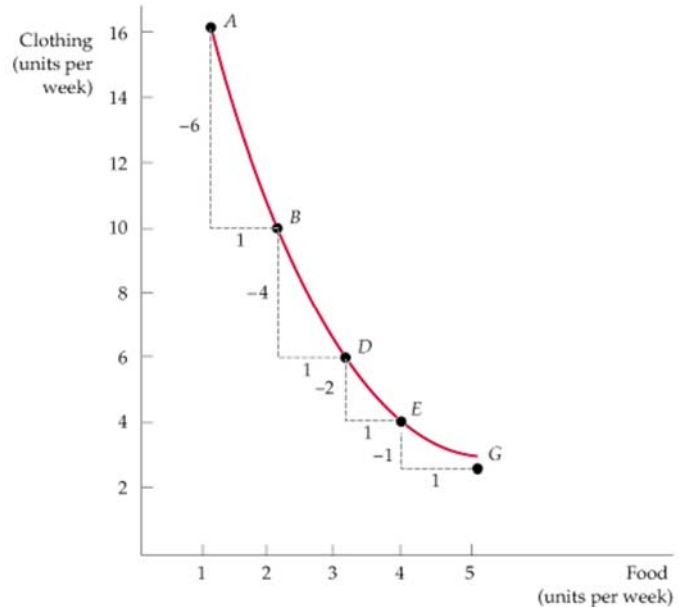
Figure 3.5

#### The Marginal Rate of Substitution

The magnitude of the slope of an indifference curve measures the consumer's marginal rate of substitution (MRS) between two goods.

In this figure, the MRS between clothing ( $C$ ) and food ( $F$ ) falls from 6 (between  $A$  and  $B$ ) to 4 (between  $B$  and  $D$ ) to 2 (between  $D$  and  $E$ ) to 1 (between  $E$  and  $G$ ).

Observe that the MRS falls as we move down the indifference curve



### •The Marginal Rate of Substitution

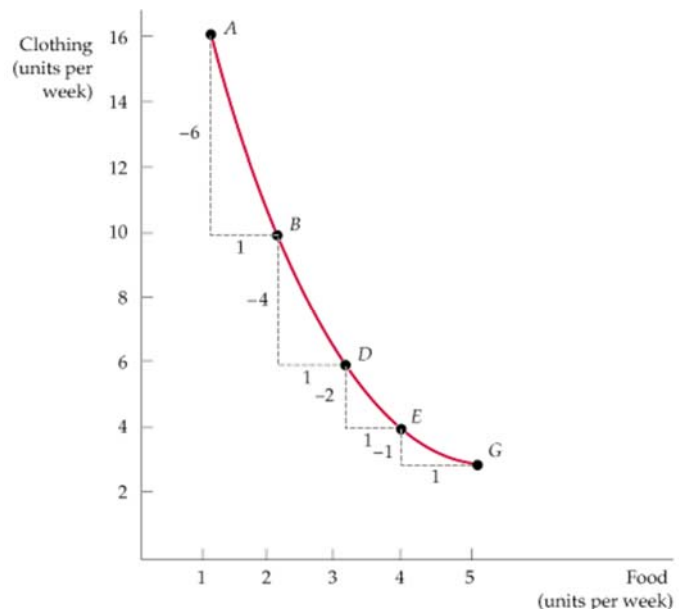
#### 4. Diminishing marginal rate of substitution:

The decline in the MRS reflects our fourth assumption regarding consumer preferences: a **diminishing marginal rate of substitution**

#### CONVEXITY

When the MRS diminishes along an indifference curve, the curve is convex.

The term *convex* means that the slope of the indifference increases (i.e., less negative) as we move down the curve.



- **Perfect Substitutes and Perfect Complements**

- **perfect substitutes** Two goods for which the marginal rate of substitution of one for the other is a constant.
- **perfect complements** Two goods for which the MRS is zero or infinite; the indifference curves are shaped as right angles.

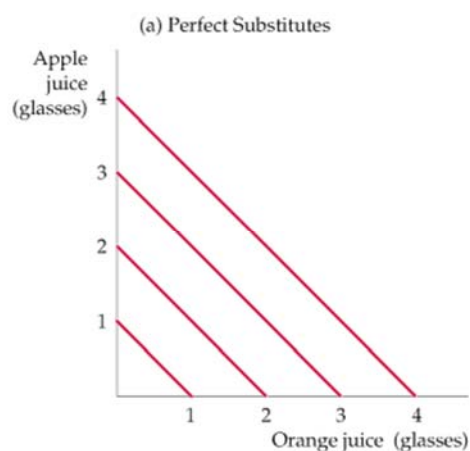
### Bads

- **bad** Good for which less is preferred rather than more.

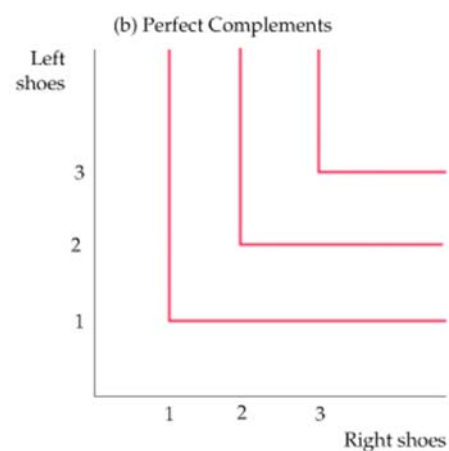
- **Perfect Substitutes and Perfect Complements**

Figure 3.6

#### Perfect Substitutes and Perfect Complements



In (a), Bob views orange juice and apple juice as perfect substitutes: He is always indifferent between a glass of one and a glass of the other.



