ECON2103 Microeconomics

Chapter 4 Individual and Market Demand

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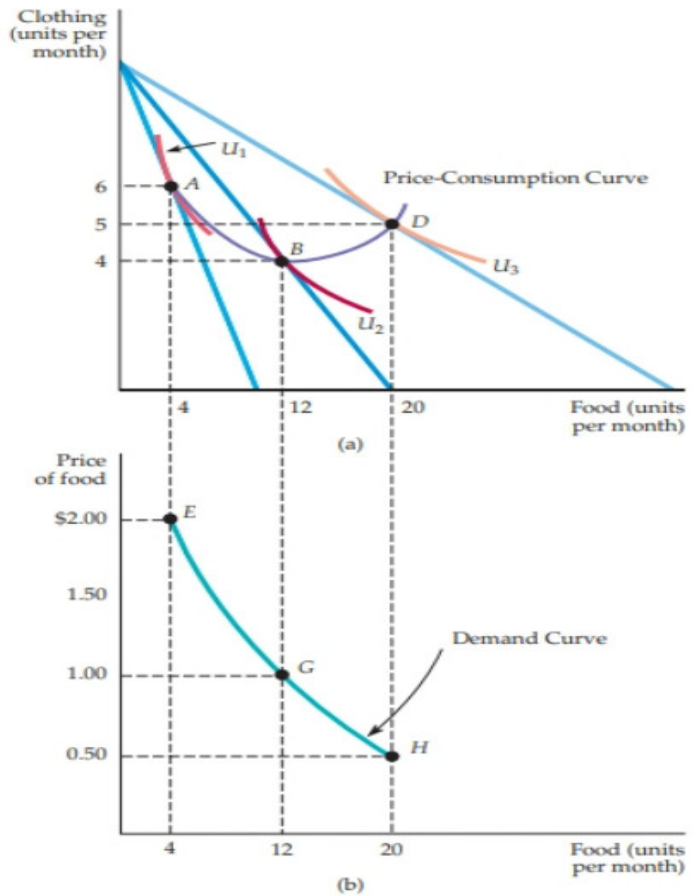
Outline

Price Changes

A reduction in the price of food, with income and the price of clothing fixed, causes the consumer to choose a different market basket.



Individual Demand Curve

price-consumption curve - Curve tracing the utility-maximizing combinations of two goods as the price of one changes.
individual demand curve - Curve relating the quantity of a good that a single consumer will buy to its price.

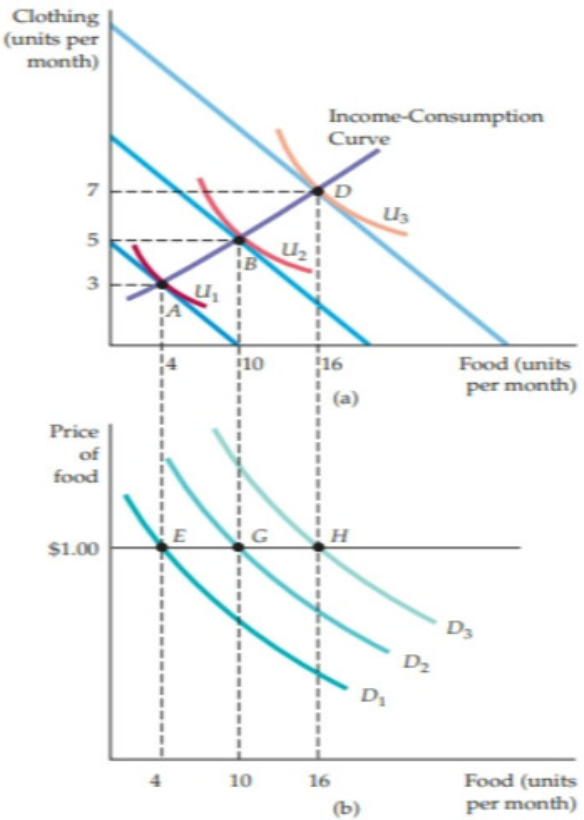
The individual demand curve has two important properties:

1. The level of utility that can be attained changes as we move along the curve.
2. At every point on the demand curve, the consumer is maximizing utility by satisfying the condition that the marginal rate of substitution (MRS) of food for clothing equals the ratio of the prices of food and clothing.

Income Changes

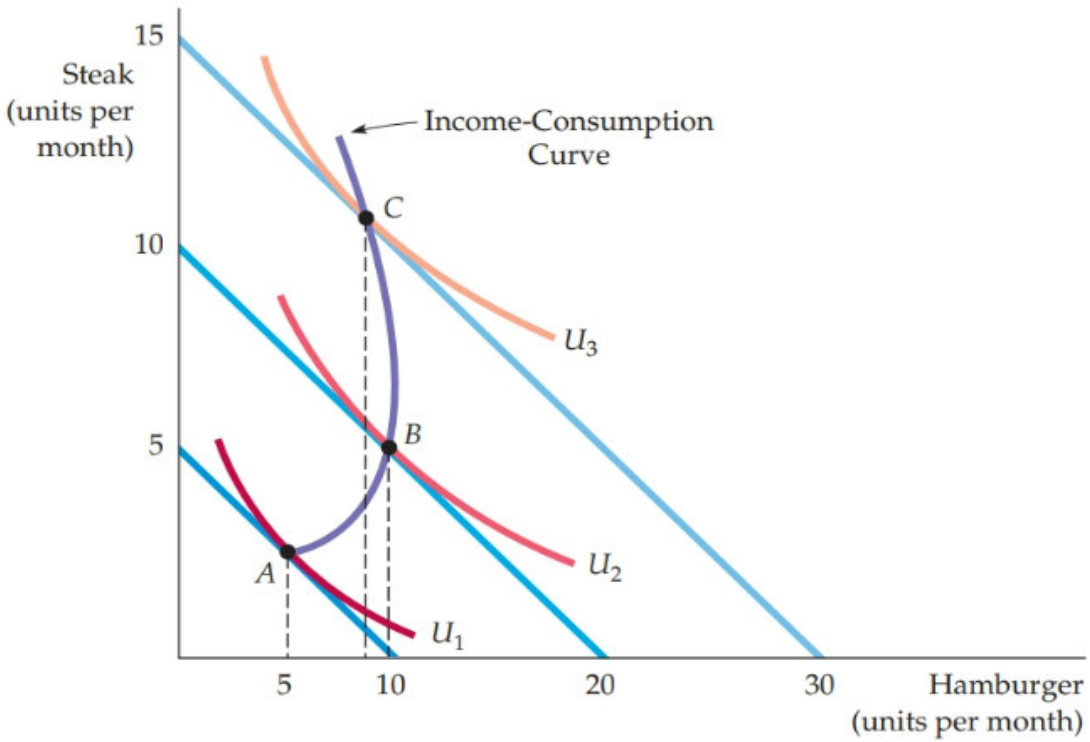
An increase in income, with the prices of all goods fixed, causes consumers to alter their choice of market baskets.

income-consumption curve - Curve tracing the utility-maximizing combinations of two goods as a consumer's income changes.



