

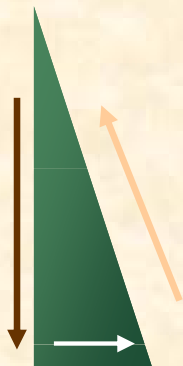
## Average Retail Price of Regular Gasoline in the United States in 2008

Date	January	February	March	April	May	June	July
Price (per \$ gallon)	\$2.95	\$3.12	\$3.26	\$3.57	\$3.91	\$4.03	\$3.90

Source: U.S. Energy Information Administration, <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp> (accessed September 25, 2009).

**a) How would an increase in the price of gasoline affect a consumer's budget line? (two good gasoline and clothes)**

**b) Think about consumers response to the rise in gasoline prices**



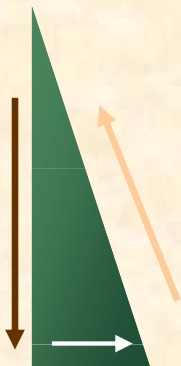
# Last time...

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## ■ Theory of consumer behavior

- How rational consumers decide on the optimal combination of goods to consume with their limited budget in order to maximize their total utility at any given time.

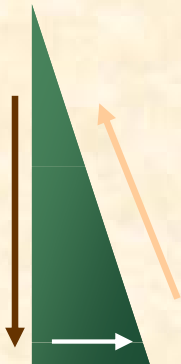


# Last time...

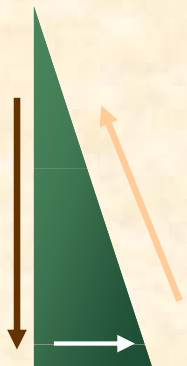
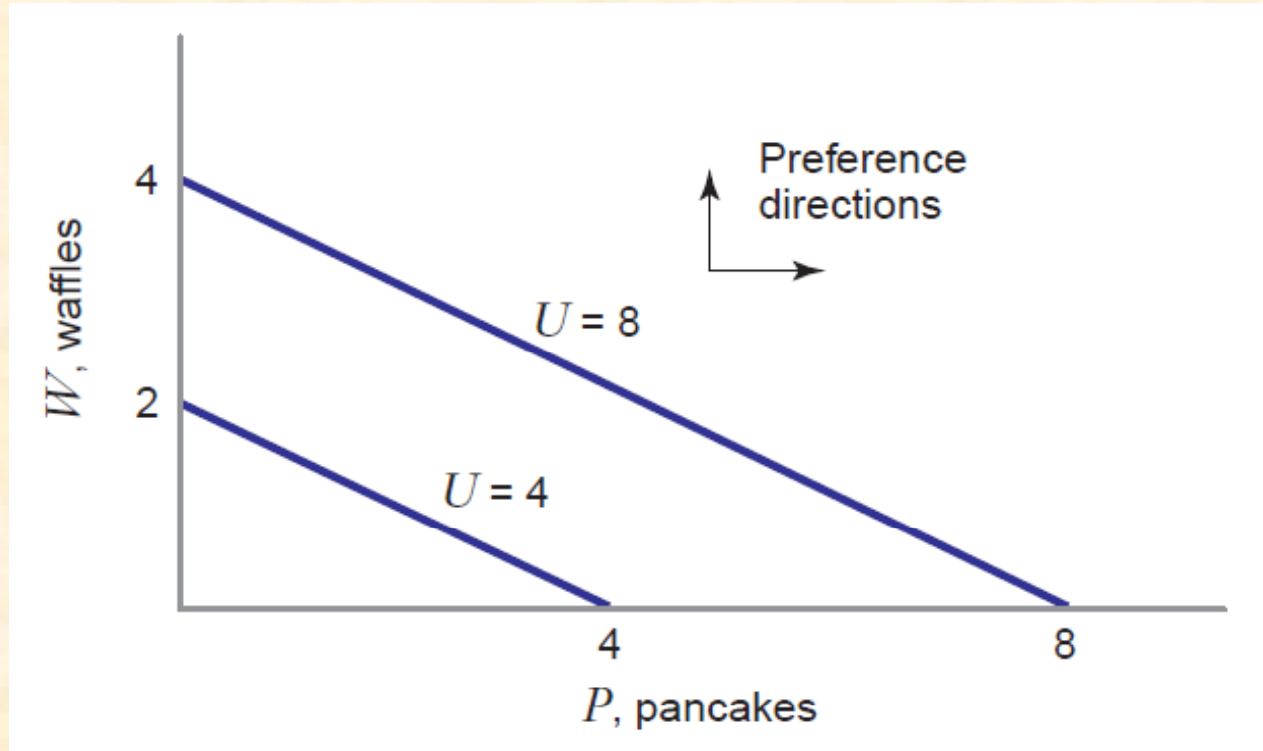
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- **Every consumer behaves rationally:** Consumers try to get the "most for their money" to maximize their total utility
- **Every consumer has different preferences:** Consumers have clear cut preferences and can determine how much marginal utility they get from consuming more units of a product
- **Every consumer is under a budget constraint:** All consumers face a budget constraint, therefore must make decisions about what they buy based on their limited budget
- **Every product has a price:** Every product has a price, so consumers must weigh their purchasing decisions based on their marginal utility from consumption and the price of the goods they consume

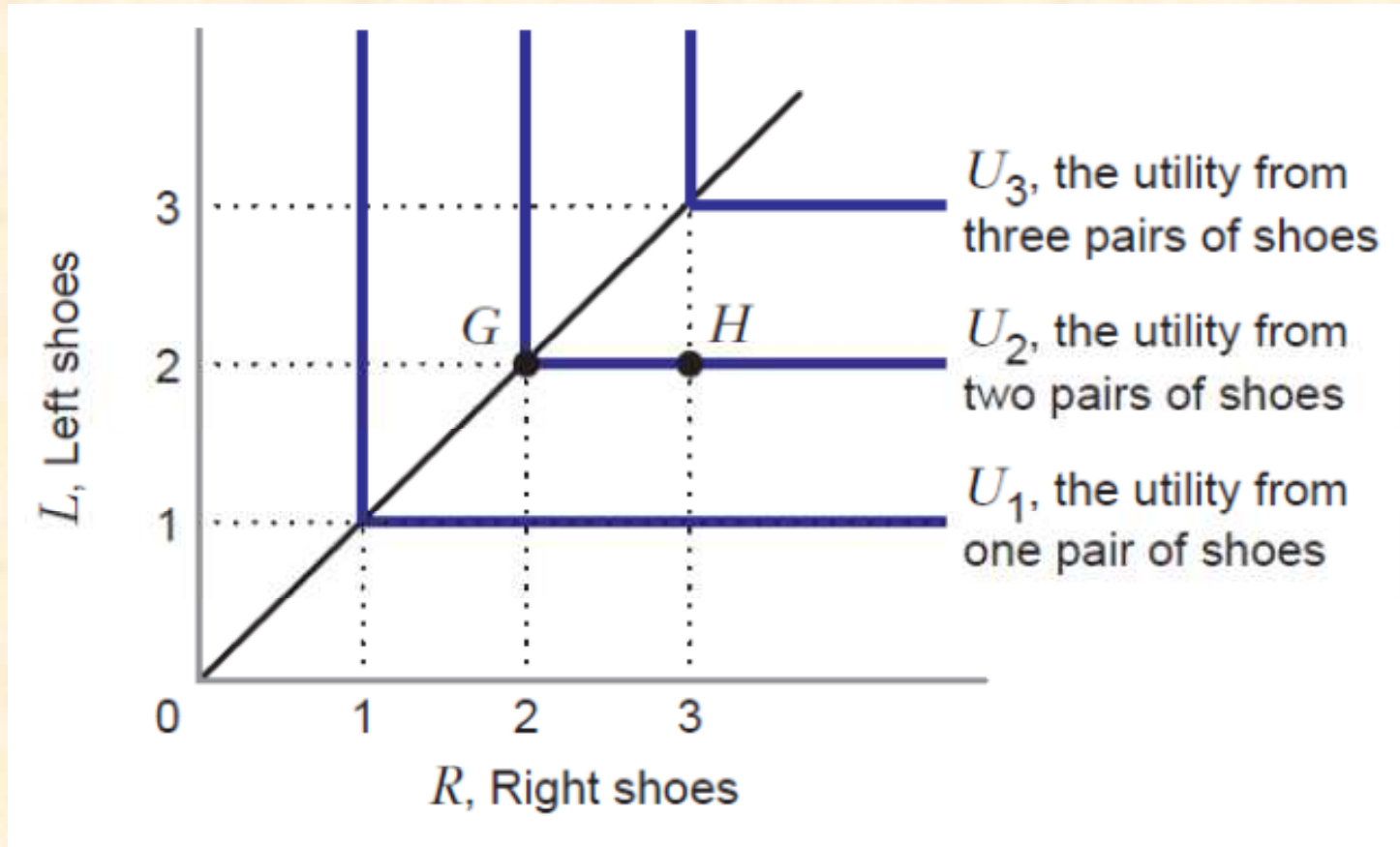


# Exercise 2

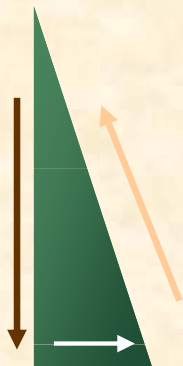


**IC with perfect substitutes**

# Exercise 3



IC with perfect complements

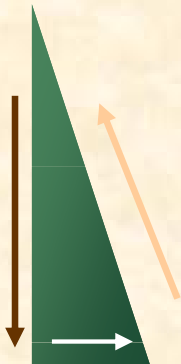


## Exercise XY

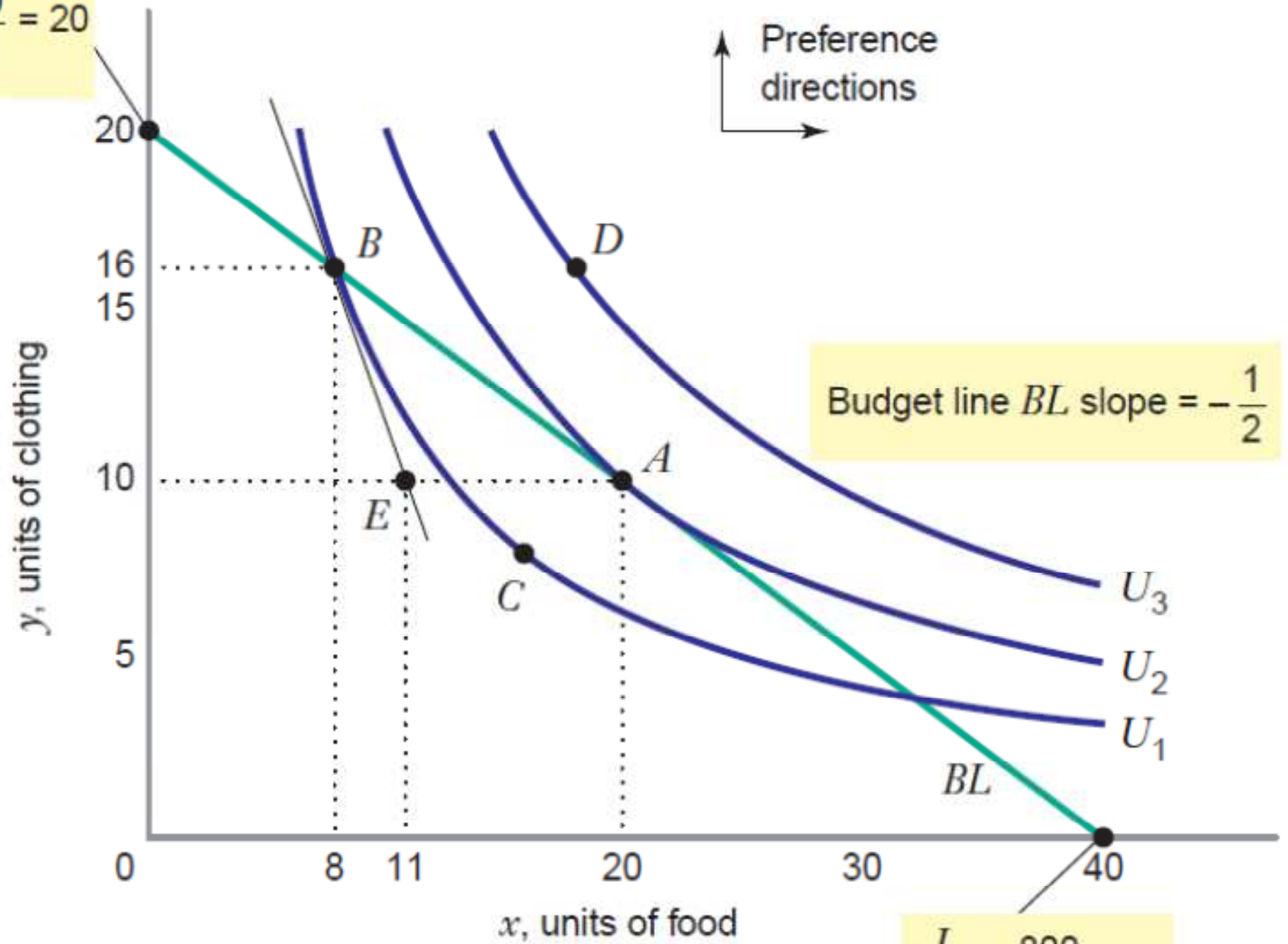
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- Income of  $I$  \$800 per month, the price of food is  $P_x$  \$20 per unit, and the price of clothing is  $P_y$  \$40 per unit.
- Budget line?



$$\frac{I}{P_y} = \frac{800}{40} = 20$$



Budget line  $BL$  slope =  $-\frac{1}{2}$

$$\frac{I}{P_x} = \frac{800}{20} = 40$$

# Interior optimum

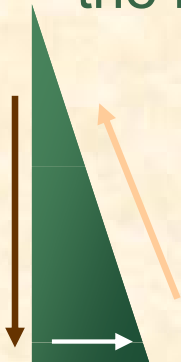
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- The optimum occurs at a point where the **budget line is tangent to the indifference curve**. In other words, at an interior optimal basket, the consumer chooses commodities so that the ratio of the marginal utilities (i.e., the marginal rate of substitution)

$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

- at an interior optimal basket, the consumer chooses commodities so that the **marginal utility per dollar spent on each commodity is the same**.