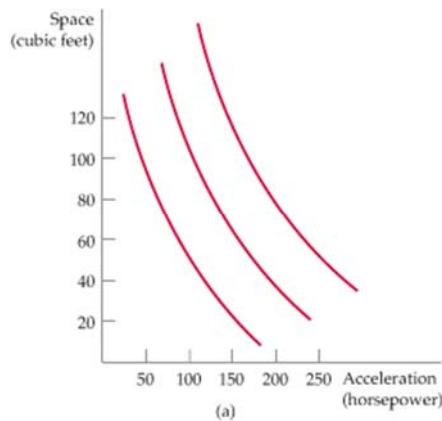
In (b), Jane views left shoes and right shoes as perfect complements: An additional left shoe gives her no extra satisfaction unless she also obtains the matching right shoe.

## EXAMPLE 3.1 DESIGNING NEW AUTOMOBILES (I)

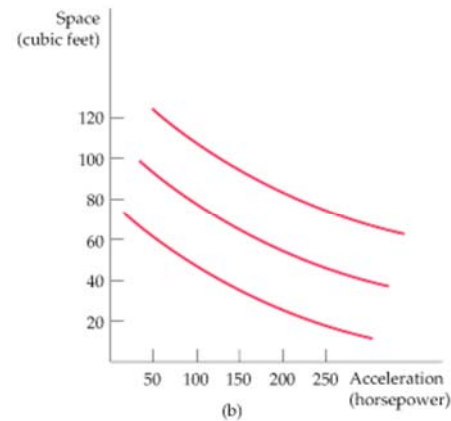
Preferences for automobile attributes can be described by indifference curves. Each curve shows the combination of acceleration and interior space that give the same satisfaction.



**FIGURE 3.7**  
**PREFERENCES FOR AUTOMOBILE ATTRIBUTES**



Owners of Ford Mustang coupes (a) are willing to give up considerable interior space for additional acceleration.



The opposite is true for owners of Ford Explorers. They prefer interior space to acceleration (b).

### 3.1

### CONSUMER PREFERENCES

#### • Utility and Utility Functions

- **utility** Numerical score representing the satisfaction that a consumer gets from a given market basket.
- **utility function** Formula that assigns a level of utility to individual market baskets.  $u(F,C) = FC$

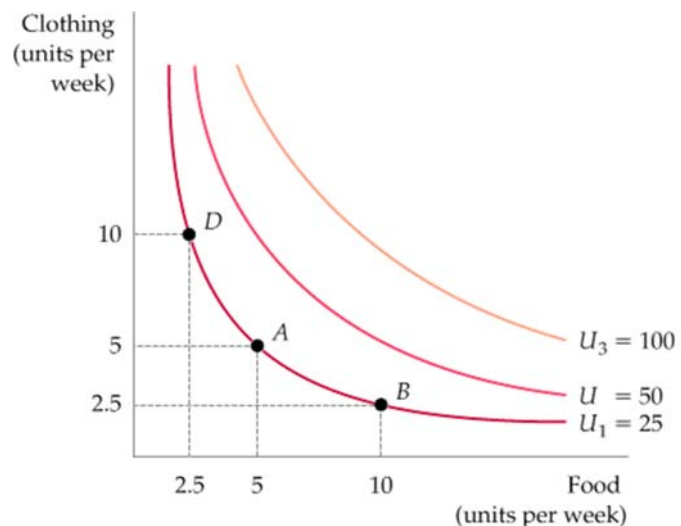
Figure 3.8

#### Utility Functions and Indifference Curves

A utility function can be represented by a set of indifference curves, each with a numerical indicator.

This figure shows three indifference curves (with utility levels of 25, 50, and 100, respectively) associated with the utility function:

$$u(F,C) = FC$$





- **ORDINAL VERSUS CARDINAL UTILITY**

- **ordinal utility function** Utility function that generates a ranking of market baskets in order of most to least preferred.

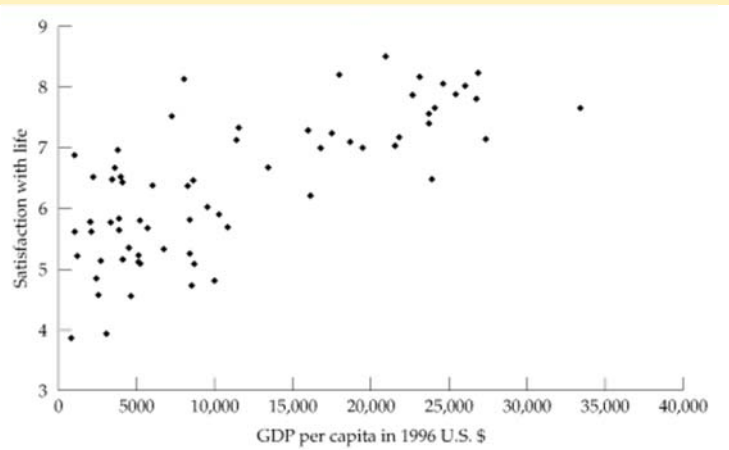
- **cardinal utility function** Utility function describing by how much one market basket is preferred to another.

### EXAMPLE 3.2 CAN MONEY BUY HAPPINESS?

**FIGURE 3.9**

**INCOME AND HAPPINESS**

A cross-country comparison shows that individuals living in countries with higher GDP per capita are on average happier than those living in countries with lower per-capita GDP.



