LECTURE 3: Theory of Demand

- Individual Demand
- Income and Substitution Effects
- Market Demand
- Consumer Surplus
- Network Externalities
- Empirical Estimation of Demand

Cost-of-Living Indexes 생계비 지수

- Social security payments are given to qualifying individuals
- COLA, Cost-of-Living Adjustment
- Each year the benefit increases equal to the rate of increase of the Consumer Price Index (CPI)
  - Ratio of the present cost of typical bundle of goods/services in comparison to the cost during a base period

Cost-of-Living Indexes

- Does the CPI give a good measure of inflation and therefore a measure of the cost of living changes?
- Should the CPI be used to measure how much cost of living has increased determining increases in government payment programs?

Cost-of-Living Indexes

- The ideal cost of living index represents the cost of attaining a given level of utility at current prices relative to the cost of attaining the same utility at base prices

Cost-of-Living Indexes

- To obtain the ideal cost of living index would require too much information such as consumer preferences as well as prices and expenditures
- Actual price indexes are based on consumer purchases, not preferences

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Laspeyres price index and Paasche price index

- **Laspeyres price index**
  - Amount of money at current year prices that an individual requires to purchase a bundle of goods and services chosen in a base year divided by the cost of purchasing the same bundle at base-year prices.
- **Paasche price index**
  - Amount of money at current-year prices that an individual requires to purchase a current bundle of goods and services divided by the cost of purchasing the same bundle in a base year.

Cost-of-Living Indexes

- The Laspeyres price index assumes that consumers do not alter their consumption patterns as prices change
- Tend to overstate the true cost of living index
- Using the CPI to adjust retirement benefits will tend to overcompensate most recipients requiring greater government expenditure