$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$



# Corner point

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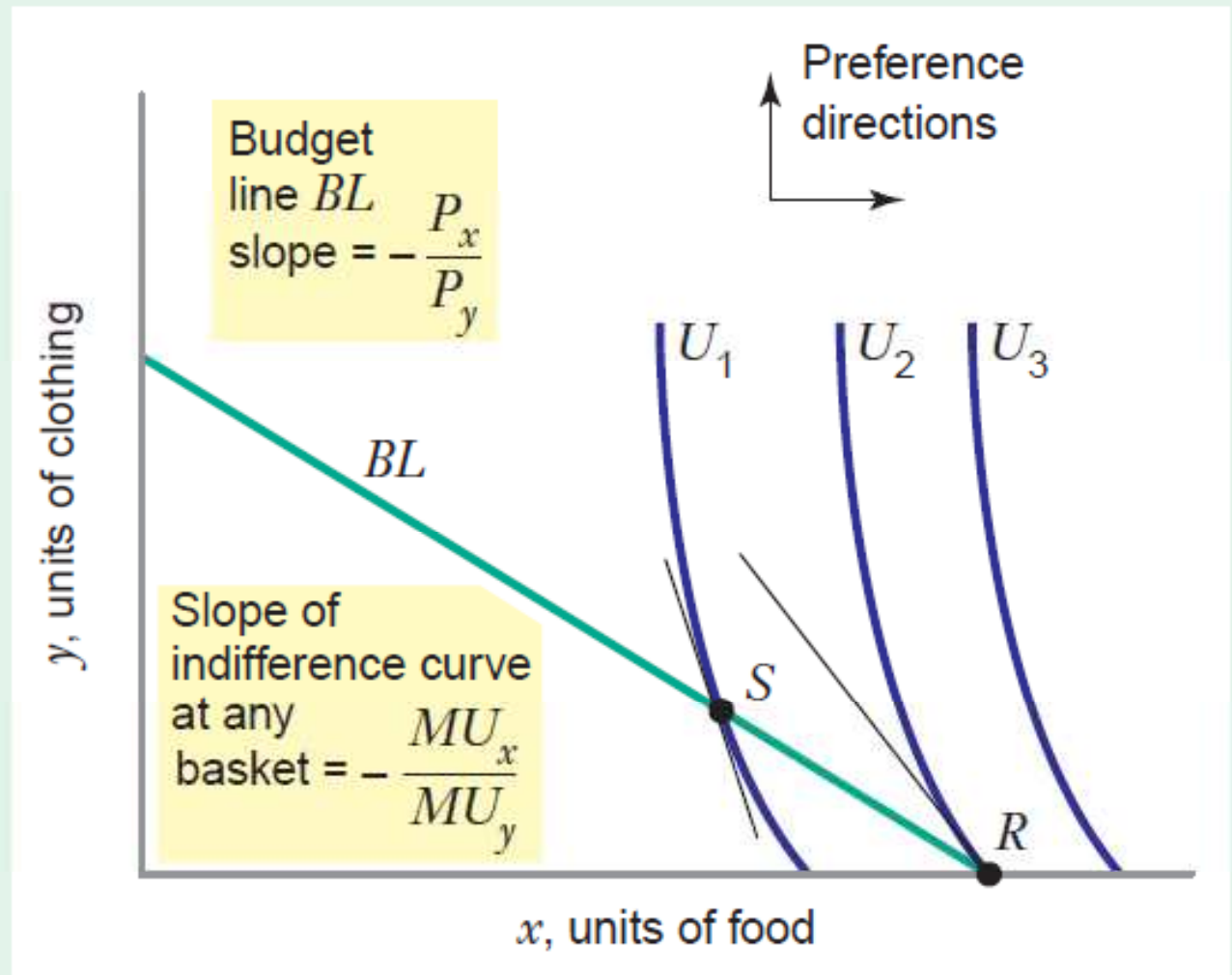
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- **Interior optimum**= consumer purchases positive amounts of both goods
- However, in reality, though, a consumer might not purchase positive amounts of all available goods (some consumers may not spend money on tobacco or alcohol)
- **Solution**= optimal basket at a corner point, that is, at a basket along an axis, where one or more of the goods is not purchased at all (the budget line may not be tangent to an indifference curve at the optimal basket).



# Corner point

**FIGURE 4.7** Corner Point  
At basket  $S$  the slope of the indifference curve  $U_1$  is steeper (more negative) than the budget line. This means that the marginal utility per dollar spent on food is higher than on clothing, so the consumer would like to purchase less clothing and more food. He would move along the budget line until he reaches the corner point basket  $R$ , where no further substitution is possible because he purchases no clothing at  $R$ .

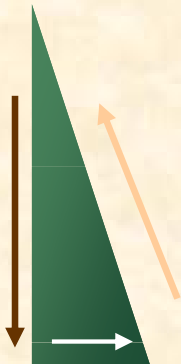


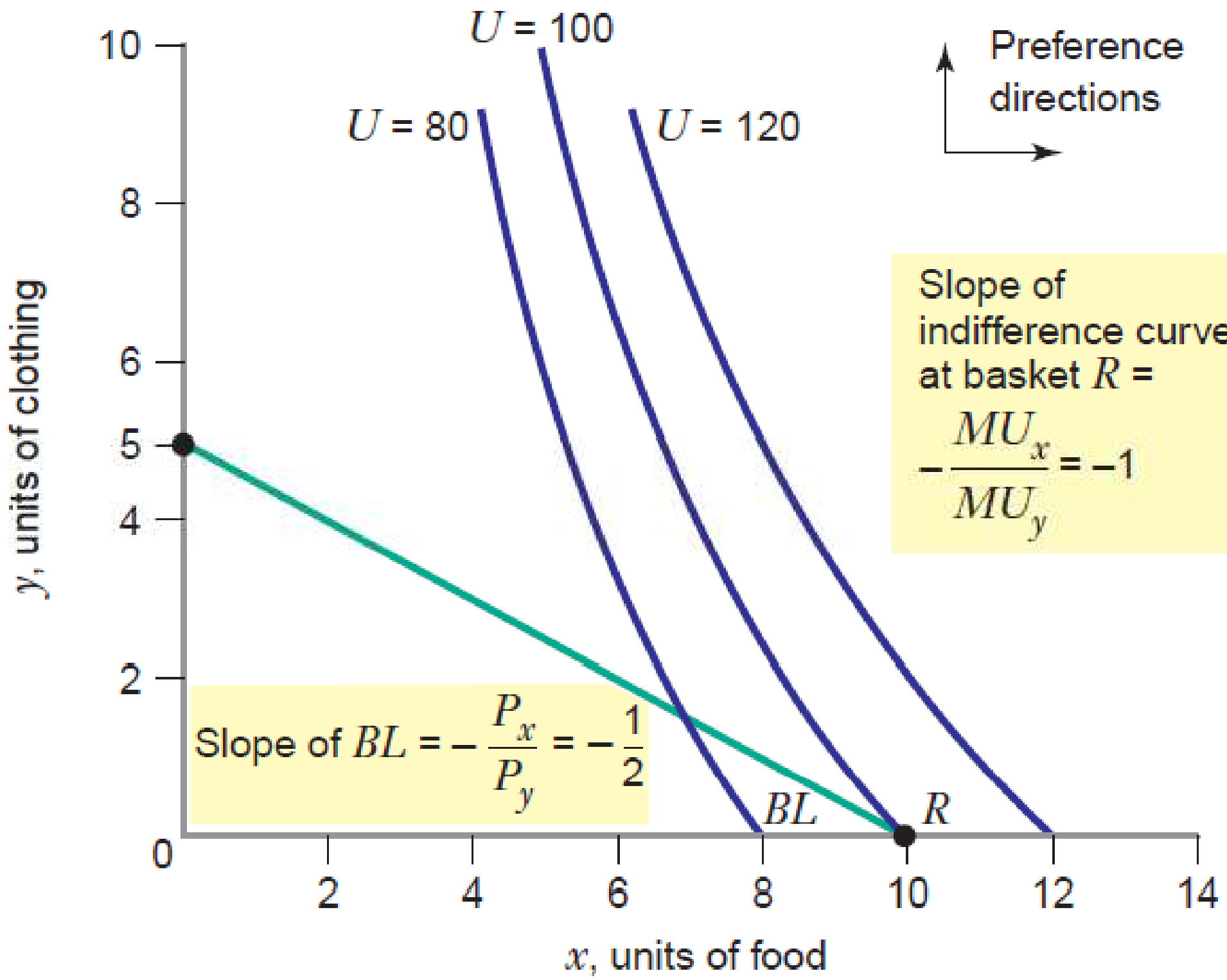
## Exercise XY

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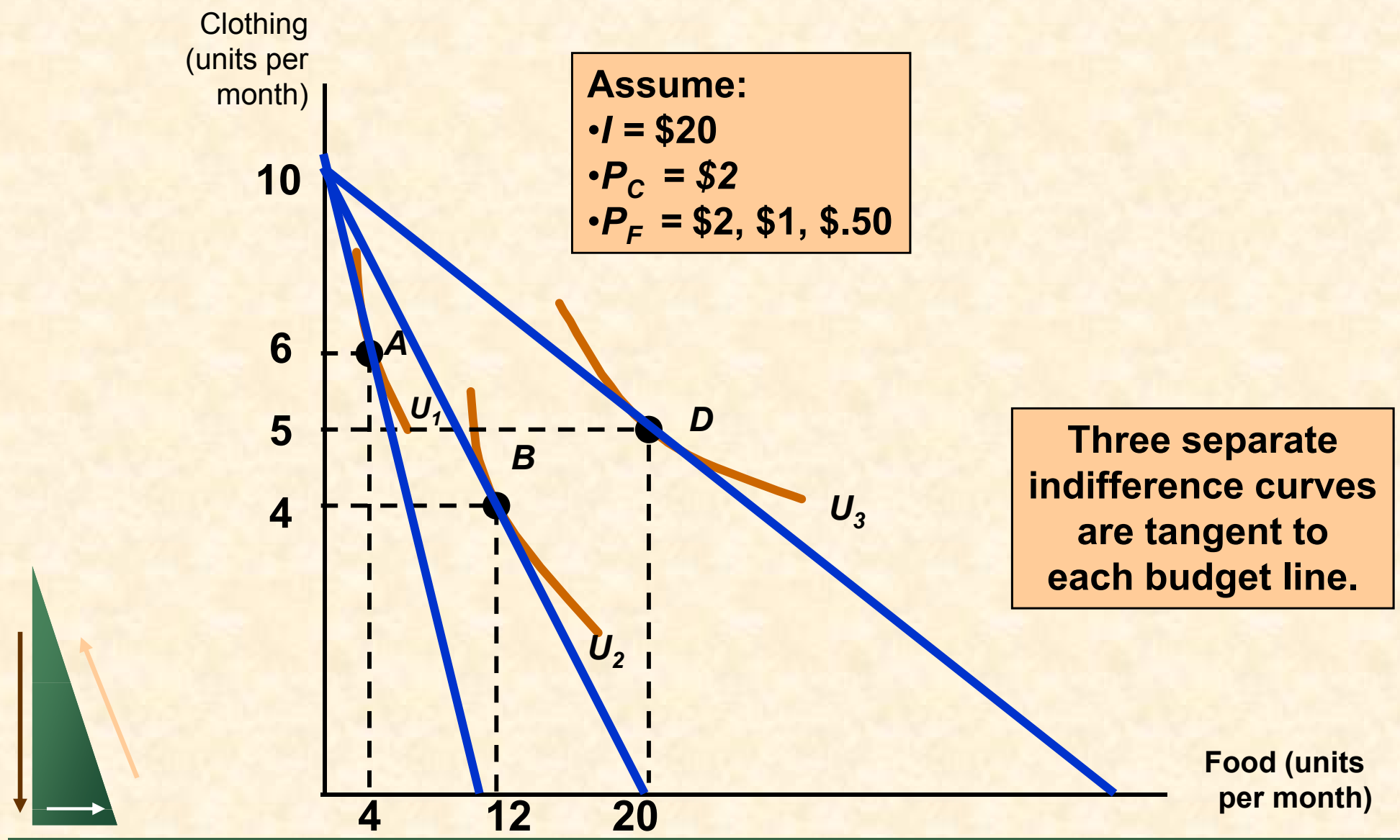
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- utility function  $U(x, y) = xy + 10x$  and income = 10.  $P_x = \$1$  and a price of clothing  $P_y = \$2$ .
- Optimal basket?