2. Draw indifference curves that represent the following individuals' preferences for hamburgers and soft drinks. Indicate the direction in which the individuals' satisfaction (or utility) is increasing.

- Joe has *convex* preferences and dislikes both hamburgers and soft drinks.
- Jane loves hamburgers and dislikes soft drinks. If she is served a soft drink, she will pour it down the drain rather than drink it.
- Bob loves hamburgers and dislikes soft drinks. If he is served a soft drink, he will drink it to be polite.
- Molly loves hamburgers and soft drinks, but insists on consuming exactly one soft drink for every two hamburgers that she eats.
- Bill likes hamburgers, but neither likes nor dislikes soft drinks.
- Mary always gets twice as much satisfaction from an extra hamburger as she does from an extra soft drink.

## 3.2

## Budget Constraints

- **budget constraints** Constraints that consumers face as a result of limited incomes.

- **The Budget Line**

- **budget line** All combinations of goods for which the total amount of money spent is equal to income.

$$P_F F + P_C C = I \quad (3.1)$$

TABLE 3.2 MARKET BASKETS AND THE BUDGET LINE			
MARKET BASKET	FOOD (F)	CLOTHING (C)	TOTAL SPENDING
A	0	40	\$80
B	20	30	\$80
D	40	20	\$80
E	60	10	\$80
G	80	0	\$80

Market baskets associated with the budget line  $F + 2C = \$80$

## 3.2

## BUDGET CONSTRAINTS

- **The Budget Line**

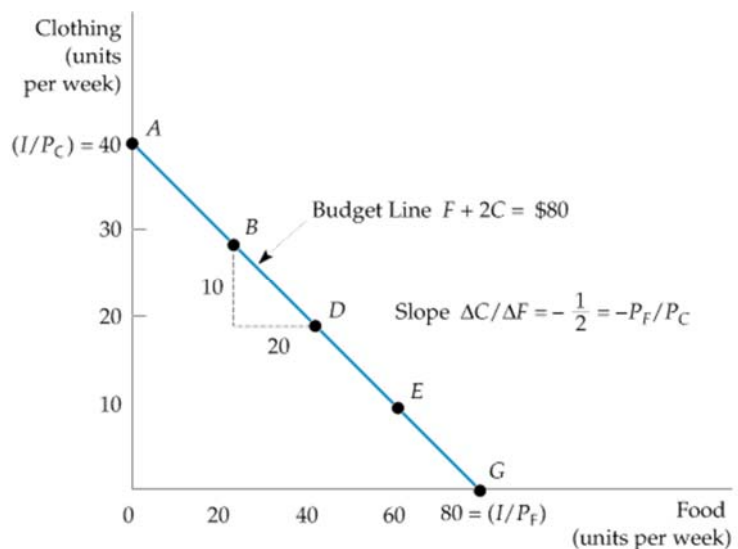
Figure 3.10

### A Budget Line

A budget line describes the combinations of goods that can be purchased given the consumer's income and the prices of the goods.

Line AG (which passes through points B, D, and E) shows the budget associated with an income of \$80, a price of food of  $P_F = \$1$  per unit, and a price of clothing of  $P_C = \$2$  per unit.

The slope of the budget line (measured between points B and D) is  $-P_F/P_C = -10/20 = -1/2$ .



- The Effects of Changes in Income and Prices

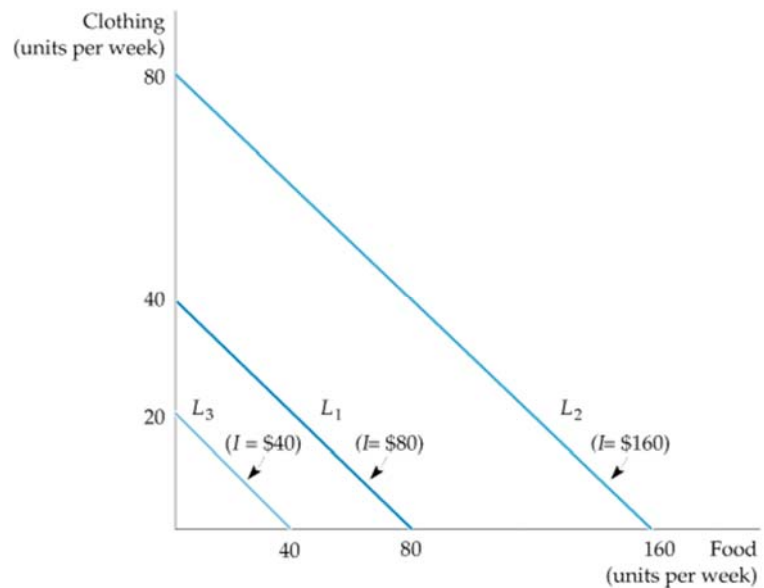
Figure 3.11

**Effects of a Change in Income on the Budget Line**

**Income changes** A change in income (with prices unchanged) causes the budget line to shift parallel to the original line ( $L_1$ ).

When the income of \$80 (on  $L_1$ ) is increased to \$160, the budget line shifts outward to  $L_2$ .

If the income falls to \$40, the line shifts inward to  $L_3$ .