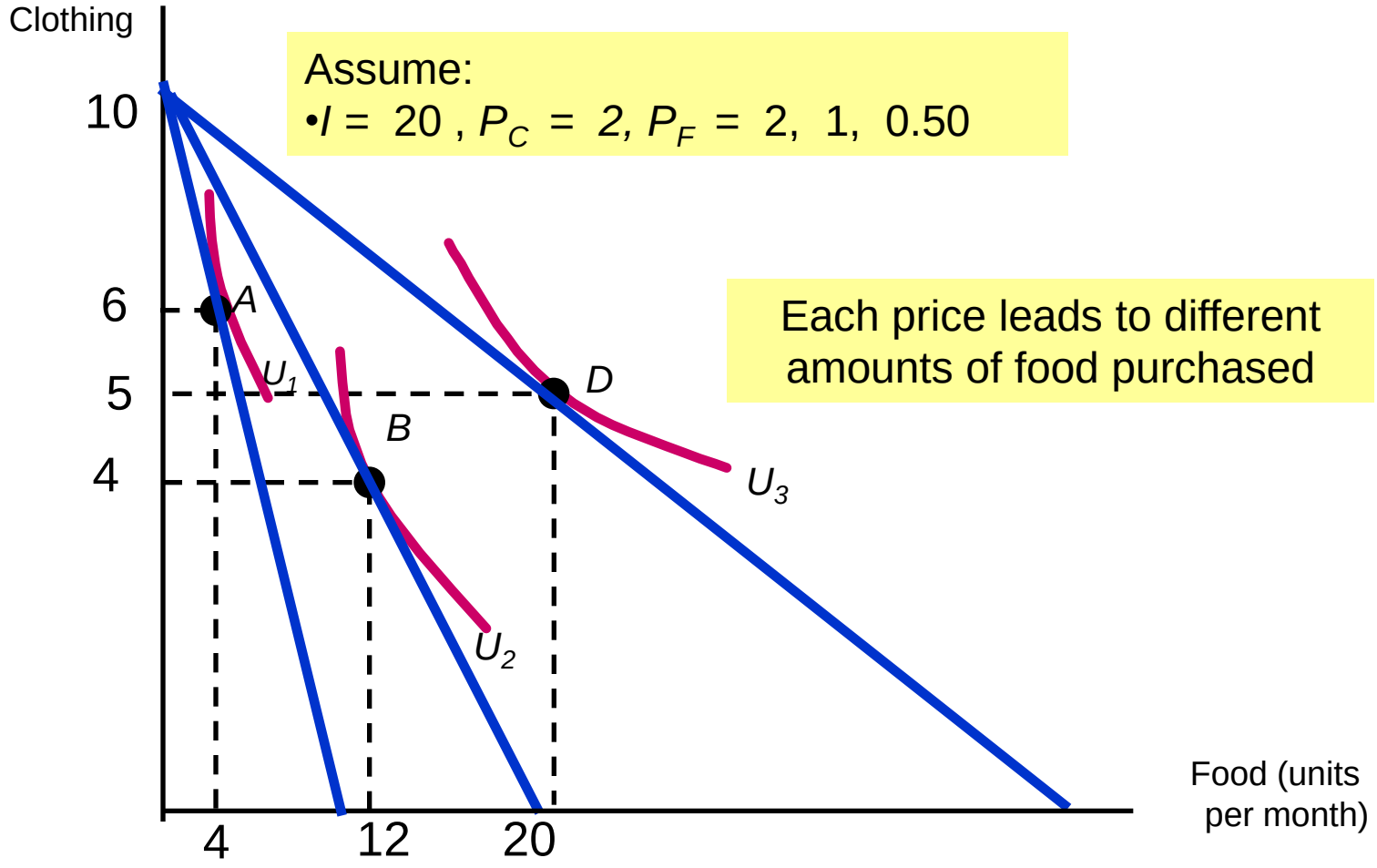
Individual Demand 개인수요

- Price Changes
  - Using the figures developed in the previous chapter, the impact of a change in the price of food can be illustrated using indifference curves.
  - For each price change, we can determine how much of the good the individual would purchase given their budget lines and indifference curves