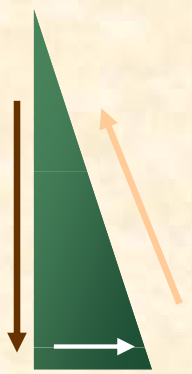
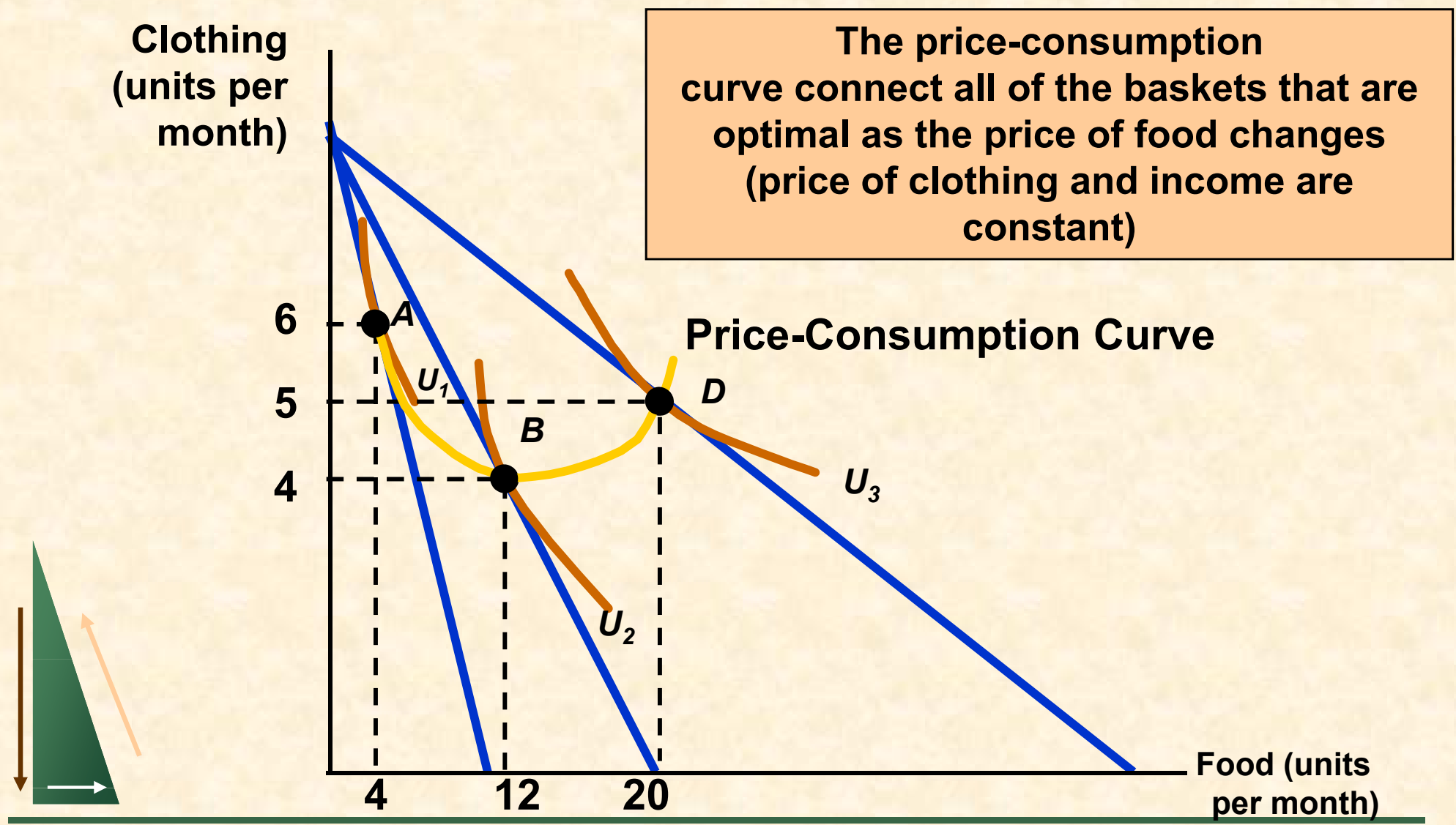


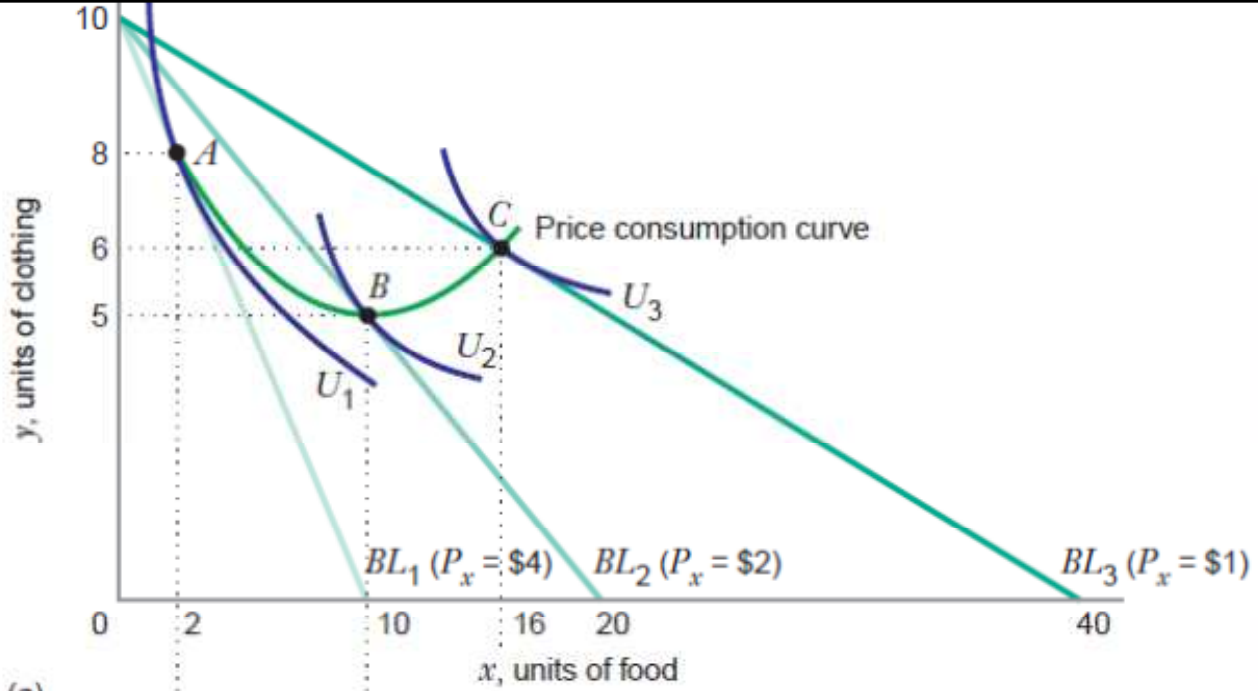


# Individual Demand: Effect of a Price Change

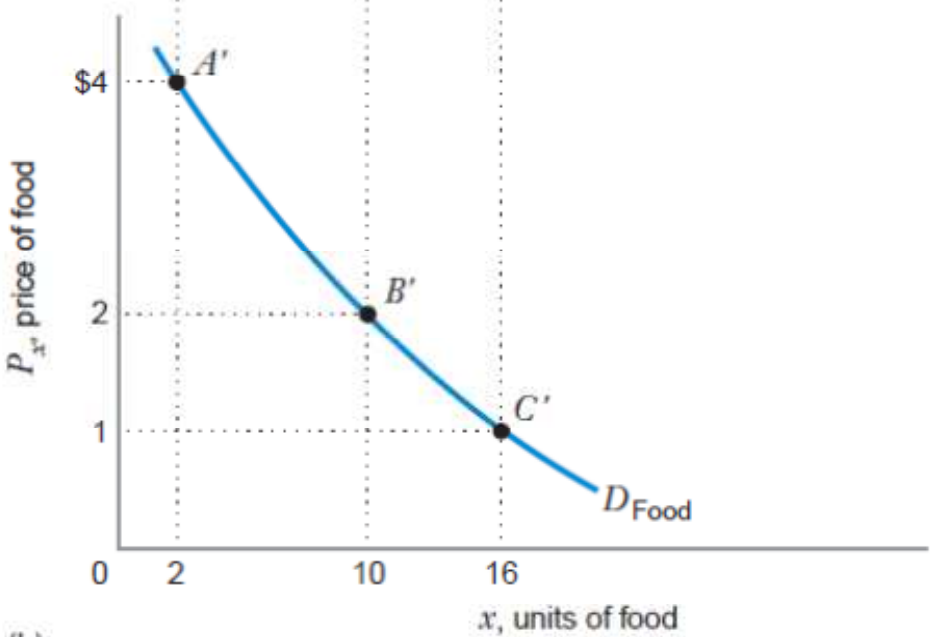


# Individual Demand: Effect of a Price Change





(a)



(b)

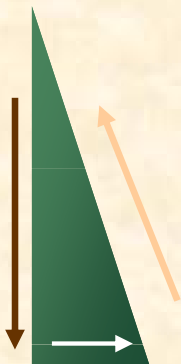
# Individual Demand: Effect of a Price Change

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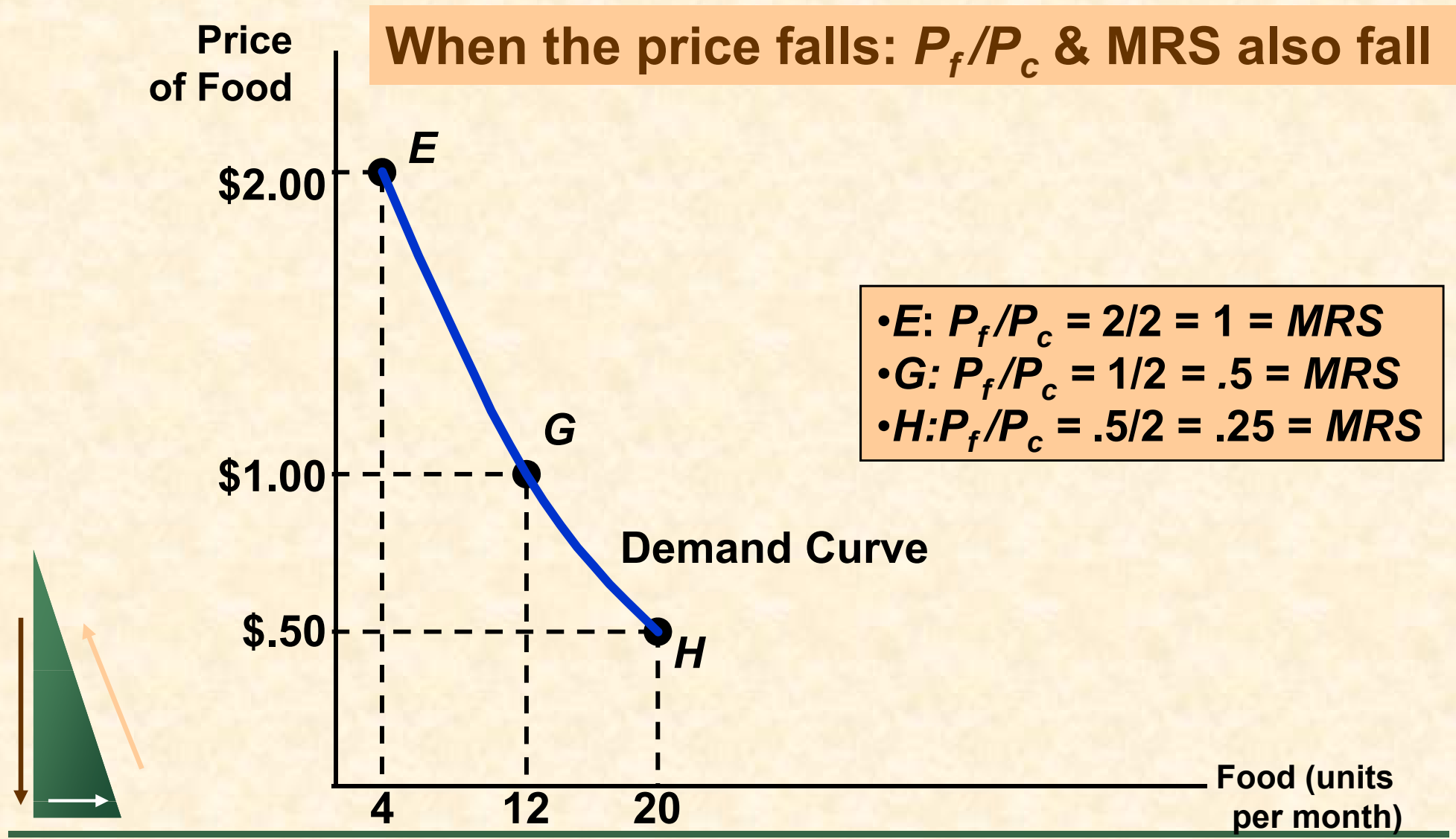
## The Individual Demand Curve: 2 Important Properties

- 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 *MRS* of food for clothing equals the ratio of the prices of food and clothing.