- The Effects of Changes in Income and Prices

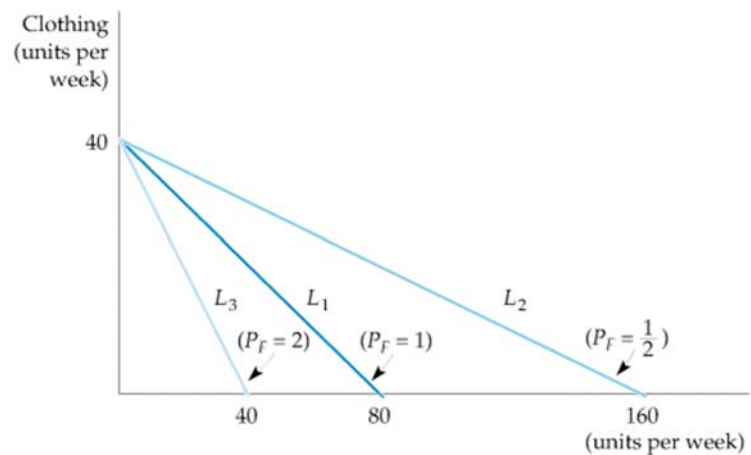
Figure 3.12

**Effects of a Change in Price on the Budget Line**

**Price changes** A change in the price of one good (with income unchanged) causes the budget line to rotate about one intercept.

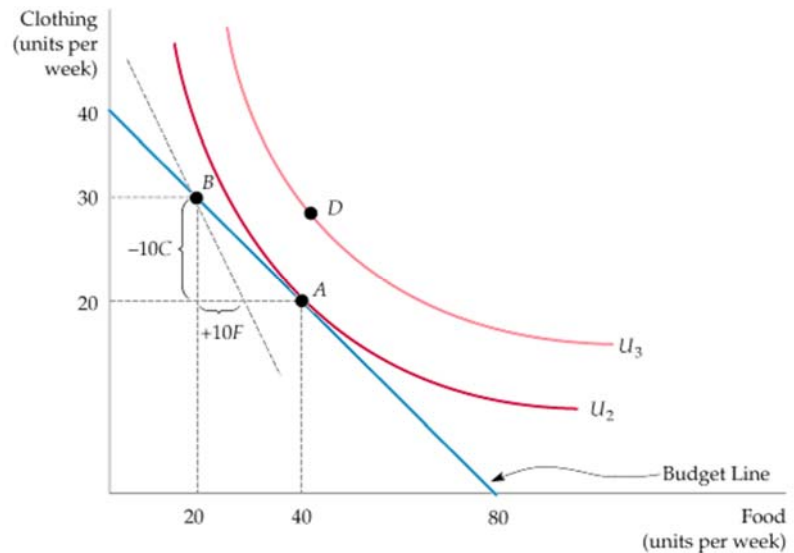
When the price of food falls from \$1.00 to \$0.50, the budget line rotates outward from  $L_1$  to  $L_2$ .

However, when the price increases from \$1.00 to \$2.00, the line rotates inward from  $L_1$  to  $L_3$ .



The maximizing market basket must satisfy two conditions:

1. *It must be located on the budget line.*
2. *It must give the consumer the most preferred combination of goods and services.*



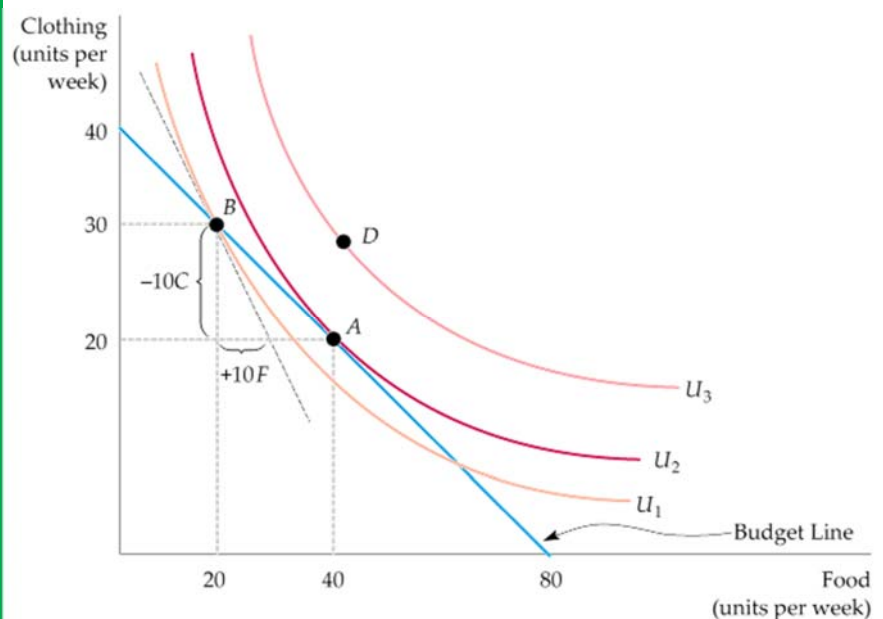
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### FIGURE 3.13 MAXIMIZING CONSUMER SATISFACTION

A consumer maximizes satisfaction by choosing market basket A. At this point, the budget line and indifference curve  $U_2$  are tangent.

No higher level of satisfaction (e.g., market basket D) can be attained.

At A, the point of maximization, the MRS between the two goods equals the price ratio. At B, however, because the MRS [ $-(-10/10) = 1$ ] is greater than the price ratio ( $1/2$ ), satisfaction is not maximized.



Satisfaction is maximized (given the budget constraint) at the point where  $MRS = P_F/P_C$ .