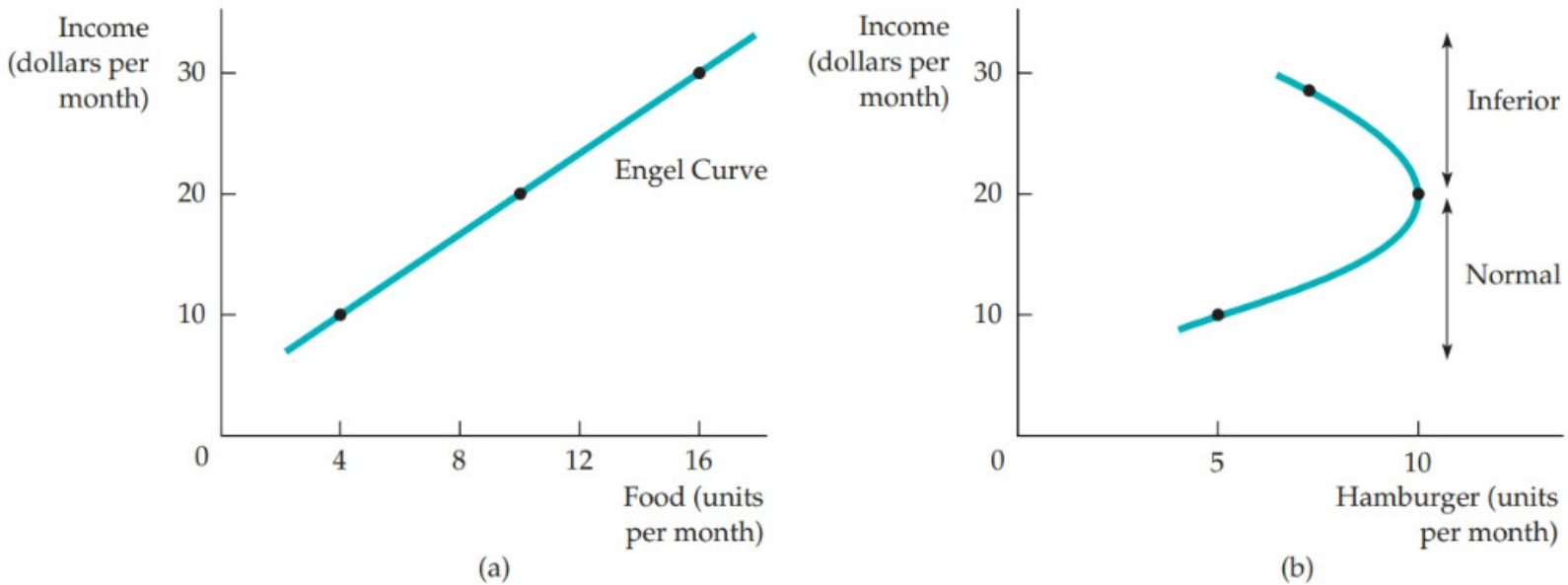
Normal versus Inferior Goods

normal goods: Consumers want to buy more of them as their incomes increase.
inferior goods: Consumption falls when income rises.



Engel Curves

Engel curves - Curve relating the quantity of a good consumed to income.

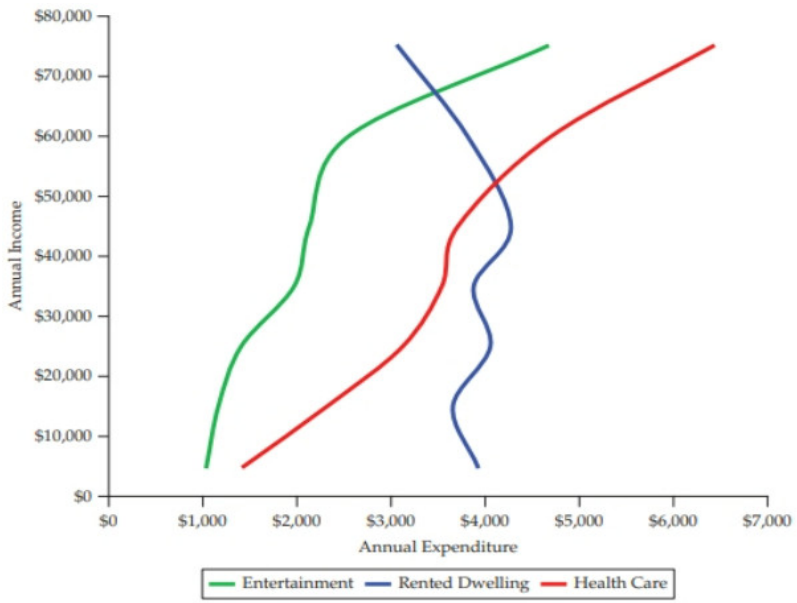


Example: Consumer Expenditures in the US

TABLE 4.1 ANNUAL U.S. HOUSEHOLD CONSUMER EXPENDITURES

	INCOME GROUP						
EXPENDITURES ($) ON:	LESS THAN $10,000	10,000–19,999	20,000–29,999	30,000–39,999	40,000–49,999	50,000–69,999	70,000 AND ABOVE
Entertainment	1,038	1,165	1,407	1,969	2,131	2,548	4,655
Owned Dwelling	1,770	2,134	2,795	3,581	4,198	5,556	11,606
Rented Dwelling	3,919	3,657	4,054	3,878	4,273	3,812	3,072
Health Care	1,434	2,319	3,124	3,539	3,709	4,702	6,417
Food	3,466	3,706	4,432	5,194	5,936	6,486	10,116
Clothing	798	766	960	1,321	1,518	1,602	2,928

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey, Annual Report 2015."



Substitutes and Complements

- Two goods are *substitutes* if an increase in the price of one leads to an increase in the quantity demanded of the other.
- Two goods are *complements* if an increase in the price of one good leads to a decrease in the quantity demanded of the other.
- Two goods are *independent* if a change in the price of one good has no effect on the quantity demanded of the other.