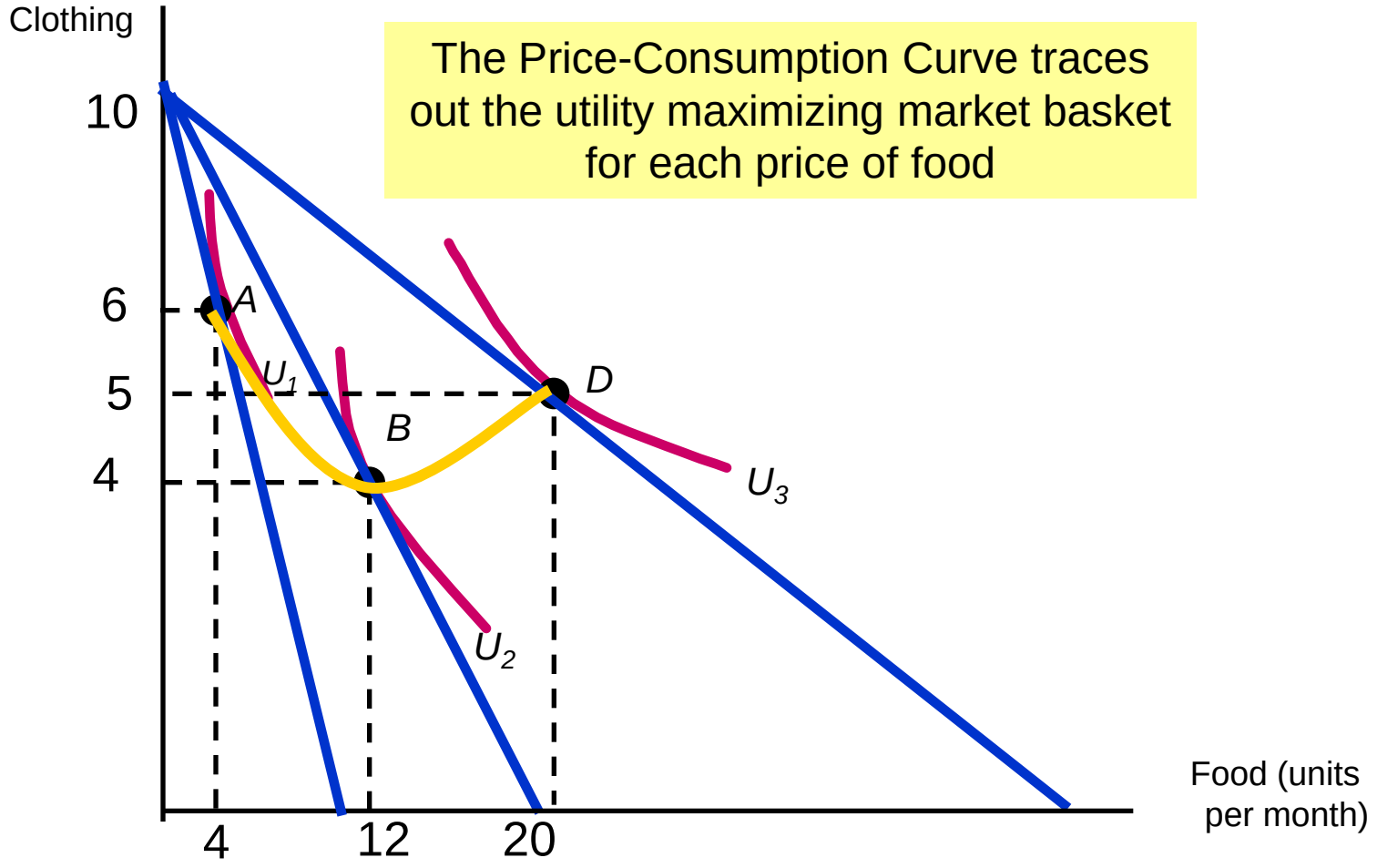
Individual Demand 개인수요

- Price Changes
  - **price-consumption curve** 가격-소비곡선
  - 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.