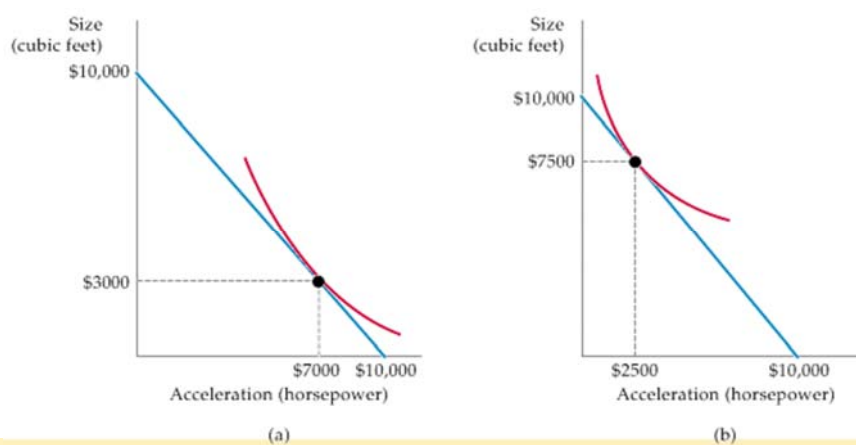
- **marginal benefit** Benefit from the consumption of one additional unit of a good.
- **marginal cost** Cost of one additional unit of a good.

Using these definitions, we can then say that satisfaction is maximized when the **marginal benefit**—the benefit associated with the consumption of one additional unit of food—is equal to the **marginal cost**—the cost of the additional unit of food. The marginal benefit is measured by the MRS.

### EXAMPLE 3.3 DESIGNING NEW AUTOMOBILES (II)



Different preferences of consumer groups for automobiles can affect their purchasing decisions. Following up on Example 3.1, we consider two groups of consumers planning to buy new cars.



**FIGURE 3.14**  
**CONSUMER CHOICE OF AUTOMOBILE ATTRIBUTES**

The consumers in (a) are willing to trade off a considerable amount of interior space for some additional acceleration.

Given a budget constraint, they will choose a car that emphasizes acceleration. The opposite is true for consumers in (b).

- **Corner Solutions**

- **corner solution** Situation in which the marginal rate of substitution for one good in a chosen market basket is not equal to the slope of the budget line.

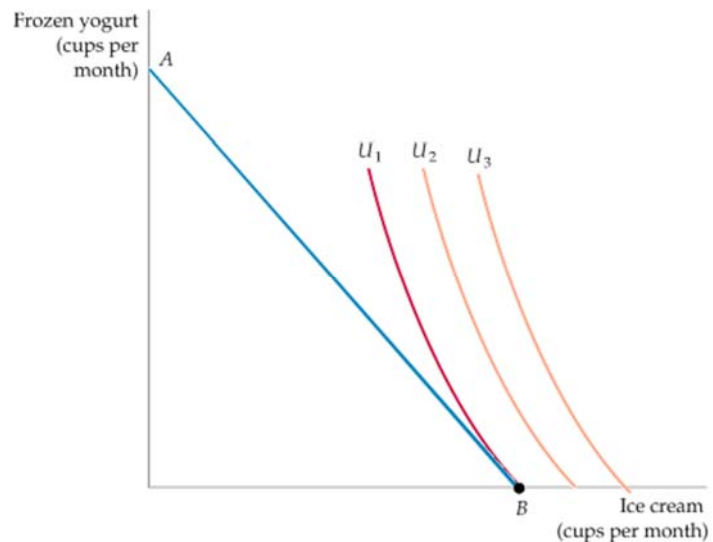
Figure 3.15

#### A Corner Solution

When a corner solution arises, the consumer maximizes satisfaction by consuming only one of the two goods.

Given budget line  $AB$ , the highest level of satisfaction is achieved at  $B$  on indifference curve  $U_1$ , where the MRS (of ice cream for frozen yogurt) is greater than the ratio of the price of ice cream to the price of frozen yogurt.

$$MRS > P_{IC}/P_Y$$



#### EXAMPLE 3.4

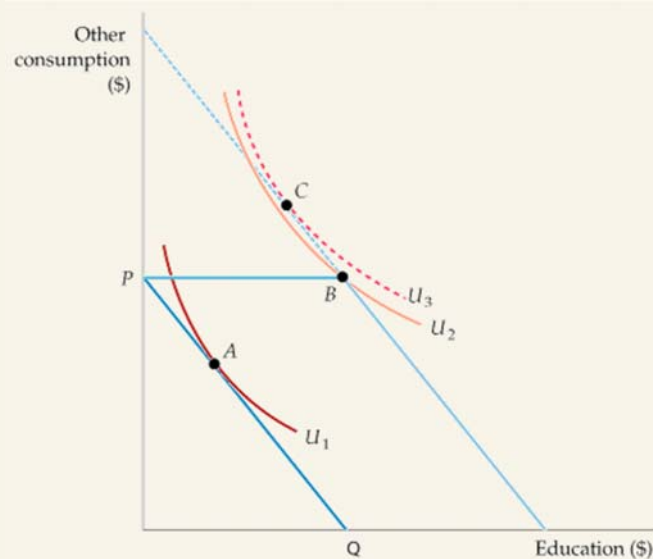
#### A College Trust Fund

Figure 3.16

#### A College Trust Fund

When given a college trust fund that must be spent on education, the student moves from  $A$  to  $B$ , a corner solution.

If, however, the trust fund could be spent on other consumption as well as education, the student would be better off at  $C$ .



15. Jane receives utility from days spent traveling on vacation domestically (D) and days spent traveling on vacation in a foreign country (F), as given by the utility function  $U(D,F) = 10DF$ . In addition, the price of a day spent traveling domestically is \$100, the price of a day spent traveling in a foreign country is \$400, and Jane's annual travel budget is \$4000.