Income and Substitution Effects

A fall in the price of a good has two effects:

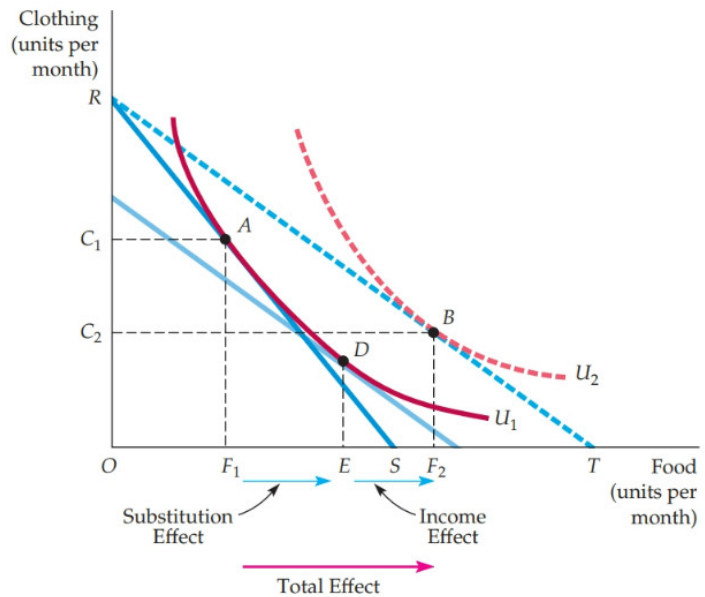
1. Consumers will tend to buy more of the good that has become cheaper and less of those goods that are now relatively more expensive.
   - **substitution effect** - Change in consumption of a good associated with a change in its price, with the level of utility held constant.
2. Because one of the goods is now cheaper, consumers enjoy an increase in real purchasing power.
   - **income effect** - Change in consumption of a good resulting from an increase in purchasing power, with relative prices held constant.

Income and Substitution Effects (Con't)

$$\text{Total Effect}(F_1F_2) = \text{Subsitution Effect}(F_1E) + \text{Income Effect}(EF_2)$$

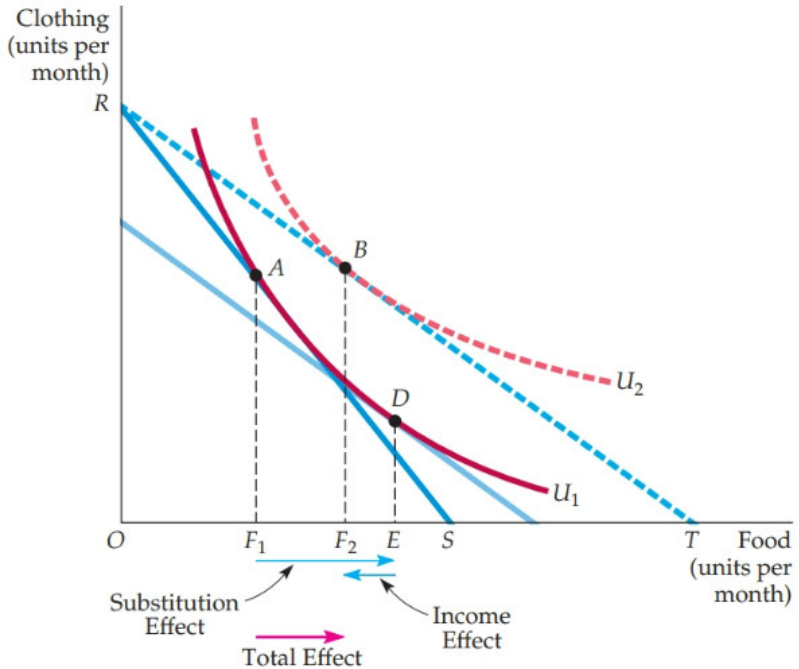
The direction of the substitution effect is always the same. However, the income effect can move demand in either direction, depending on whether the good is normal or inferior.

Income and substitution effects: normal good



Income and Substitution Effects (Con't)

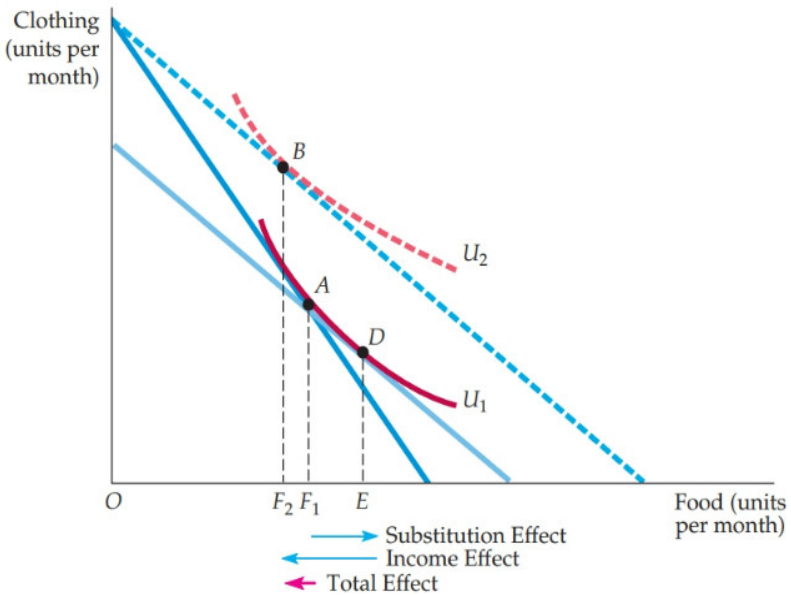
Income and substitution effects: inferior good



However, because the substitution effect exceeds the income effect, the decrease in the price of food leads to an increase in the quantity of food demanded.

A Special Case: The Giffen Good

Giffen good - Good whose demand curve slopes upward because the (negative) income effect is larger than the substitution effect.



When food is an inferior good, and when the income effect is large enough to dominate the substitution effect, the demand curve will be upward-sloping.