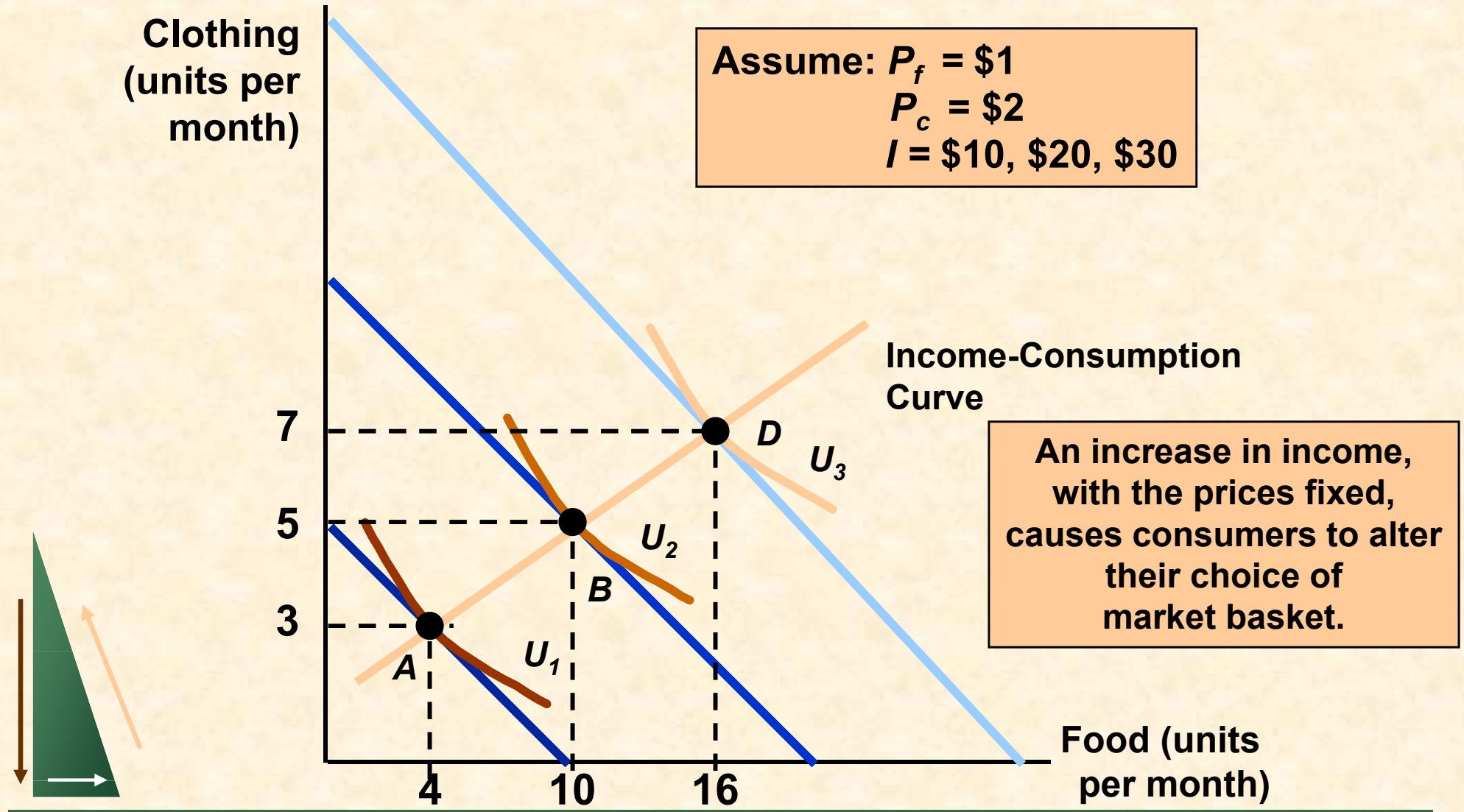




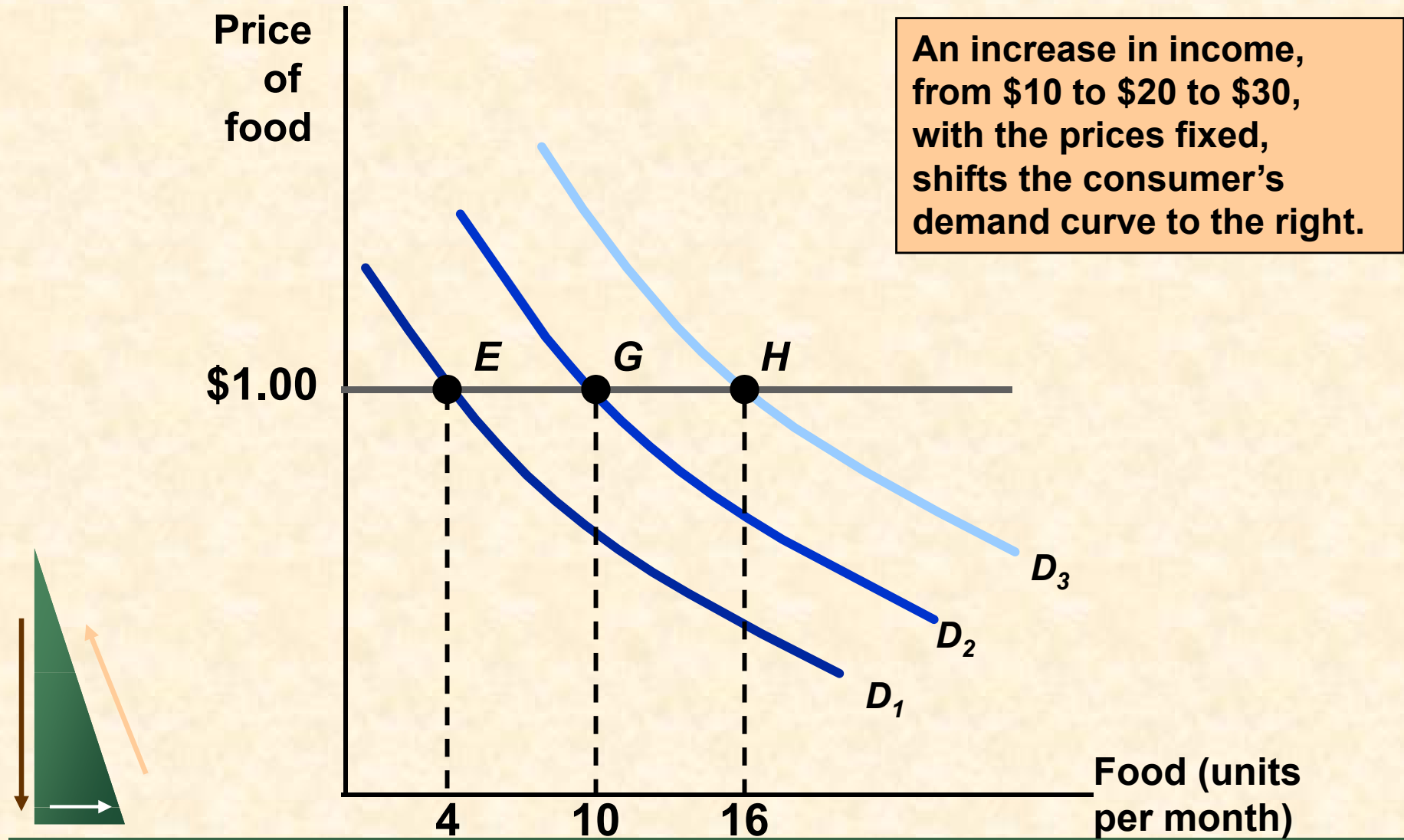
# Individual Demand: Effect of a Price Change

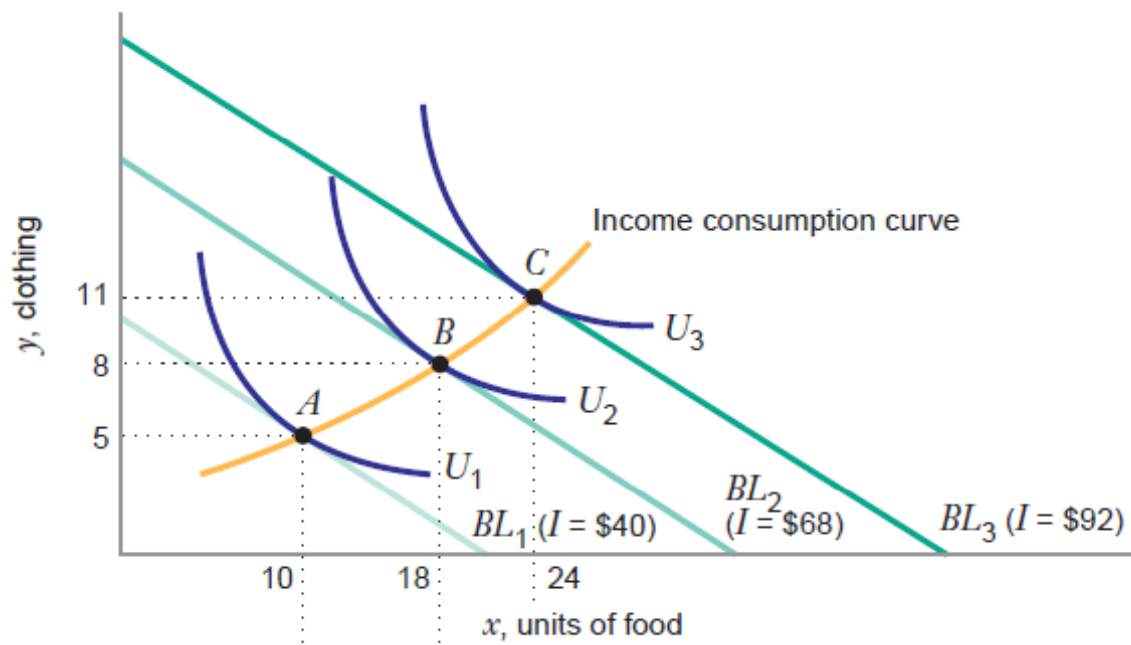


# Individual Demand: Effect of Income Changes

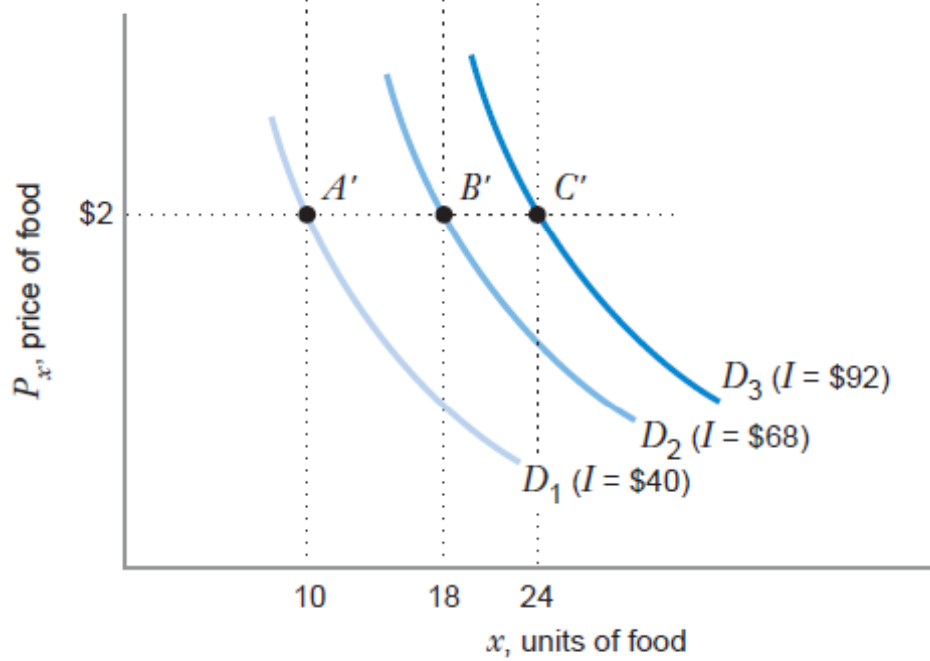


# Individual Demand: Effect of Income Changes





(a)



(b)

# Individual Demand: Effect of Income Changes

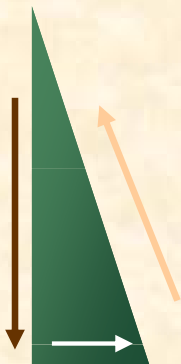
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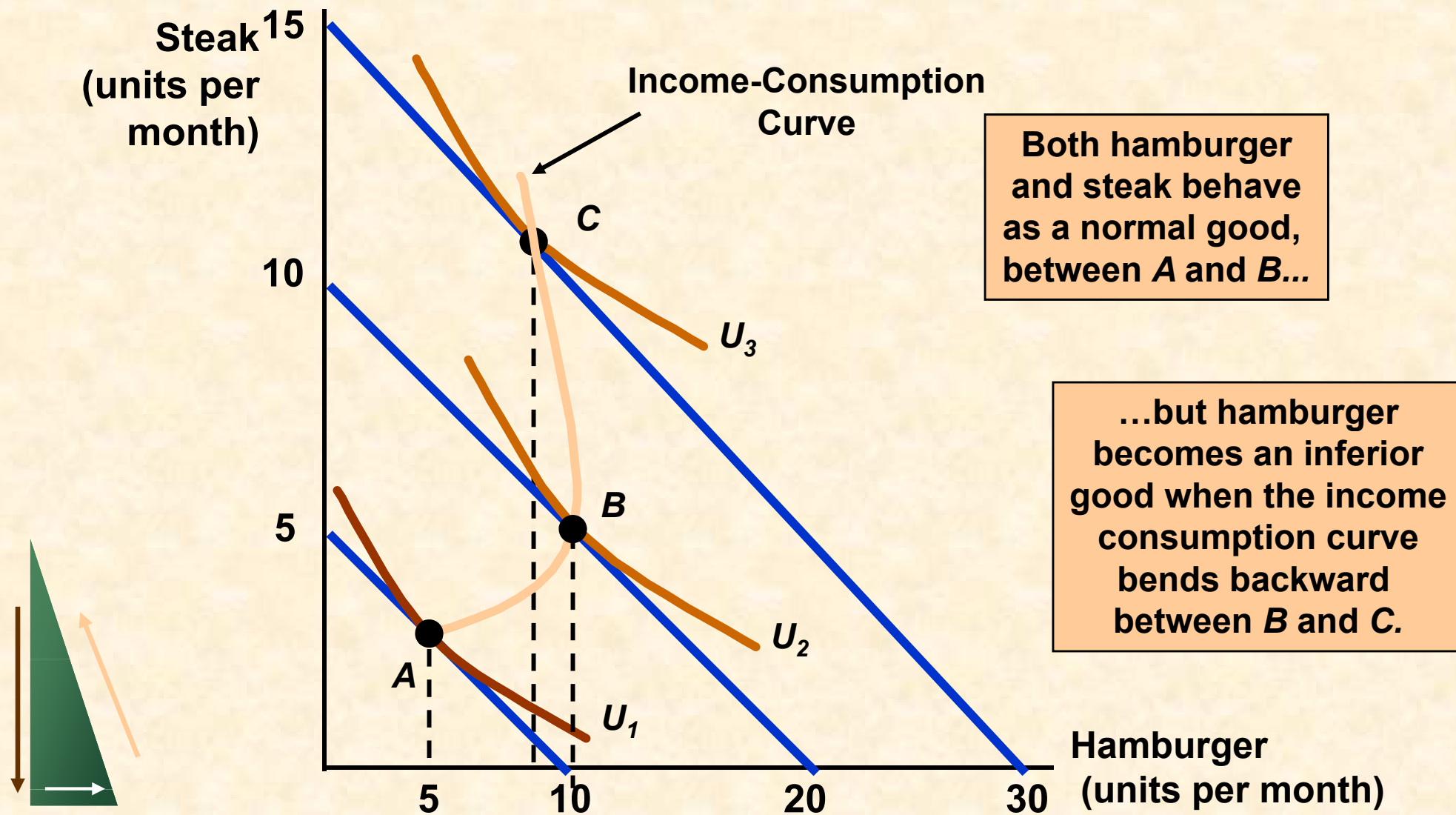
## Normal Good vs. Inferior Good

### ■ Income Changes

- When the income-consumption curve has a positive slope, the quantity demanded increases with income; the income elasticity of demand is positive. The good is a **normal good**.
- When the income-consumption curve has a negative slope, the quantity demanded decreases with income; the income elasticity of demand is negative. The good is an **inferior good**.