- Illustrate the indifference curve associated with a utility of 800 and the indifference curve associated with a utility of 1200.
- Graph Jane's budget line on the same graph.
- Can Jane afford any of the bundles that give her a utility of 800? What about a utility of 1200?
- Find Jane's utility maximizing choice of days spent traveling domestically and days spent in a foreign country.

- Illustrate the indifference curve associated with a utility of 800 and the indifference curve associated with a utility of 1200.

$$U(D,F) = 10DF$$

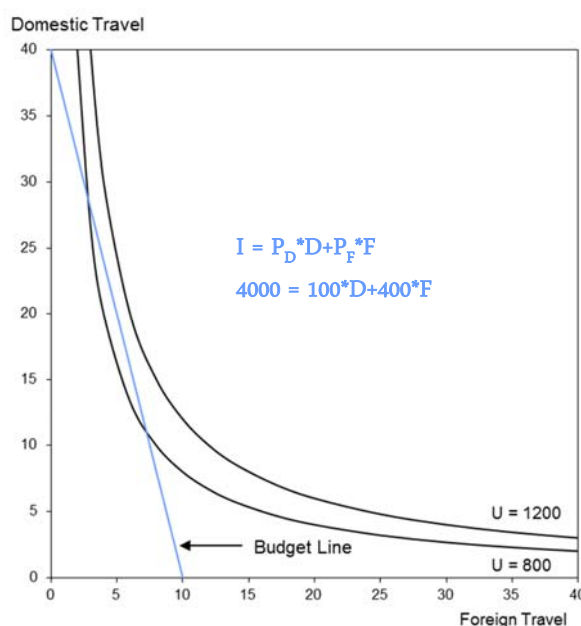
$$800 = 10 \cdot 30 \cdot 2.67$$

$$800 = 10 \cdot 5 \cdot 16$$

$$U(D,F) = 10DF$$

$$1200 = 10 \cdot 30 \cdot 4$$

$$1200 = 10 \cdot 5 \cdot 24$$



In Section 3.3, we saw how preferences given budget constraints, determine choices.

Can this process be reversed?

If we know the choices that a consumer has made, can we determine his or her preferences.

The basic idea is simple.

*If a consumer chooses one market basket over another, and if the chosen market basket is more expensive than the alternative, then the consumer must prefer the chosen market basket.*

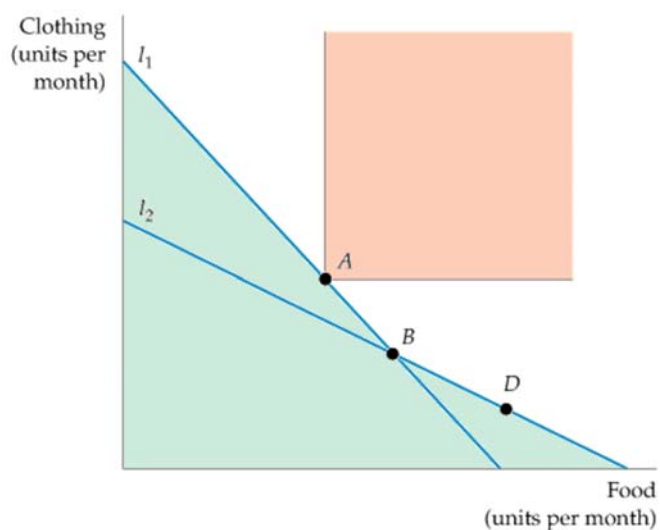
**FIGURE 3.18**

**REVEALED PREFERENCE:  
TWO BUDGET LINES**

If an individual facing budget line  $I_1$  chose market basket  $A$  rather than market basket  $B$ ,  $A$  is revealed to be preferred to  $B$ .

Likewise, the individual facing budget line  $I_2$  chooses market basket  $B$ , which is then revealed to be preferred to market basket  $D$ .

Whereas  $A$  is preferred to all market baskets in the green-shaded area, all baskets in the pink-shaded area are preferred to  $A$ .





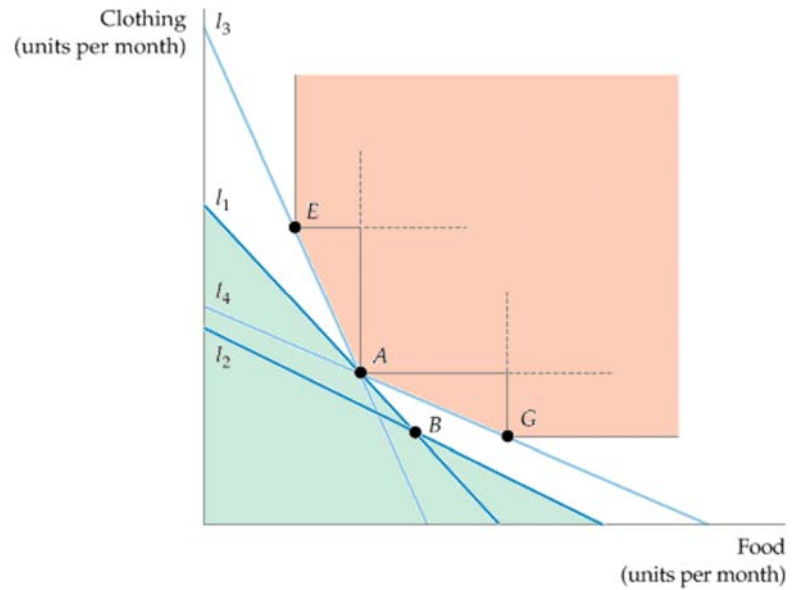
**FIGURE 3.19**

**REVEALED PREFERENCE:  
FOUR BUDGET LINES**

Facing budget line  $I_3$ , the individual chooses  $E$ , which is revealed to be preferred to  $A$  (because  $A$  could have been chosen).