Reference: Giffen Good

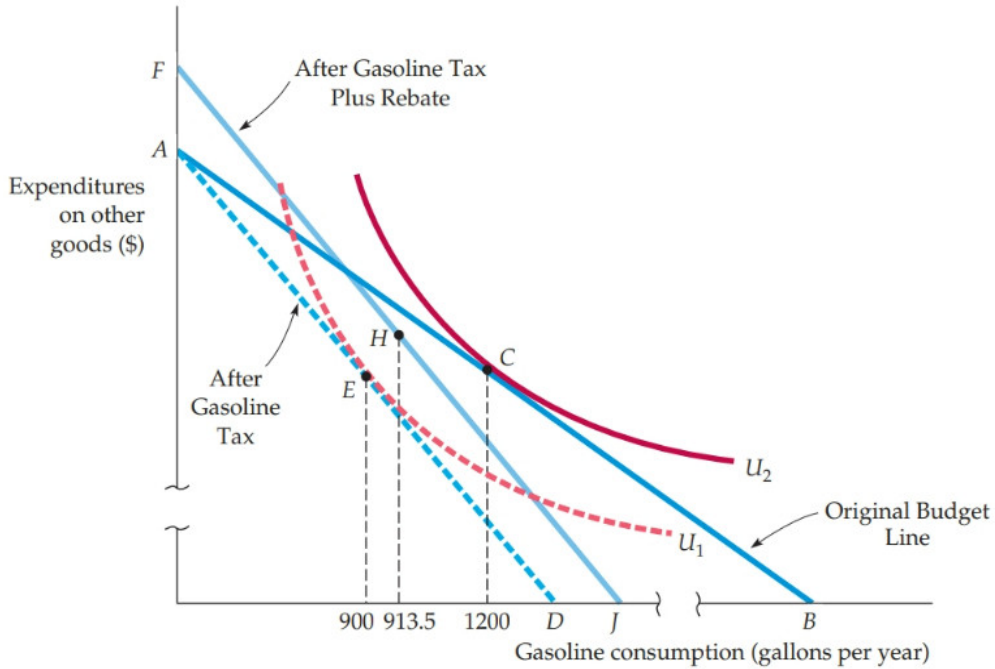
- The term "Giffen goods" was named after noted Scottish economist Sir Robert Giffen, after he noticed, in the poor Victorian era, that the rise in the price of a basic food increased the demand for that particular food.
- The concept of Giffen goods focuses on a low income, non-luxury products that have very few close substitutes.

Example: Effects of a Gasoline Tax

- Price elasticity of demand is -0.5 and income elasticity of demand is 0.3.
- A low-income consumer uses about 1200 gallons of gasoline per year and gasoline costs \$1/gallon.
- Consumer's annual income is \$9000.
- The tax is 50 cents per gallon.
- A rebate program is suggested in which tax revenues would be returned to households on an equal per-capita basis.

What would be the effect of such a program?

Example: Effects of a Gasoline Tax (Con't)



Despite the rebate program, the consumer's gasoline consumption has fallen, as has his level of satisfaction

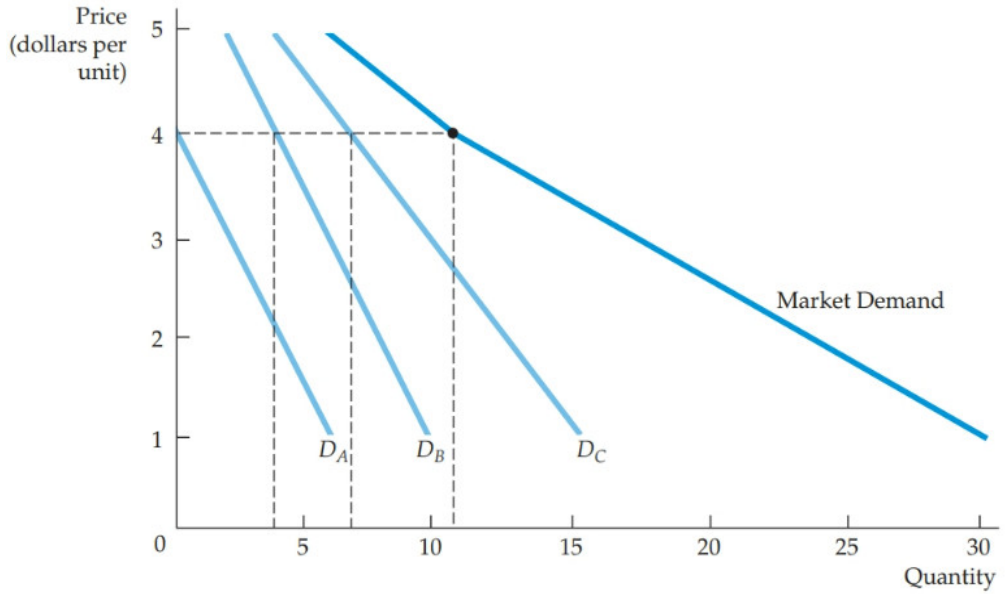
From Individual to Market Demand

market demand curve - Curve relating the quantity of a good that all consumers in a market will buy to its price.

TABLE 4.2 DETERMINING THE MARKET DEMAND CURVE

(1) PRICE ($)	(2) INDIVIDUAL A (UNITS)	(3) INDIVIDUAL B (UNITS)	(4) INDIVIDUAL C (UNITS)	(5) MARKET (UNITS)
1	6	10	16	32
2	4	8	13	25
3	2	6	10	18
4	0	4	7	11
5	0	2	4	6

Summing to Obtain a Market Demand Curve



Two points should be noted:

1. The market demand curve will shift to the right as more consumers enter the market.
2. Factors that influence the demands of many consumers will also affect market demand.

Elasticity of Demand

The *price elasticity of demand* is

$$E_P = \frac{\Delta Q/Q}{\Delta P/P} = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right)$$

Inelastic Demand

When demand is inelastic (i.e., $E_P < 1$ in absolute value), the quantity demanded is relatively unresponsive to changes in price. As a result, total expenditure on the product increases when the price increases.