# Individual Demand: Effect of Income Changes with an Inferior Good



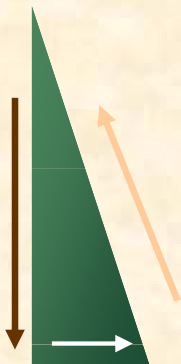
# Individual Demand: Effect of Income Changes

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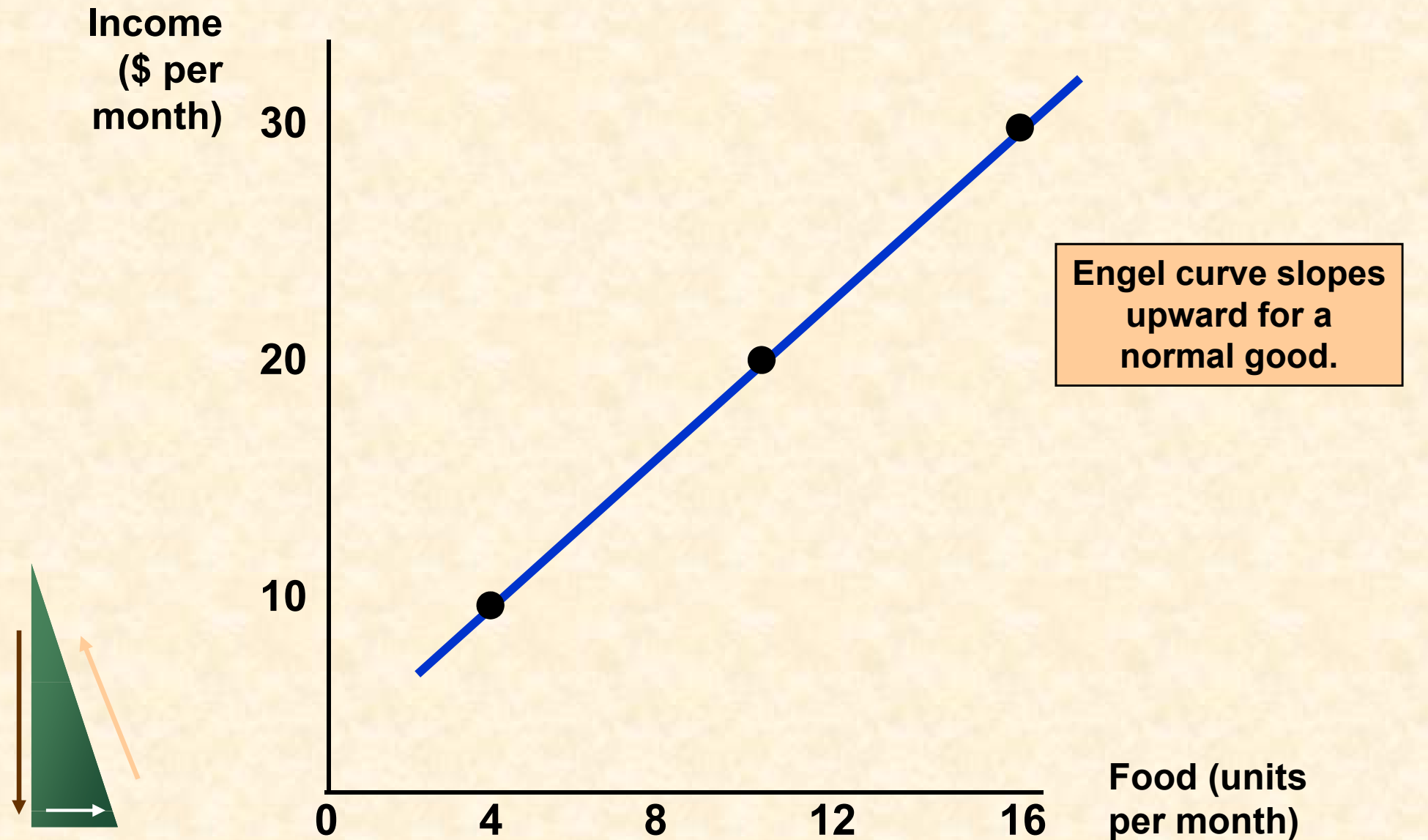
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## ■ Engel Curves

- Engel curves relate the quantity of good consumed to income.
- If the good is a normal good, the Engel curve is upward sloping.
- If the good is an inferior good, the Engel curve is downward sloping.

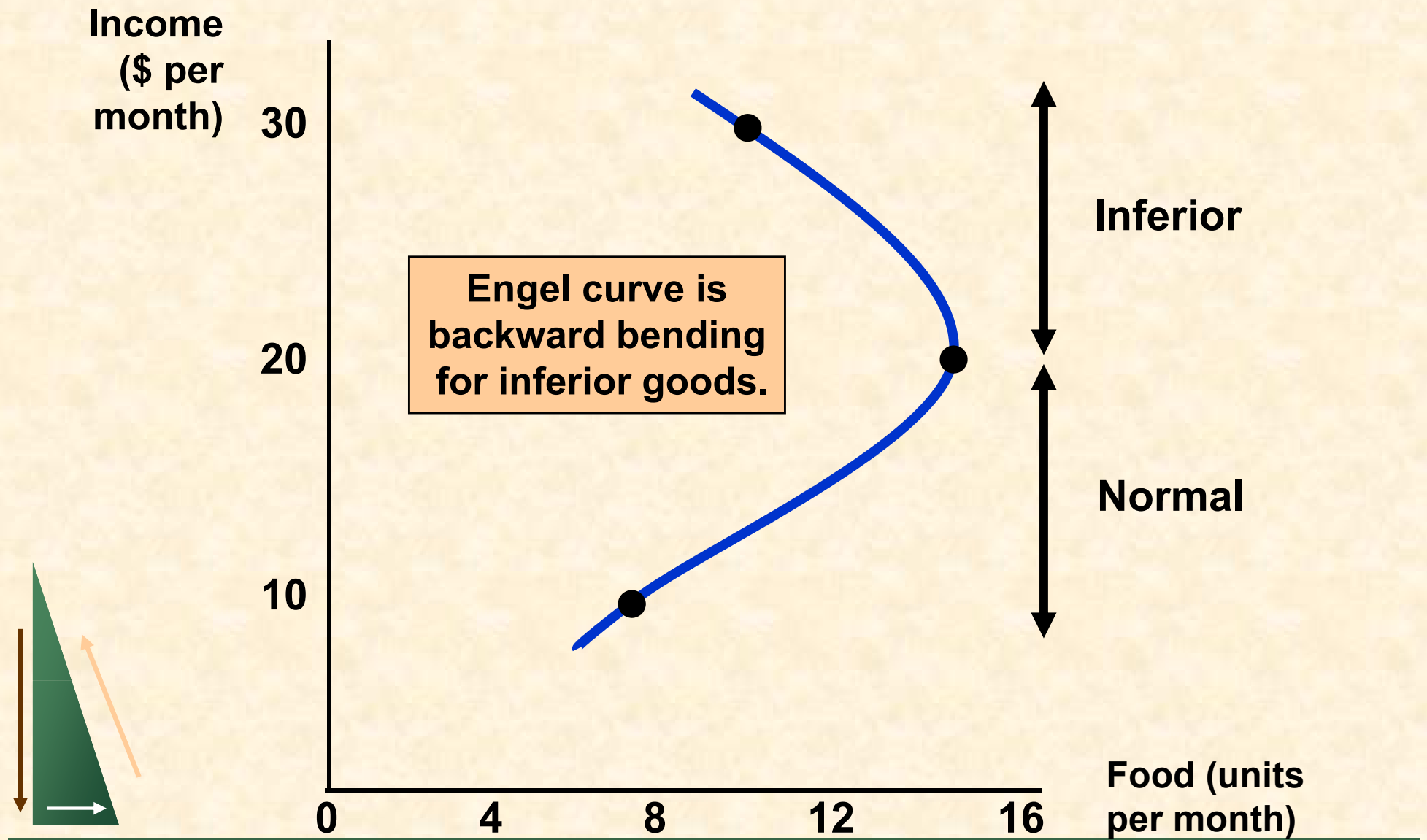


# Engel Curves: Normal Good





# Engel Curves: Inferior Good

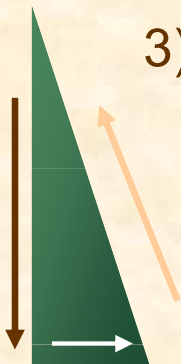


# Individual Demand: Substitutes and Complements

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- 1) **Substitute goods**: an increase (decrease) in the price of one leads to an increase (decrease) in the quantity demanded of the other. E.g. movie tickets and video rentals
- 2) **Complements**: an increase (decrease) in the price of one leads to a decrease (increase) in the quantity demanded of the other. E.g. gasoline and motor oil
- 3) Two goods are **independent** when a change in the price of one good has no effect on the quantity demanded of the other.

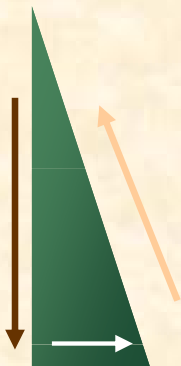


# Income and Substitution Effects

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- A fall in the price of a good has two effects:
- **Substitution Effect:** consumers will tend to buy more of the good that has become relatively cheaper, and less of the good that is now relatively more expensive.
- **Income Effect:** consumers experience an increase in real purchasing power when the price of one good falls.

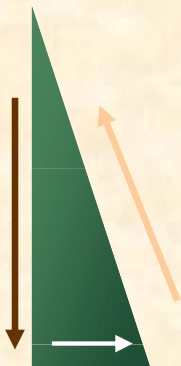


# Substitution Effect

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- The **substitution effect** is the change in an item's consumption associated with a change in the price of the item, *with the level of utility held constant*.
- When the price of an item declines, the substitution effect always leads to an increase in the quantity of the item demanded.

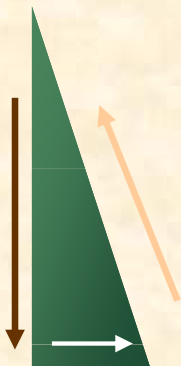


# Income Effect

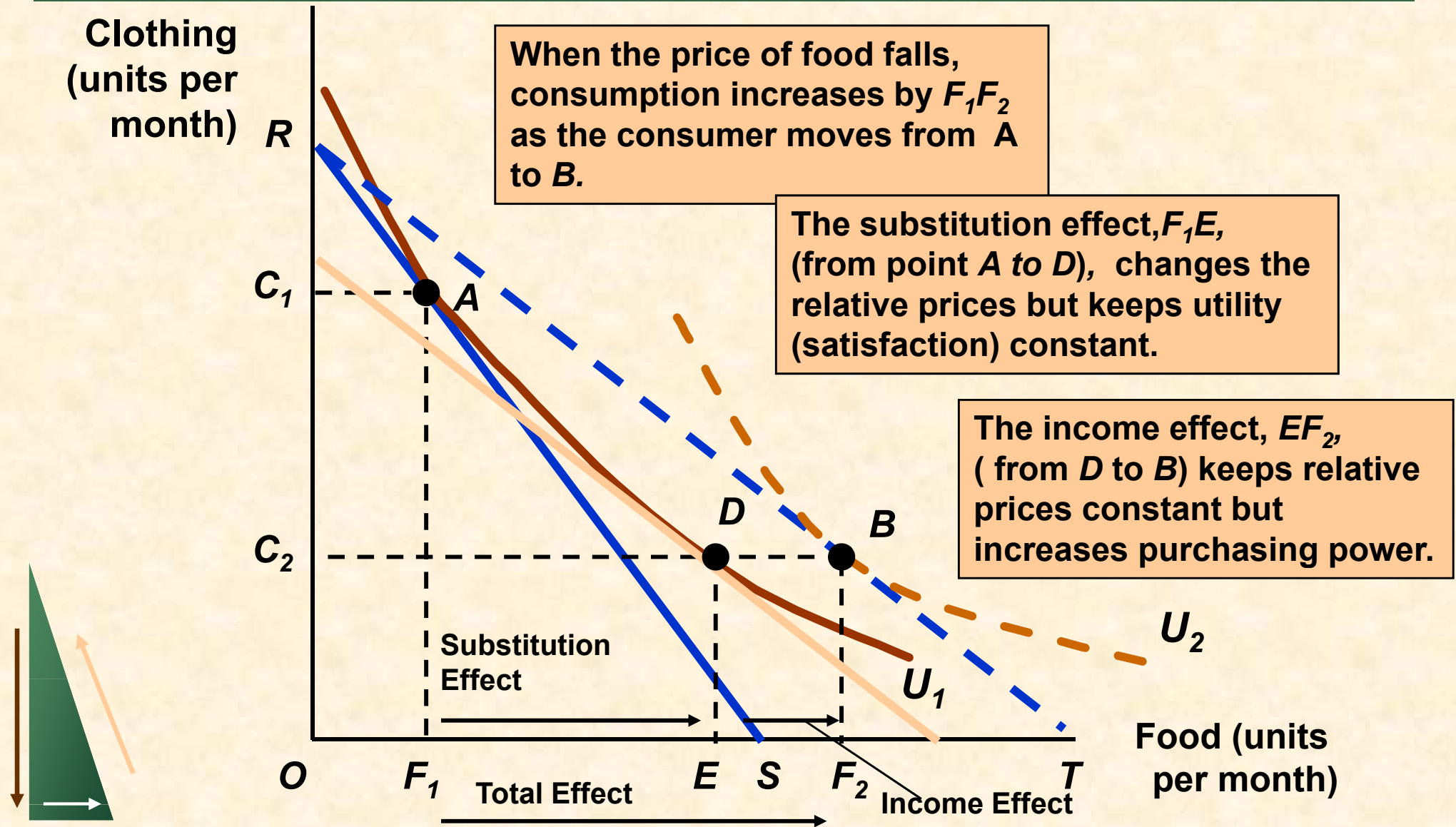
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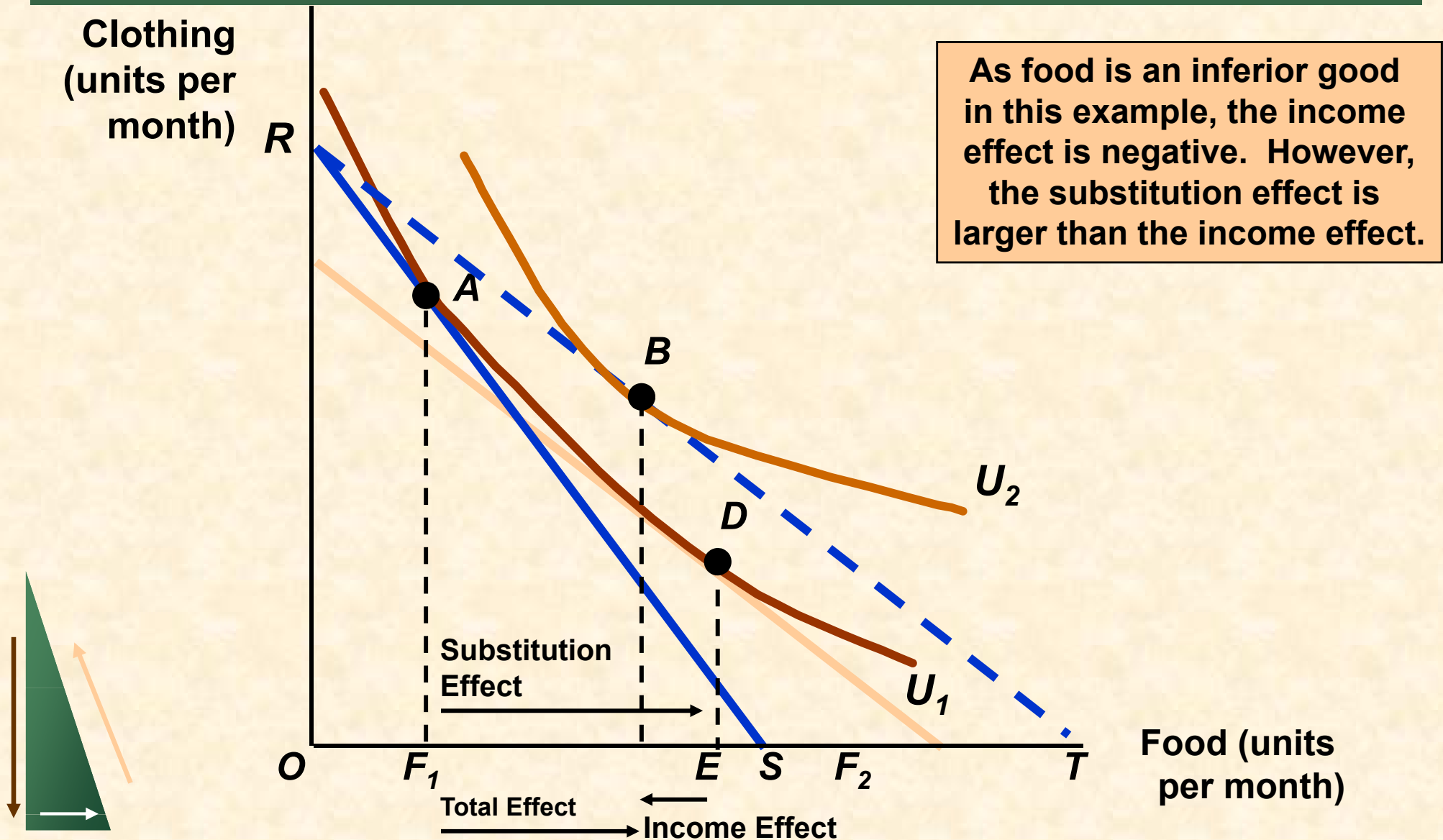
- The **income effect** is the change in an item's consumption due to an increase in purchasing power, *with the price of the item held constant*.
- If income increases, the quantity demanded for the product may increase or decrease. Even with inferior goods, the income effect is rarely large enough to outweigh the substitution effect.