Likewise, facing line  $I_4$ , the individual chooses  $G$ , which is also revealed to be preferred to  $A$ .

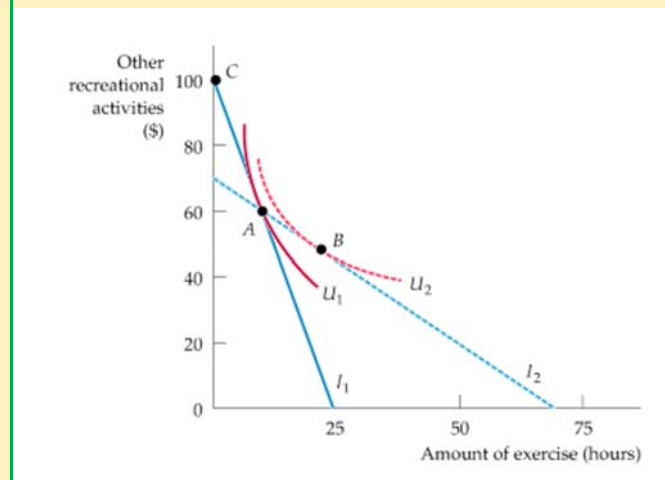
Whereas  $A$  is preferred to all market baskets in the green-shaded area, all market baskets in the pink-shaded area are preferred to  $A$ .



**EXAMPLE 3.6 REVEALED PREFERENCE FOR RECREATION**

**FIGURE 3.20**

**REVEALED PREFERENCE FOR RECREATION**



When facing budget line  $I_1$ , an individual chooses to use a health club for 10 hours per week at point  $A$ .

When the fees are altered, she faces budget line  $I_2$ .

She is then made better off because market basket  $A$  can still be purchased, as can market basket  $B$ , which lies on a higher indifference curve.

## 3.5 Marginal Utility and Consumer Choice

- **marginal utility (MU)** Additional satisfaction obtained from consuming one additional unit of a good.
- **diminishing marginal utility** Principle that as more of a good is consumed, the consumption of additional amounts will yield smaller additions to utility.

$$0 = MU_F(\Delta F) + MU_C(\Delta C)$$

$$-(\Delta C / \Delta F) = MU_F / MU_C$$

$$MRS = MU_F / MU_C \quad (3.5)$$

$$MRS = P_F / P_C \quad (3.6)$$

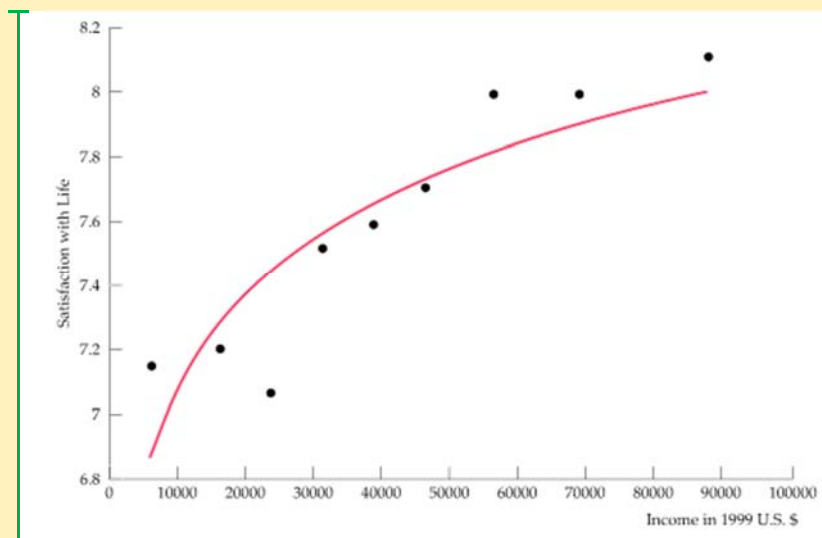
$$MU_F / MU_C = P_F / P_C$$

or 
$$MU_F / P_F = MU_C / P_C \quad (3.7)$$

- **equal marginal principle** Principle that utility is maximized when the consumer has equalized the marginal utility per dollar of expenditure across all goods.

### EXAMPLE 3.7 MARGINAL UTILITY AND HAPPINESS

What, if anything, does research on consumer satisfaction tell us about the relationship between happiness and the concepts of utility and marginal utility?



**FIGURE 3.21**  
**MARGINAL UTILITY AND HAPPINESS**

A comparison of mean levels of satisfaction with life across income classes in the United States shows that happiness increases with income, but at a diminishing rate.