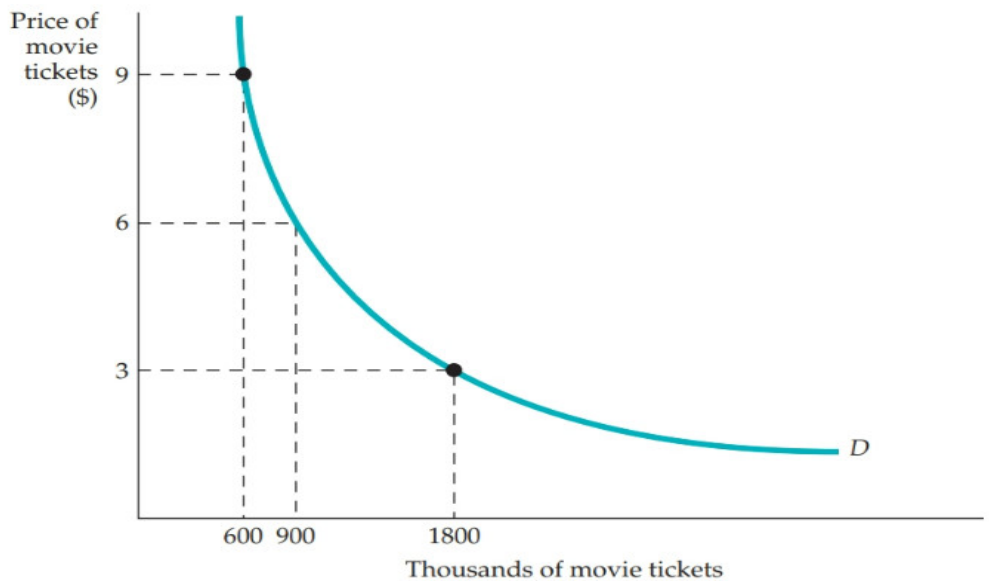
Elastic Demand

When demand is elastic ($E_P > 1$ in absolute value), total expenditure on the product decreases as the price goes up.

Isoelastic Demand

isoelastic demand curve - Demand curve with a constant price elasticity.

unit-elastic demand curve
When the price elasticity of demand is -1.0 at every price, the total expenditure is constant along the demand curve.



Price Elasticity and Consumer Expenditures

TABLE 4.3	PRICE ELASTICITY AND CONSUMER EXPENDITURES	
DEMAND	IF PRICE INCREASES, EXPENDITURES	IF PRICE DECREASES, EXPENDITURES
Inelastic	Increase	Decrease
Unit elastic	Are unchanged	Are unchanged
Elastic	Decrease	Increase

speculative demand - Demand driven not by the direct benefits one obtains from owning or consuming a good but instead by an expectation that the price of the good will increase.

Example: Aggregate Demand for Wheat

Domestic demand for wheat is

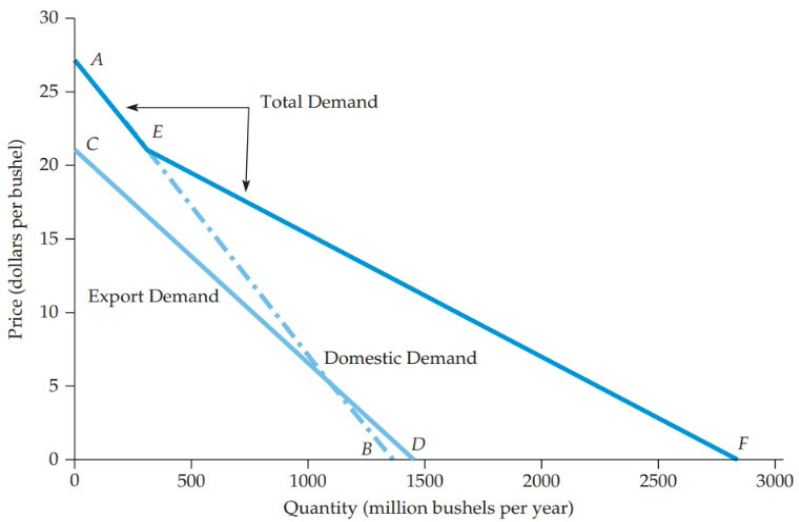
$$Q_{DD} = 1430 - 55P$$

Export demand is

$$Q_{DE} = 1470 - 70P$$

The world demand for wheat is

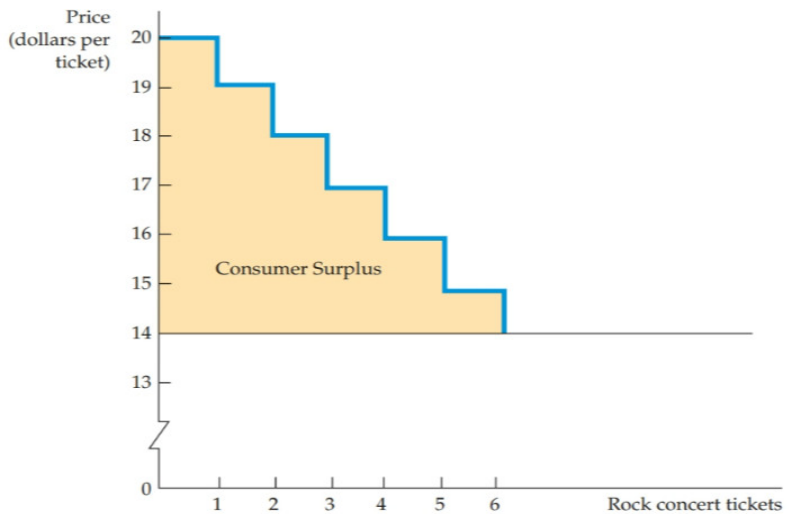
$$Q_{DD} + Q_{DE} = (1430 - 55P) + (1470 - 70P) = 2900 - 125P$$



Consumer Surplus and Demand

consumer surplus - Difference between what a consumer is willing to pay for a good and the amount actually paid.

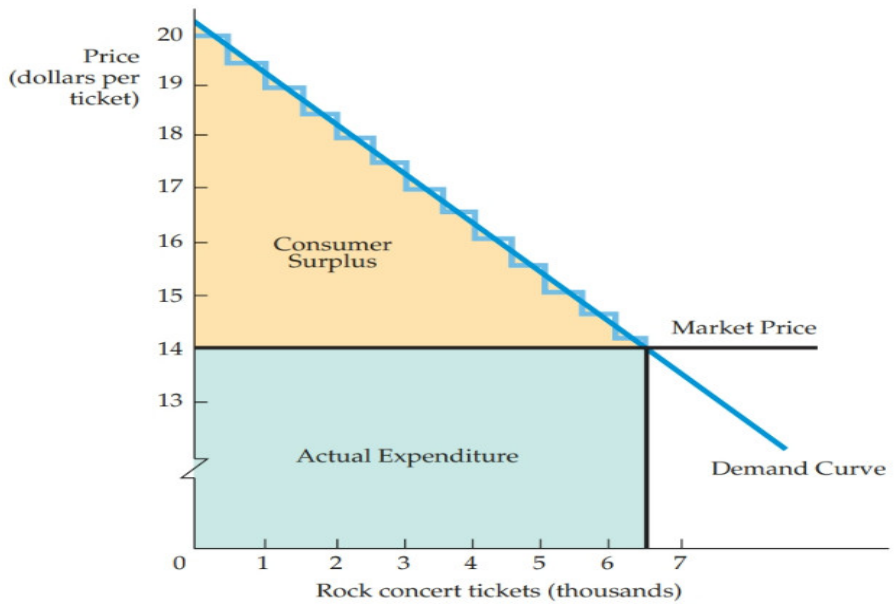
- Consumer surplus is the total benefit from the consumption of a product, less the total cost of purchasing it.