# Income and Substitution Effects: Normal Good



# Income and Substitution Effects: Inferior Good

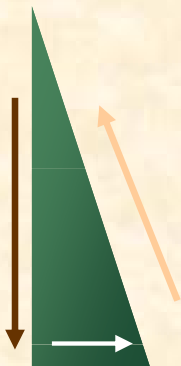


## Exercise XY

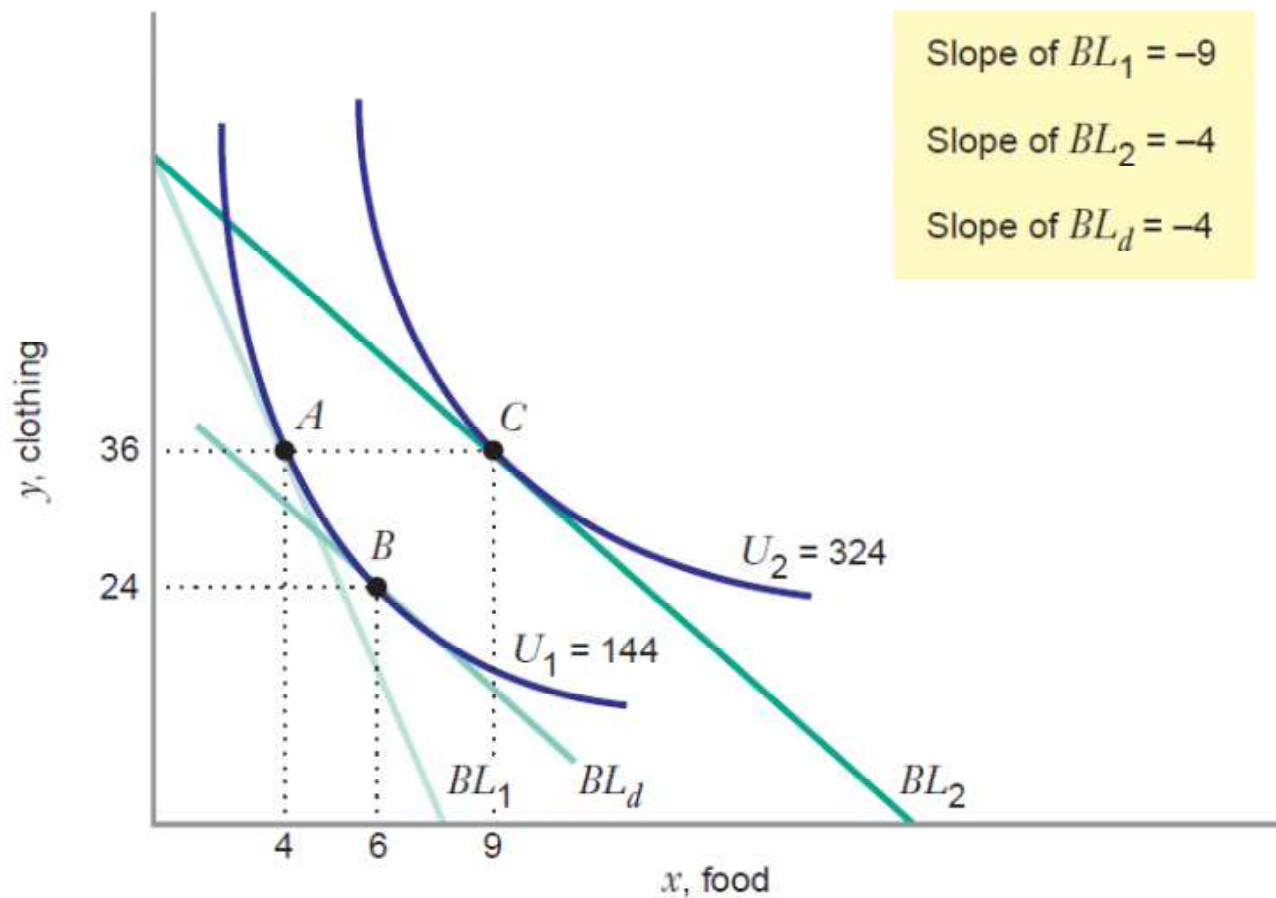
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- Suppose a consumer's preferences between two goods (x and y) can be represented by the utility function  $U=xy$ , Income is 72,  $P_y=1$ ,  $P_{x1}=9$  and  $P_{x2}=4$
- compute  $MU_x$  and  $MU_y$
- Find the numerical values of the income and substitution effects on food consumption and graph the results







**FIGURE 5.10** Income and Substitution Effects

As the price of food drops from \$9 to \$4, the substitution effect leads to an increase in food consumption from 4 (at the initial basket *A*) to 6 (at the decomposition basket *B*). The substitution effect is therefore  $6 - 4 = 2$ . The income effect is the change in food consumption as the consumer moves from the decomposition basket *B* (where 6 units of food are purchased) to the final basket *C* (where 9 units of food are bought). The income effect is therefore  $9 - 6 = 3$ .



# From Individual to Market Demand: Determining the Market Demand Curve

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Price (\$)	Individual A (units)	Individual B (units)	Individual C (units)	Market (units)
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1	6	10	16	32
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2	4	8	13	25
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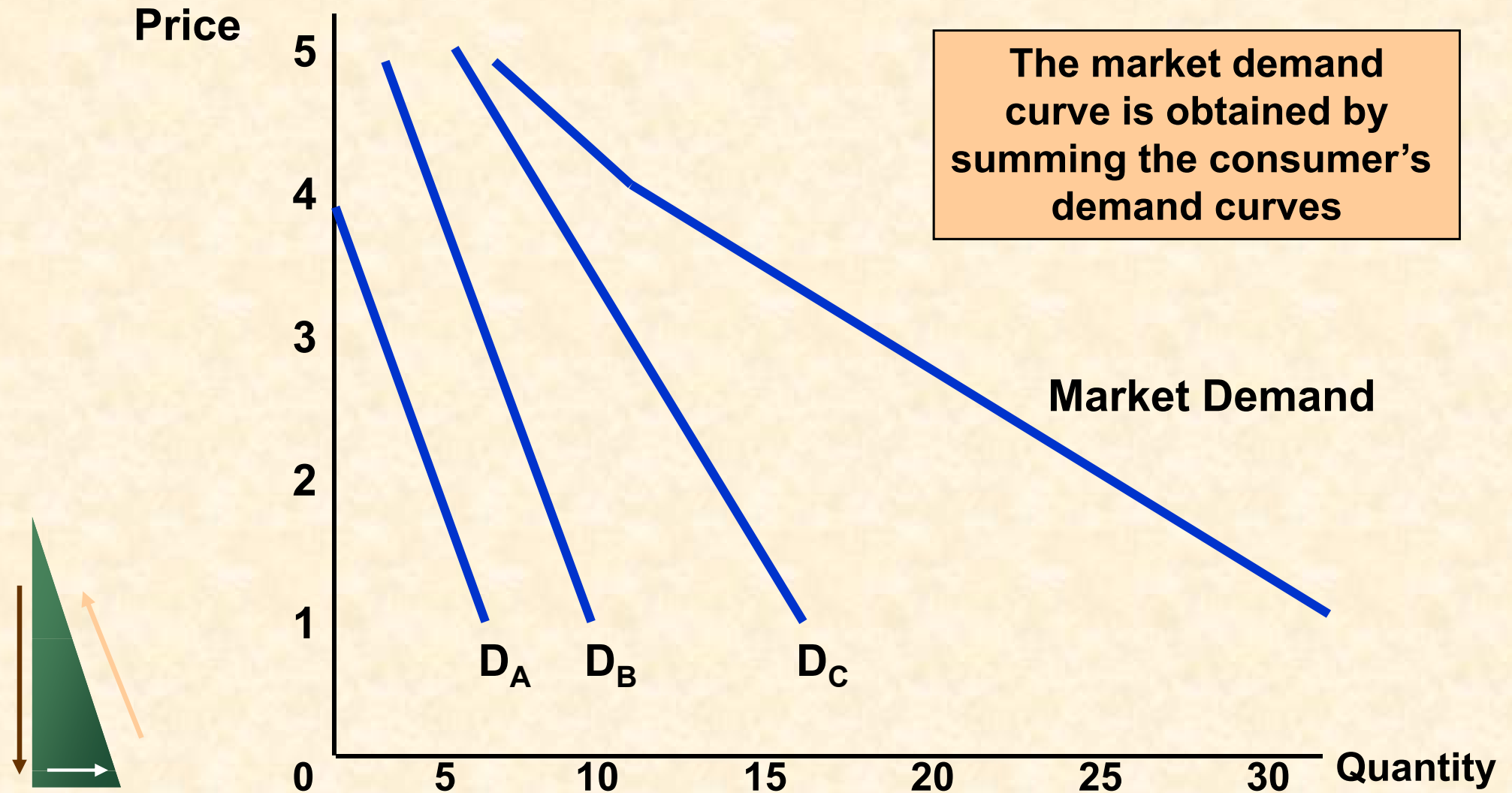
3	2	6	10	18
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4	0	4	7	11
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5	0	2	4	6
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# Summing to Obtain a Market Demand Curve



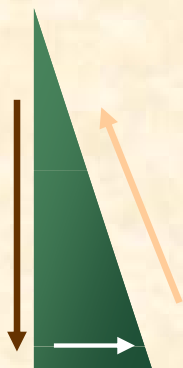
# Market Demand: Elasticity

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- Elasticity of Demand

Recall: Price elasticity of demand measures the percentage change in the quantity demanded resulting from a 1% change in price.



$$E_P = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q / \Delta P}{Q / P}$$

# Price Elasticity and Consumer Expenditure

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***Demand***

***If Price Increases,  
Expenditures:***

***If Price Decreases,  
Expenditures:***

**Inelastic ( $E_p < 1$ )**

**Increase**

**Decrease**

**Unit Elastic ( $E_p = 1$ )**

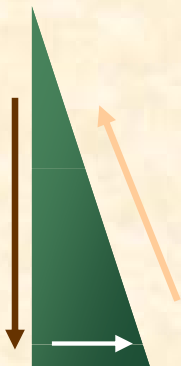
**Are unchanged**

**Are unchanged**

**Elastic ( $E_p > 1$ )**

**Decrease**

**Increase**



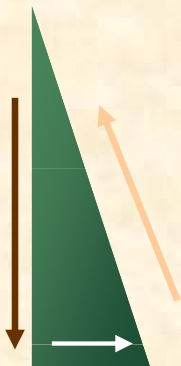
# Market Demand: Elasticity

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## ■ Point Elasticity of Demand

- **Point elasticity** measures elasticity at a point on the demand curve.
- For large price changes (e.g. 20%), the value of the elasticity will depend upon where the price and quantity lie on the demand curve.
- Problem: we may need to calculate price elasticity over a portion of the demand curve rather than at a single point. The price and quantity used as the base will alter the price elasticity of demand.