- Rationing

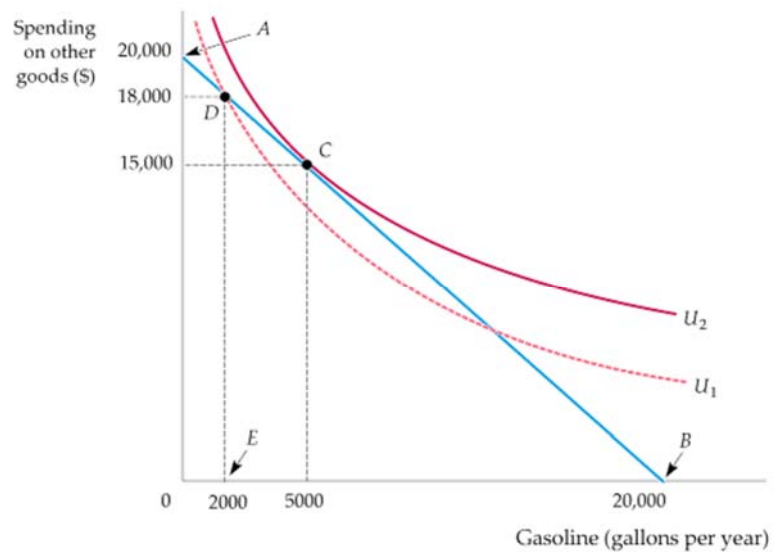
**FIGURE 3.22**  
**INEFFICIENCY OF GASOLINE RATIONING**

When a good is rationed, less is available than consumers would like to buy. Consumers may be worse off.

Without gasoline rationing, up to 20,000 gallons of gasoline are available for consumption (at point *B*).

The consumer chooses point *C* on indifference curve  $U_2$ , consuming 5000 gallons of gasoline.

However, with a limit of 2000 gallons under rationing, the consumer moves to *D* on the lower indifference curve  $U_1$ .

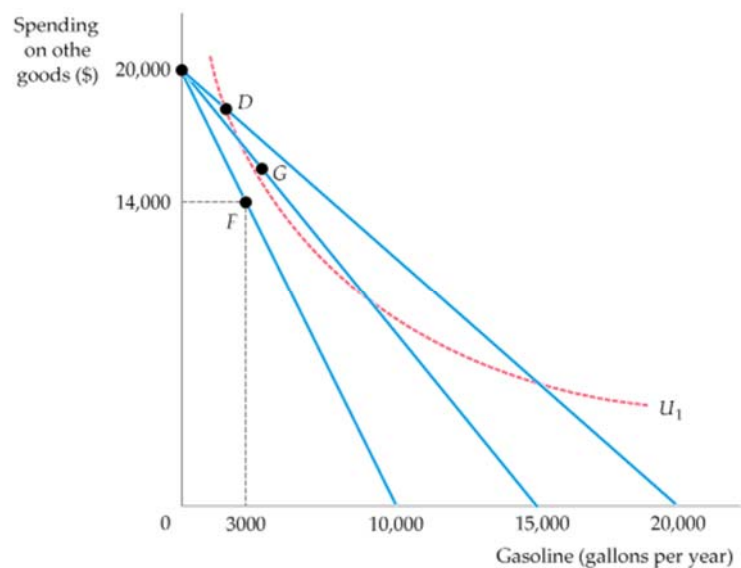


**FIGURE 3.23**  
**COMPARING GASOLINE RATIONING TO THE FREE MARKET**

Some consumers will be worse off, but others may be better off with rationing. With rationing and a gasoline price of \$1.00, she buys the maximum allowable 2000 gallons per year, putting her on indifference curve  $U_1$ .

Had the competitive market price been \$2.00 per gallon with no rationing, she would have chosen point *F*, which lies below indifference curve  $U_1$ .

However, had the price of gasoline been only \$1.33 per gallon, she would have chosen point *G*, which lies above indifference curve  $U_1$ .



**9. Upon merging with the West German economy, East German consumers indicated a preference for Mercedes-Benz automobiles over Volkswagens. However, when they converted their savings into deutsche marks, they flocked to Volkswagen dealerships. How can you explain this apparent paradox?**

**2. Draw indifference curves that represent the following individuals' preferences for hamburgers and soft drinks. Indicate the direction in which the individuals' satisfaction (or utility) is increasing.**

- a) Joe has *convex* preferences and dislikes both hamburgers and soft drinks.
- b) Jane loves hamburgers and dislikes soft drinks. If she is served a soft drink, she will pour it down the drain rather than drink it.
- c) Bob loves hamburgers and dislikes soft drinks. If he is served a soft drink, he will drink it to be polite.
- d) Molly loves hamburgers and soft drinks, but insists on consuming exactly one soft drink for every two hamburgers that she eats.
- e) Bill likes hamburgers, but neither likes nor dislikes soft drinks.
- f) Mary always gets twice as much satisfaction from an extra hamburger as she does from an extra soft drink.

**6. Suppose that Jones and Smith have each decided to allocate \$1000 per year to an entertainment budget in the form of hockey games or rock concerts. They both like hockey games and rock concerts and will choose to consume positive quantities of both goods. However, they differ substantially in their preferences for these two forms of entertainment. Jones prefers hockey games to rock concerts, while Smith prefers rock concerts to hockey games.**

- a) Draw a set of indifference curves for Jones and a second set for Smith.
- b) Using the concept of marginal rate of substitution, explain why the two sets of curves are different from each other.

8. Anne has a job that requires her to travel three out of every four weeks. She has an annual travel budget and can travel either by train or by plane. The airline on which she typically flies has a frequent-traveler program that reduces the cost of her tickets according to the number of miles she has flown in a given year.

When she reaches 25,000 miles, the airline will reduce the price of her tickets by 25 percent for the remainder of the year.

When she reaches 50,000 miles, the airline will reduce the price by 50 percent for the remainder of the year.

Graph Anne's budget line, with train miles on the vertical axis and plane miles on the horizontal axis.

## CHAPTER 3 RECAP

- Consumer Preferences
- Budget Constraints
- Consumer Choice
- Revealed Preference
- Marginal Utility and Consumer Choice