Here, the consumer surplus is $6+5+4+3+2+1 = \$21$

Consumer Surplus Generalized

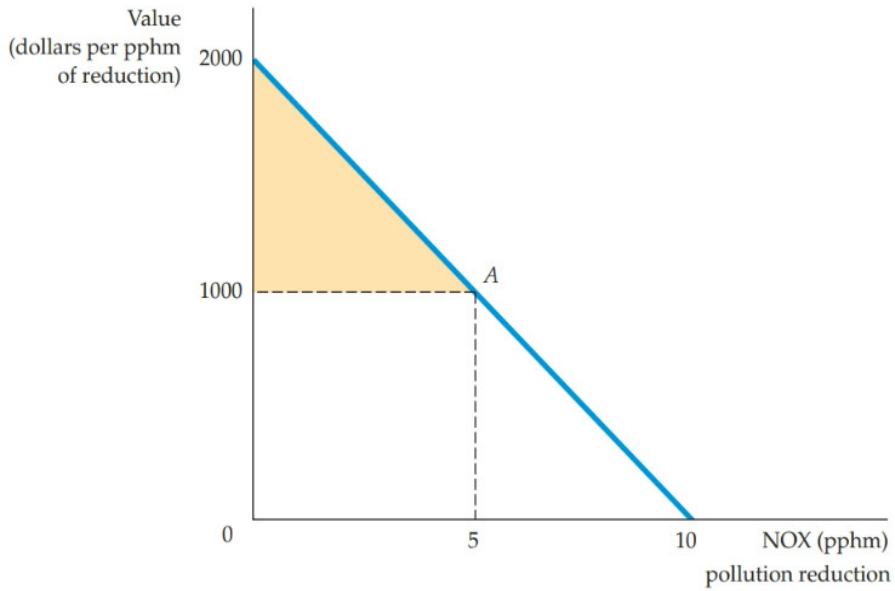
For the market as a whole, consumer surplus is measured by the area under the demand curve and above the line representing the purchase price of the good.



Here, the consumer surplus is $1/2(20-14)(6500) = \$19,500$

Example: The Value of Clean Air

Although there is no actual market for clean air, people do pay more for houses where the air is clean than for comparable houses in areas with dirtier air.



The surplus is created because most consumers are willing to pay more than \$1000 for each unit reduction of nitrogen oxide.

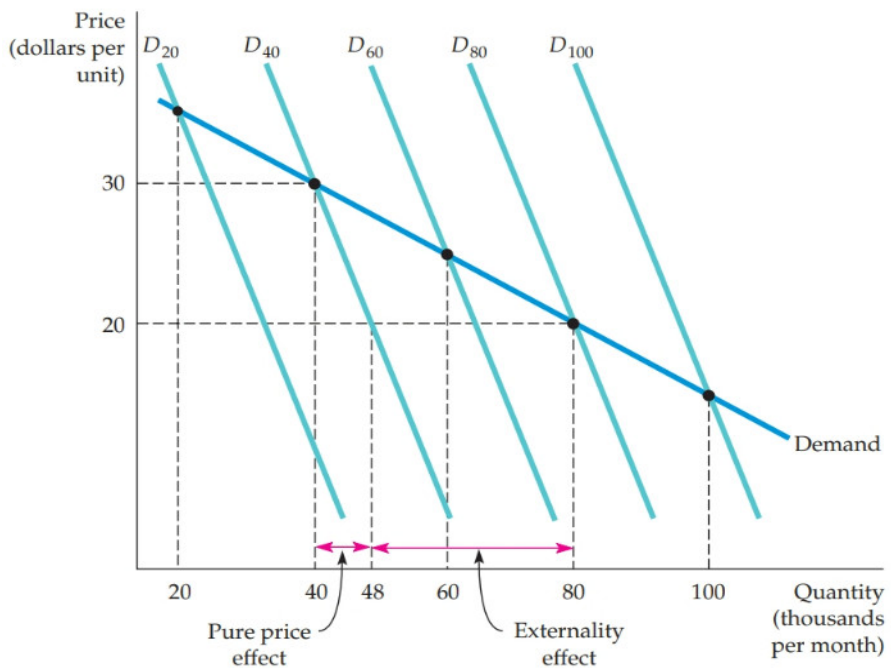
Network Externalities

network externality - Situation in which each individual's demand depends on the purchases of other individuals.

- A *positive* network externality exists if the quantity of a good demanded by a typical consumer increases in response to the growth in purchases of other consumers.
- If the quantity demanded decreases, there is a *negative* network externality.

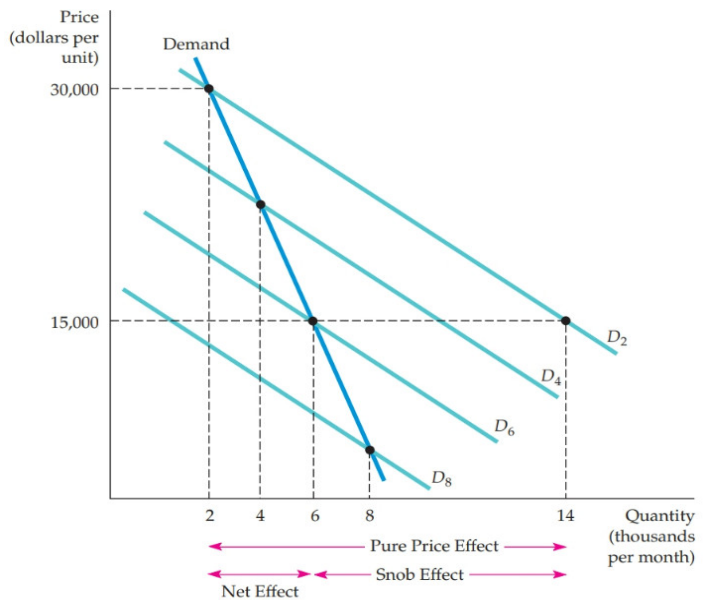
Positive Network Externalities

- Examples: Microsoft Word, Wechat, etc.
- **bandwagon effect** - positive network externality in which a consumer wishes to possess a good in part because others do.
- The positive externality leads to a more elastic demand curve.