# Market Demand: Elasticity

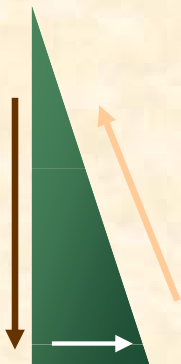
## Point Elasticity of Demand (An Example)

### ■ Assume

- As price increases from \$8 to \$10, the quantity demanded falls from 6 to 4
- Percent change in price equals:  $\$2/\$8 = 25\%$  or  $\$2/\$10 = 20\%$
- Percent change in quantity equals:  $-2/6 = -33.33\%$  or  $-2/4 = -50\%$

■ Elasticity equals:  $-33.33/25 = -1.33$  or  $-50/20 = -2.5$

■ **Which one is correct?**



# Market Demand: Elasticity

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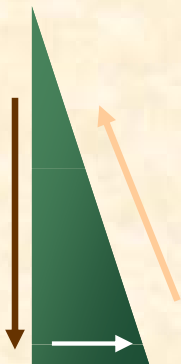
## ■ Arc Elasticity of Demand

- **Arc elasticity** calculates elasticity over a range of prices
- Its formula is:

$$E_P = (\Delta Q / \Delta P) (\bar{P} / \bar{Q})$$

$\bar{P}$  = the average price

$\bar{Q}$  = the average quantity





# Market Demand: Elasticity

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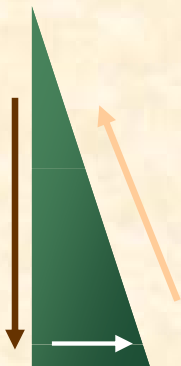
- Arc Elasticity of Demand (An Example)

$$E_P = (\Delta Q / \Delta P) (\bar{P} / \bar{Q})$$

$$P_1 = 8 \quad P_2 = 10 \quad \bar{P} = \frac{10 + 8}{2} = 9$$

$$Q_1 = 6 \quad Q_2 = 4 \quad \bar{Q} = \frac{6 + 4}{2} = 5$$

$$E_p = (-2 / \$2) (\$9 / 5) = -1.8$$

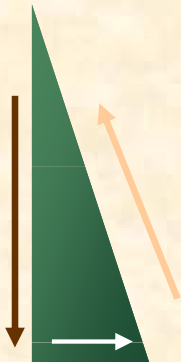


# An Example: Aggregate Demand For Wheat

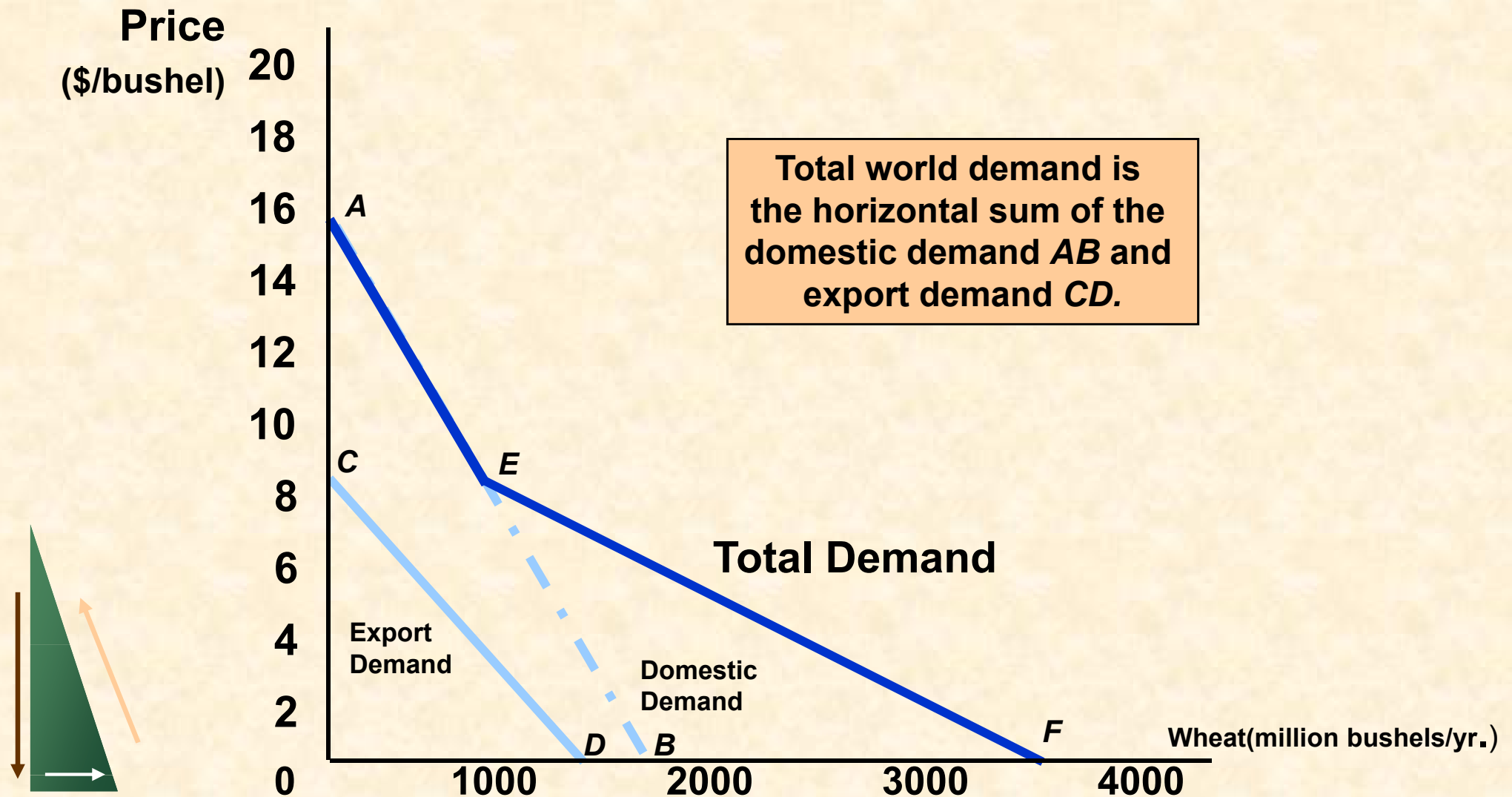
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- The demand for US wheat is comprised of domestic demand and export demand.
- The domestic demand for wheat is given by:
  - $Q_{DD} = 1700 - 107P$
- The export demand for wheat is given by:
  - $Q_{DE} = 1544 - 176P$
- Domestic demand is relatively price inelastic (-0.2), while export demand is more price elastic (-0.4).



# The Aggregate Demand For Wheat

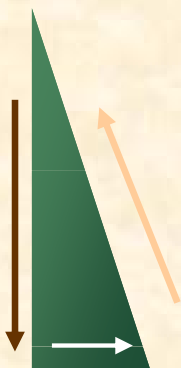


# Consumer Surplus

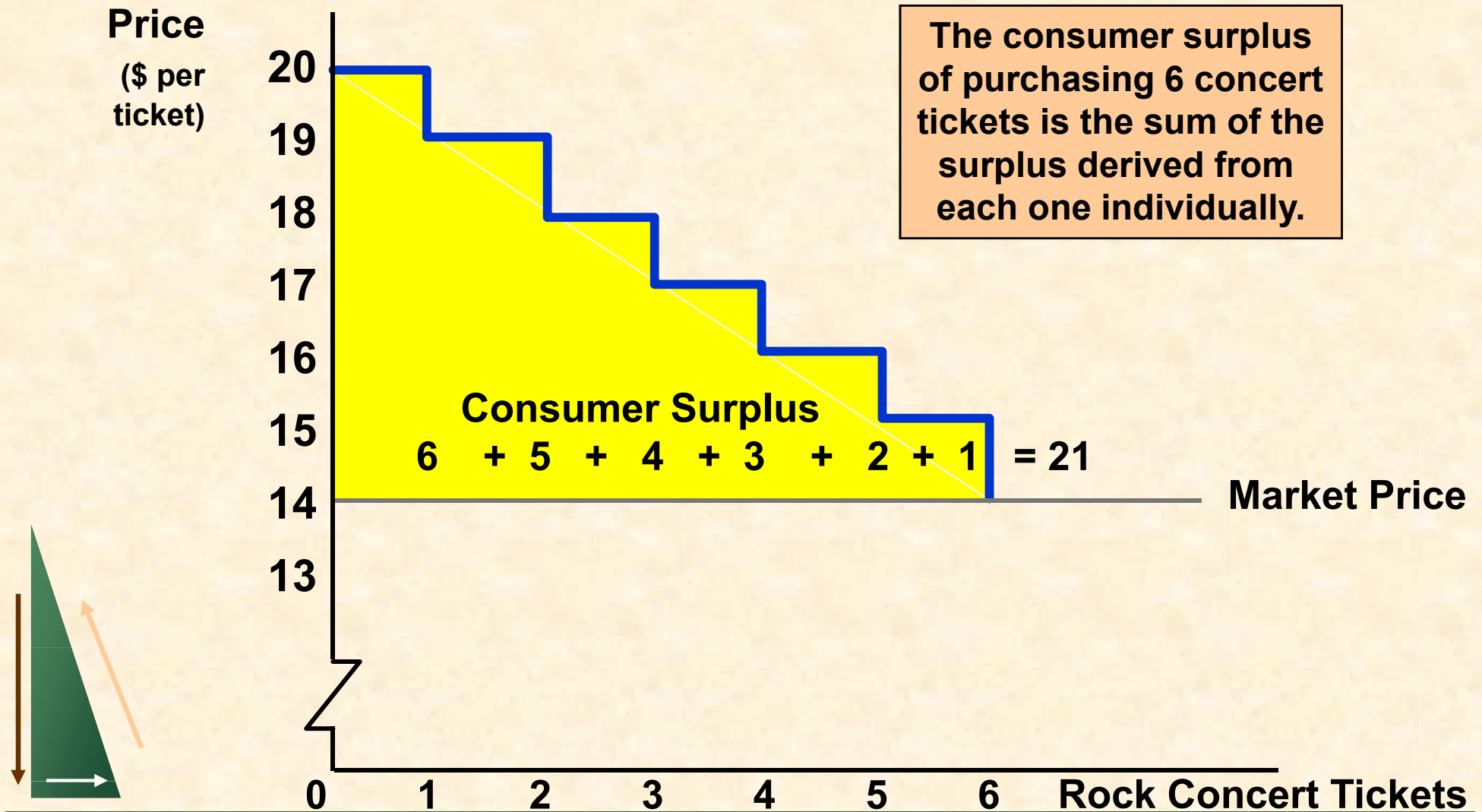
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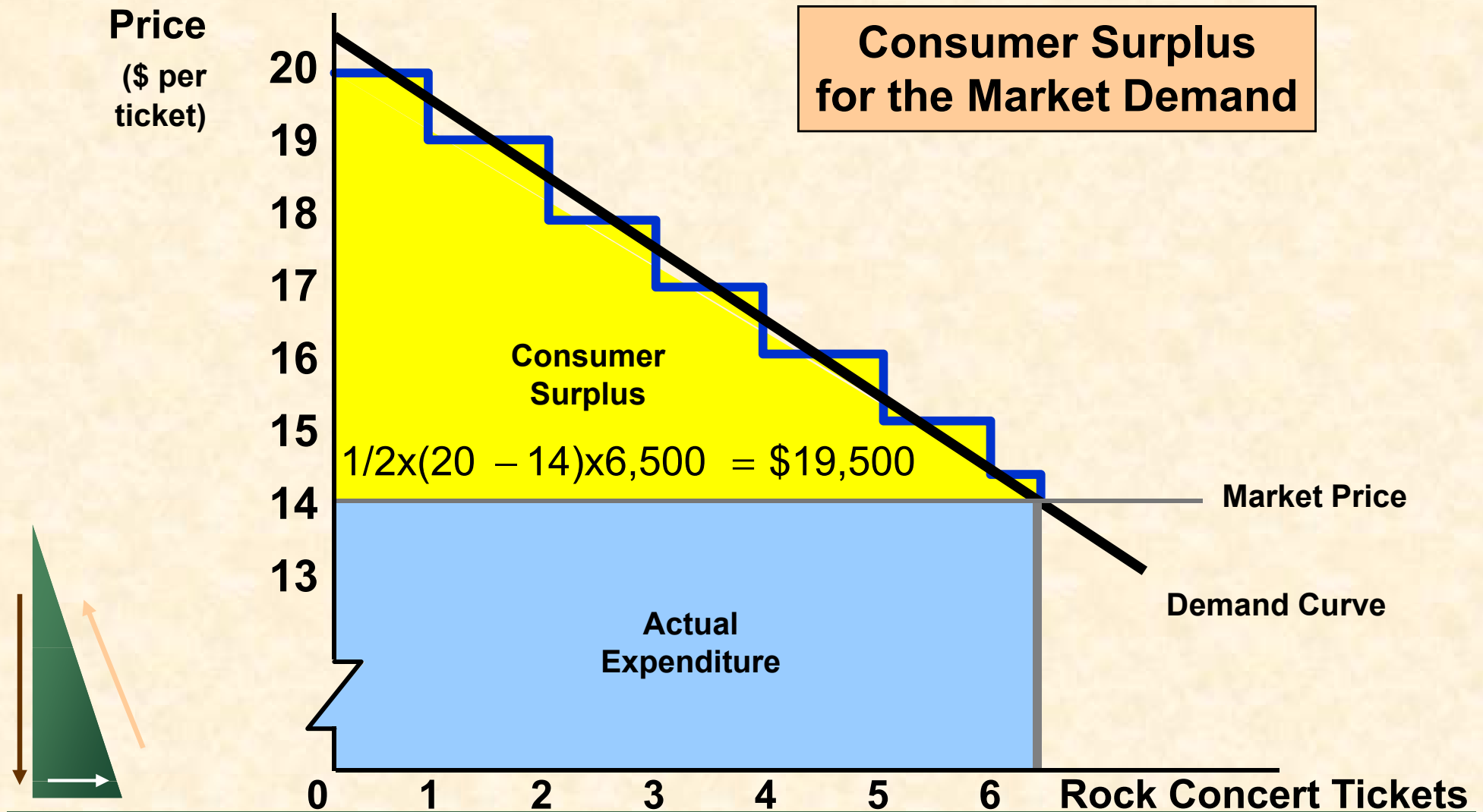
- **Consumer Surplus:** the difference between the maximum amount a consumer is willing to pay for a good and the amount actually paid.
- Combining consumer surplus with the aggregate profits that producers obtain we can evaluate:
  - 1) Costs and benefits of different market structures
  - 2) Public policies that alter the behavior of consumers and firms



# Consumer Surplus



# Consumer Surplus

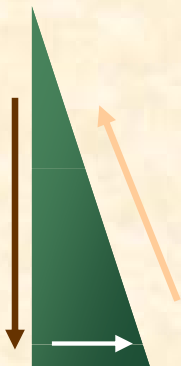


# Network Externalities

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- Up to this point we have assumed that people's demands for a good are independent of one another.
- In fact, a person's demand may be affected by the number of other people who have purchased the good. If this is the case, a network externality exists.