Negative Network Externalities

- Congestion offers an example.
- Another example is the **snob effect** - negative network externality in which a consumer wishes to own an exclusive or unique good.
- The negative network externality makes market demand less elastic.



Example: Facebook

A strong positive network externality was central to Facebook's success.

Network externalities have been crucial drivers for many modern technologies over many years.

TABLE 4.5 FACEBOOK USERS		
YEAR	FACEBOOK USERS (MILLIONS)	HOURS PER USER PER MONTH
2004	1	
2005	5.5	
2006	12	<1
2007	50	2
2008	100	3
2009	350	5.5
2010	500	7
2011	766	7.5
2012	980	8.5
2013	1171	9
2014	1334	10
2015	1517	10.5
2016	1654	11
Sources: Facebook, eMarketer		

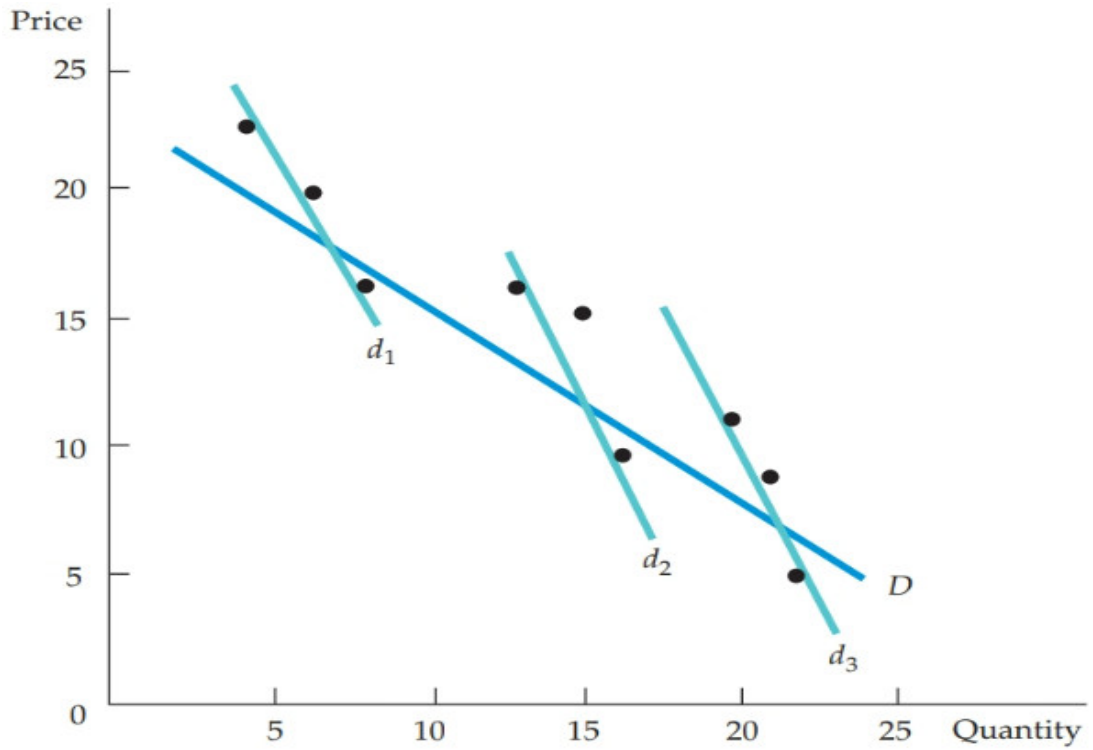
Estimating Demand

TABLE 4.6	DEMAND DATA		
YEAR	QUANTITY (Q)	PRICE (P)	INCOME (I)
2004	4	24	10
2005	7	20	10
2006	8	17	10
2007	13	17	17
2008	16	10	27
2009	15	15	27
2010	19	12	20
2011	20	9	20
2012	22	5	20

Using the data in the table and the least squares method, the demand relationship is

$$Q = 8.08 - 0.49P + 0.81L$$

Estimating Demand (Con't)



Form of the Demand Relationship

The price elasticity for $Q = a - bP$ equals:

$$E_P = (\Delta Q / \Delta P)(P/Q) = -b(P/Q)$$

We often find it useful to work with the *isoelastic demand curve*. When written in its *log-linear form*, an isoelastic demand curve appears as follows:

$$\log(Q) = a - b\log(P) + c\log(I)$$

Suppose that P_2 represents the price of a second good-one which is believed to be related to the product we are studying. We can write the demand function in the following form:

$$\log(Q) = a - b\log(P) + b_2\log(P_2) + c\log(I)$$

When $b_2 > 0$, the two goods are substitutes; when $b_2 < 0$, the two goods are complements.

Summary

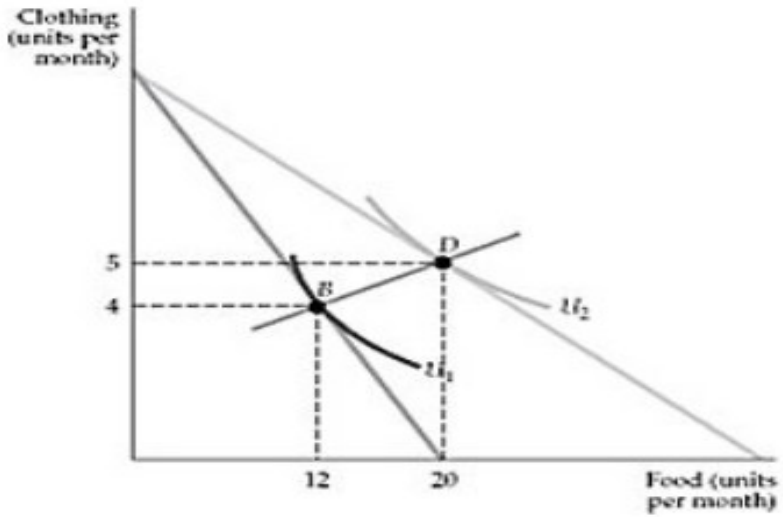
- Individual demand curve
  - normal versus inferior goods
  - Engel curves
- Income and substitution effects
  - substitutes, complements, and independent
  - income and substitution effects for normal good and inferior good
  - Giffen good
- Market demand
  - inelastic versus elastic demand
  - isoelastic demand curve and unit-elastic demand curve