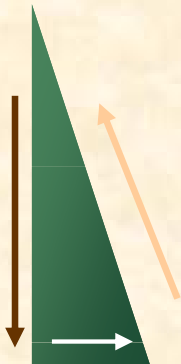


# Positive Network Externalities

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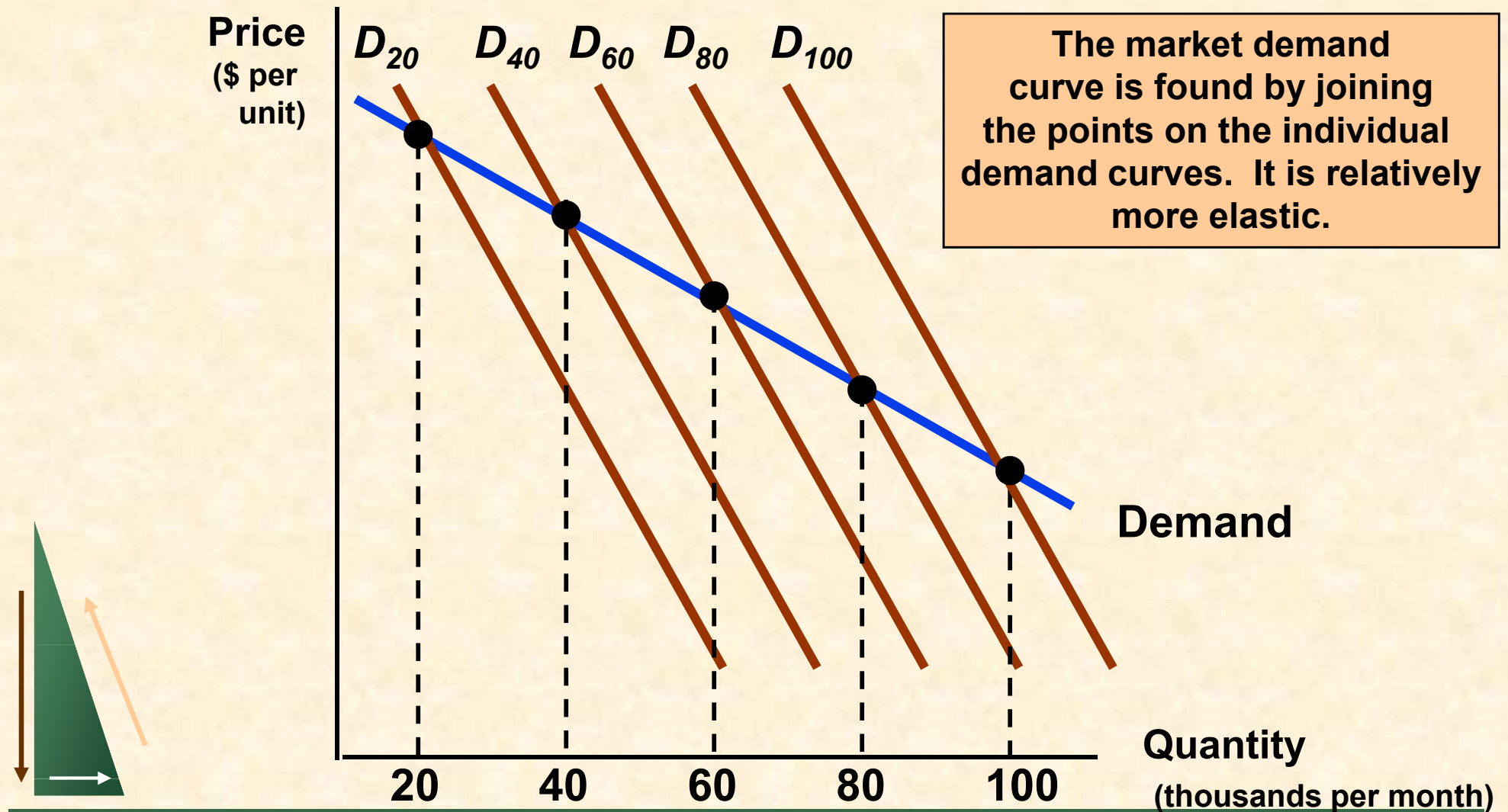
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- *Positive network externality*: the quantity of a good demanded by a consumer increases in response to an increase in purchases by other consumers.
- The Bandwagon Effect
  - This is the desire to be in style, to have a good because almost everyone else has it, or to indulge in a fad.
  - This is the major objective of marketing and advertising campaigns (e.g. toys, clothing).

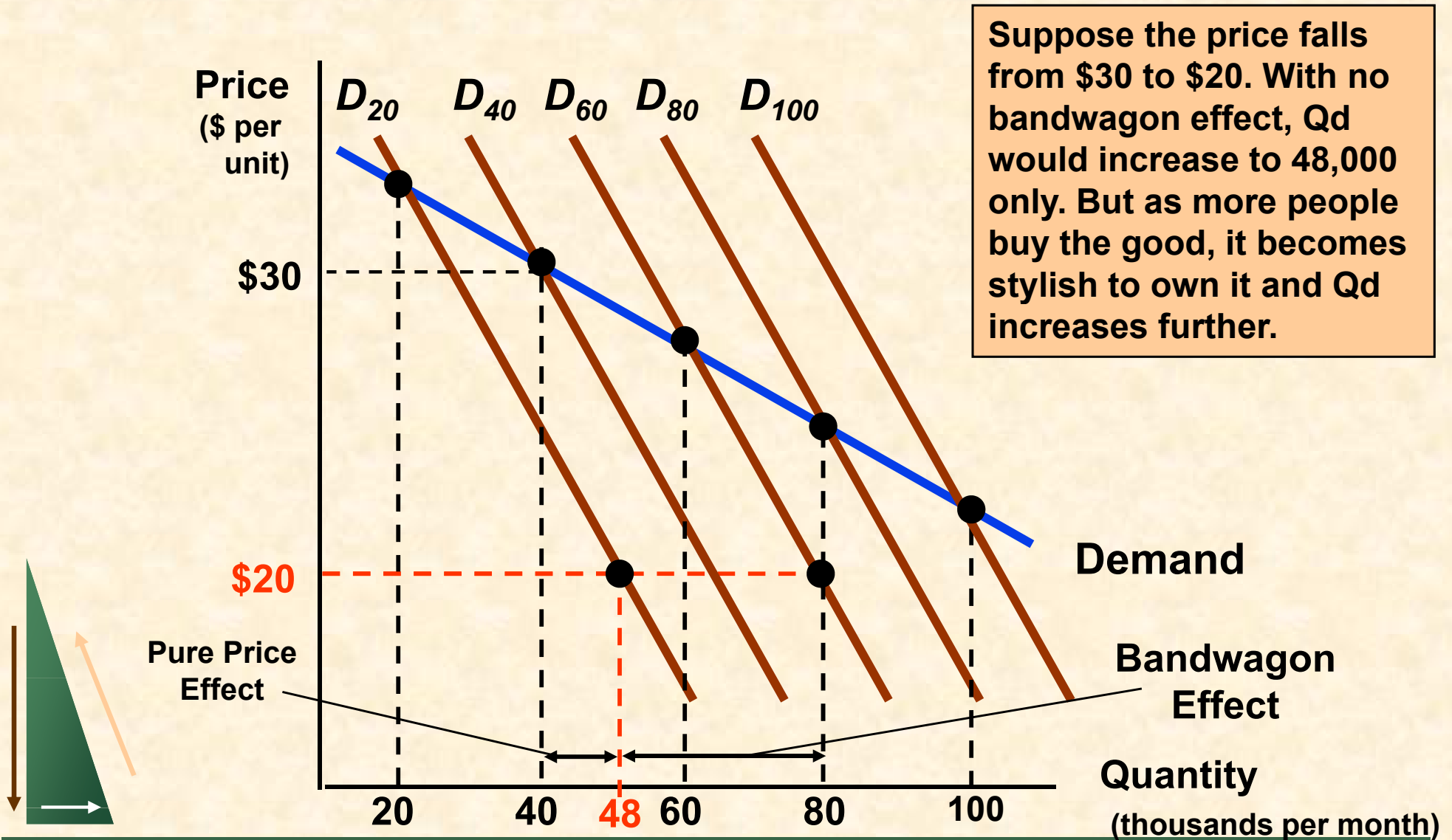




# Positive Network Externality: Bandwagon Effect



# Positive Network Externality: Bandwagon Effect

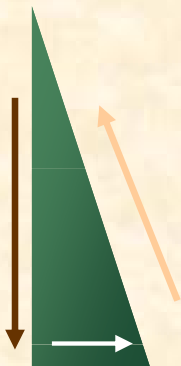


# Negative Network Externalities

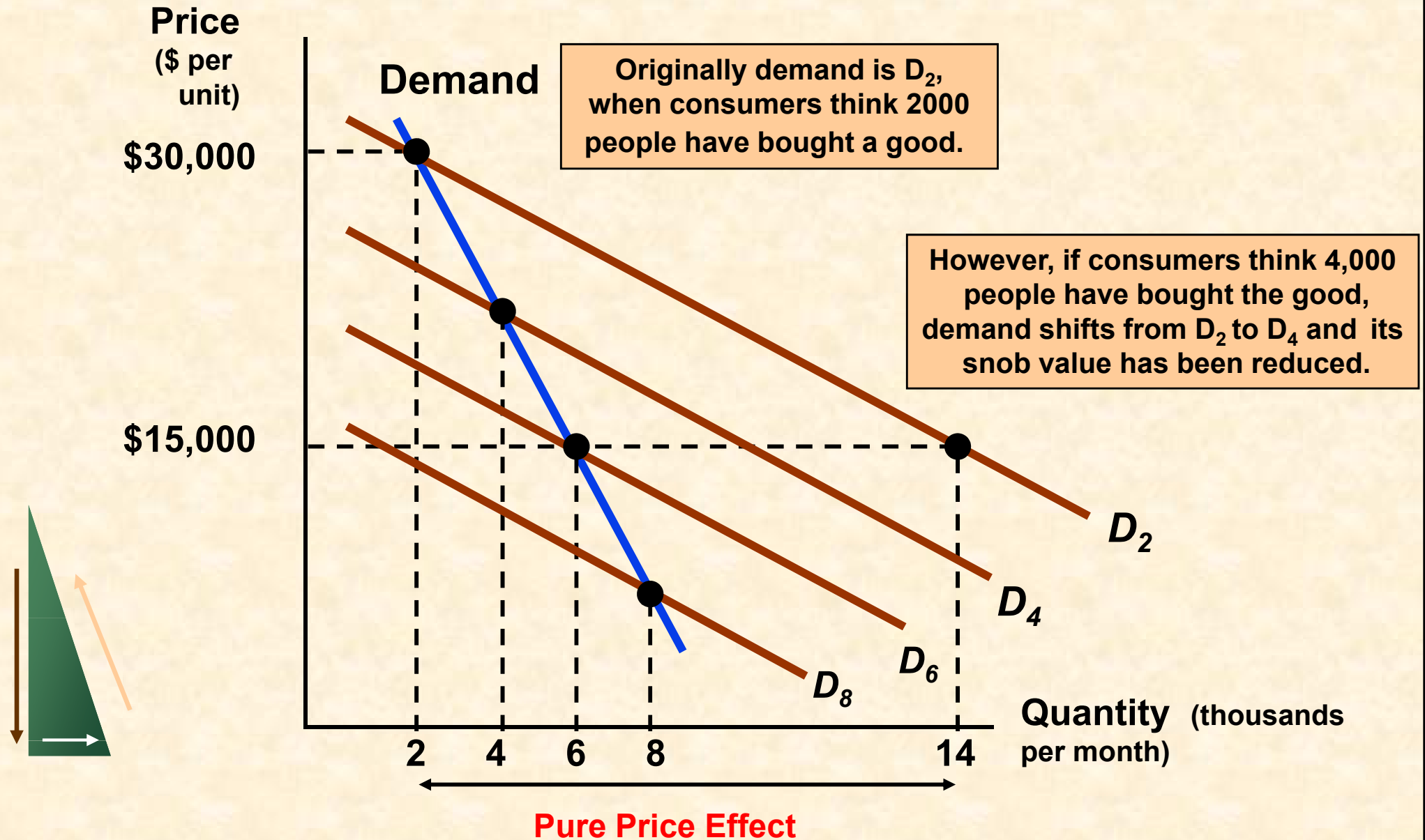
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- If the network externality is negative, a **snob effect** exists = the desire to own exclusive or unique goods.
- The quantity demanded of a “snob” good is higher the *fewer* the people who own it.



# Negative Network Externality: Snob Effect



# Negative Network Externality: Snob Effect