Summary (Con't)

- Consumer surplus
- Network externality
  - positive versus negative network externality
  - bandwagon effect and snob effect
- Empirical estimation of demand
  - price elasticity
  - log-linear form: isoelastic demand curve

Exercises

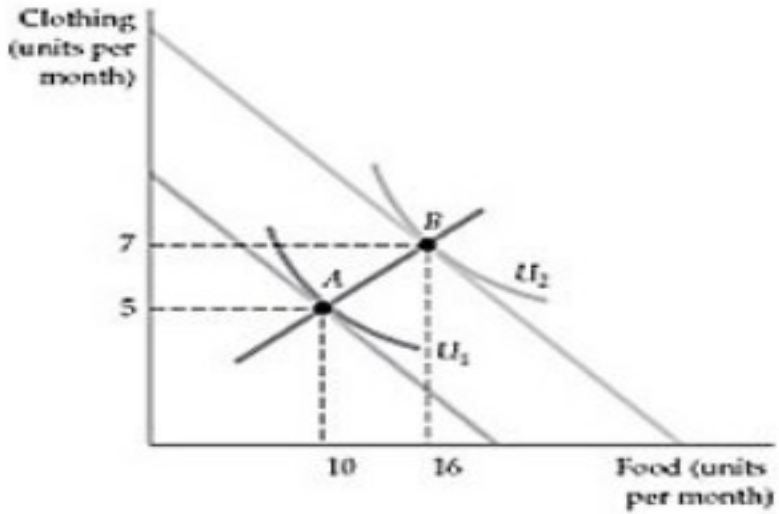
1. From the information on the figure, we can obtain



   a. an upward-sloping demand curve.
   b. two points on a downward-sloping individual demand curve.
   c. a downward-sloping market demand curve.
   d. a demand curve for food and clothing.

Exercises (Con't)

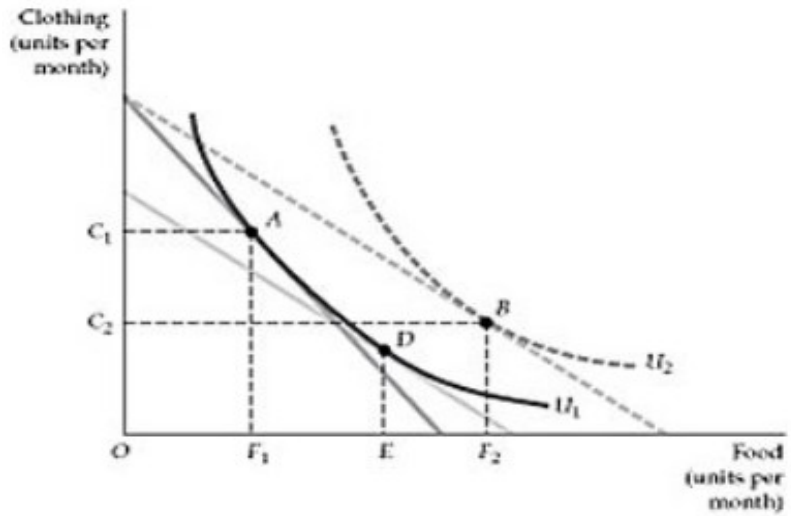
2. The connection of points A and B on the graph yields



   a. a price-consumption curve.
   b. an income-consumption curve.
   c. an individual demand curve.
   d. an Engel curve.

Exercises (Con't)

3. Which of the following moves represents the substitution effect?



   a. The move from F_1 to E
   b. The move from E to F_2
   c. The move from F_1 to F_2
   d. A move from F_1 to F_2 and then to E

Exercises (Con't)

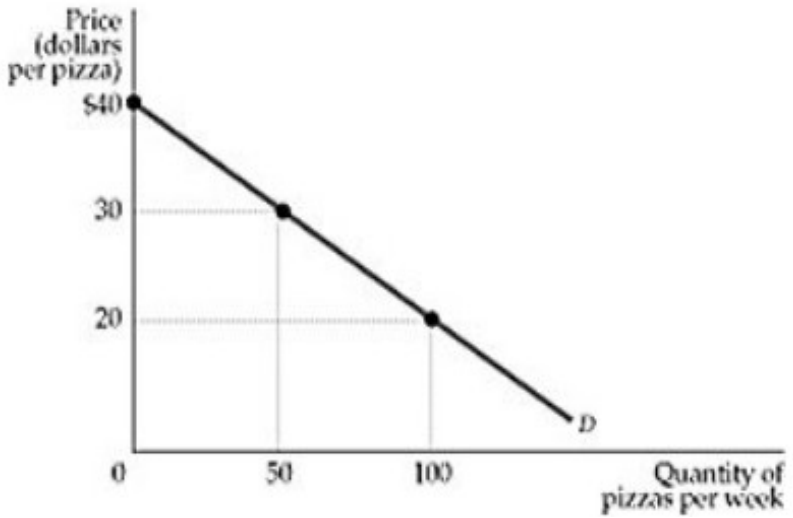
4. A Giffen good
   a. is always the same as an inferior good.
   b. is the special subset of inferior goods in which the substitution effect dominates the income effect.
   c. is the special subset of inferior goods in which the income effect dominates the substitution effect.
   d. must have a downward sloping demand curve.

Exercises (Con't)

5. When demand is inelastic, an increase in price leads to
   a. an increase in total expenditures.
   b. a decrease in total expenditures.
   c. no change in total expenditures.
   d. an undetermined change in expenditures.

Exercises (Con't)

6. When the price of pizza is \$20, total expenditure and consumer surplus are, respectively



   a. \$2000; \$2000.
   b. \$1000; \$2000.
   c. \$2000; \$1000.
   d. \$1000; \$1000.

Exercises (Con't)

7. Which of the following are examples of situations with negative network externalities?
   a. A crowded beach
   b. A rare work of art
   c. Clothing made to order
   d. All of the above

Exercises (Con't)

8. When a demand curve is expressed in log-linear form, such as $\log(Q) = a - b\log(P) + b_2\log(P_2) + c\log(I)$, the coefficients of the demand determinants correspond to
   a. changes in determinants other than price.
   b. the elasticity values of those determinants.
   c. the parameters that may fluctuate in value.
   d. the independent variables in the model.