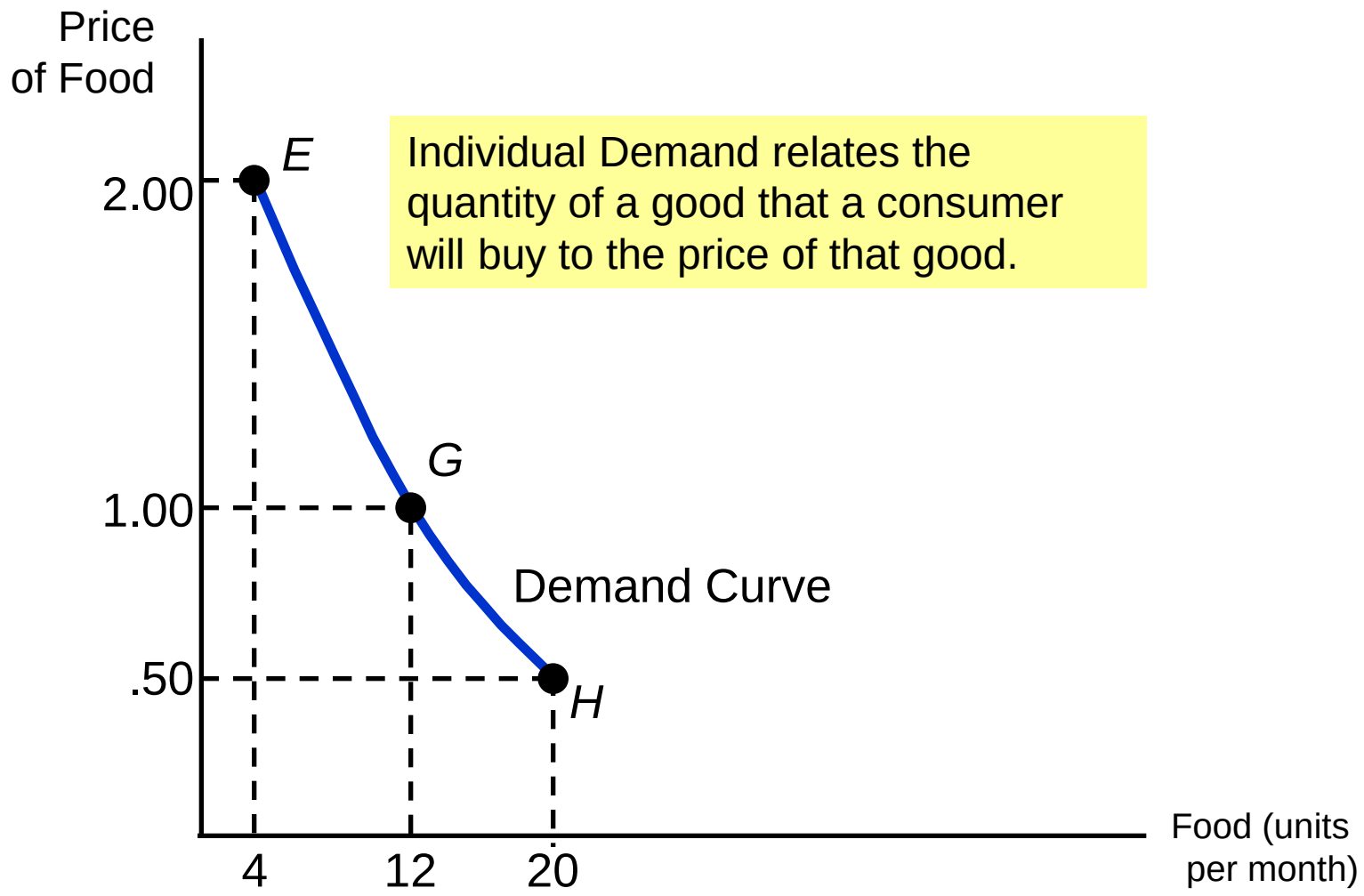
Effect of a Price Change



Effect of a Price Change



Effect of a Price Change



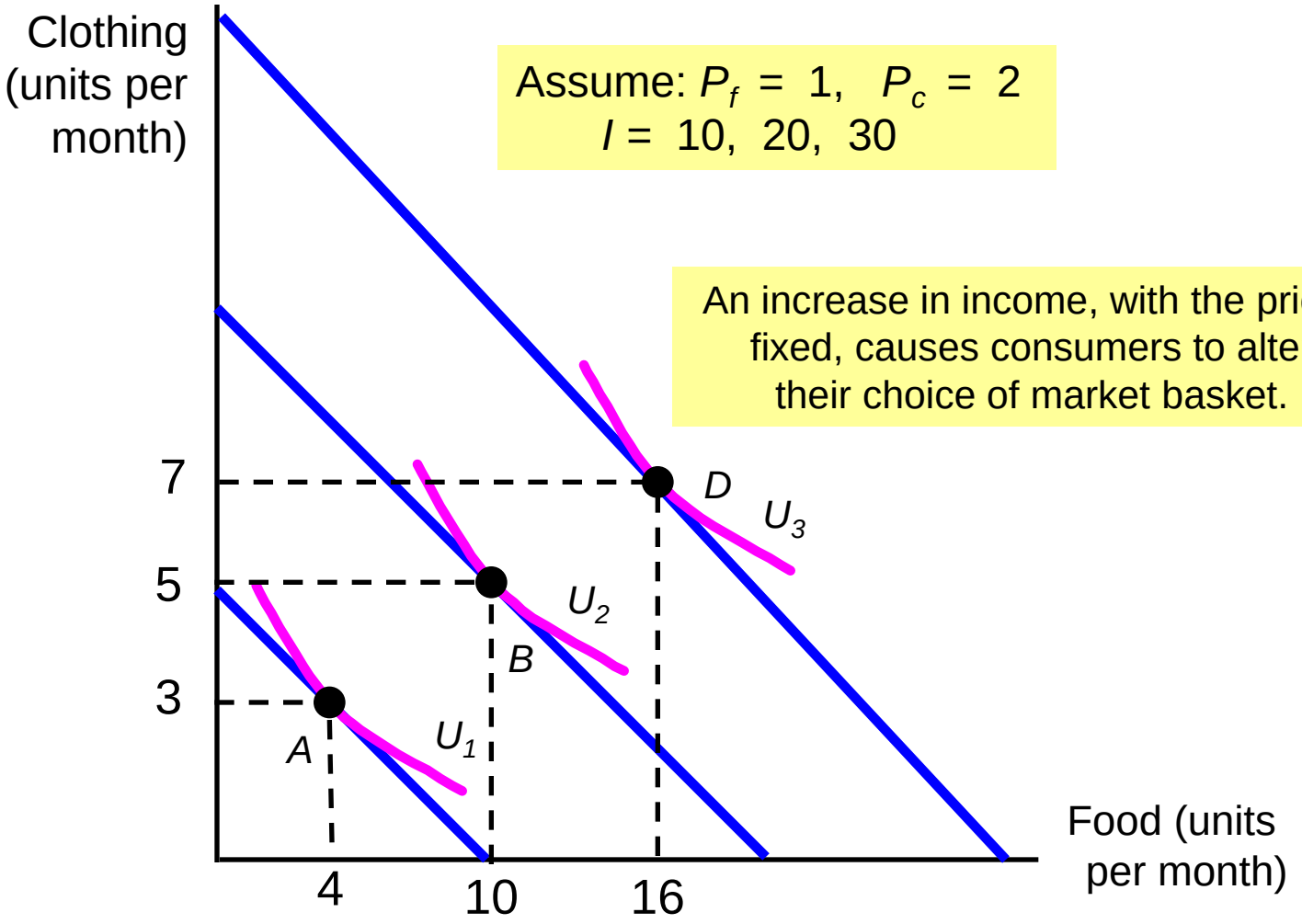
Demand Curves: Important Properties

- The level of utility that can be attained changes as we move along the curve.
- 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: 소득-수요 곡선

- Income Changes
  - Using the figures developed in the previous chapter, the impact of a change in the income can be illustrated using indifference curves.
  - Changing income, with prices fixed, causes consumer to change their market baskets.
  - The income-consumption curve 소득-수요 곡선
    - traces out the utility-maximizing combinations of food and clothing associated with every income level.

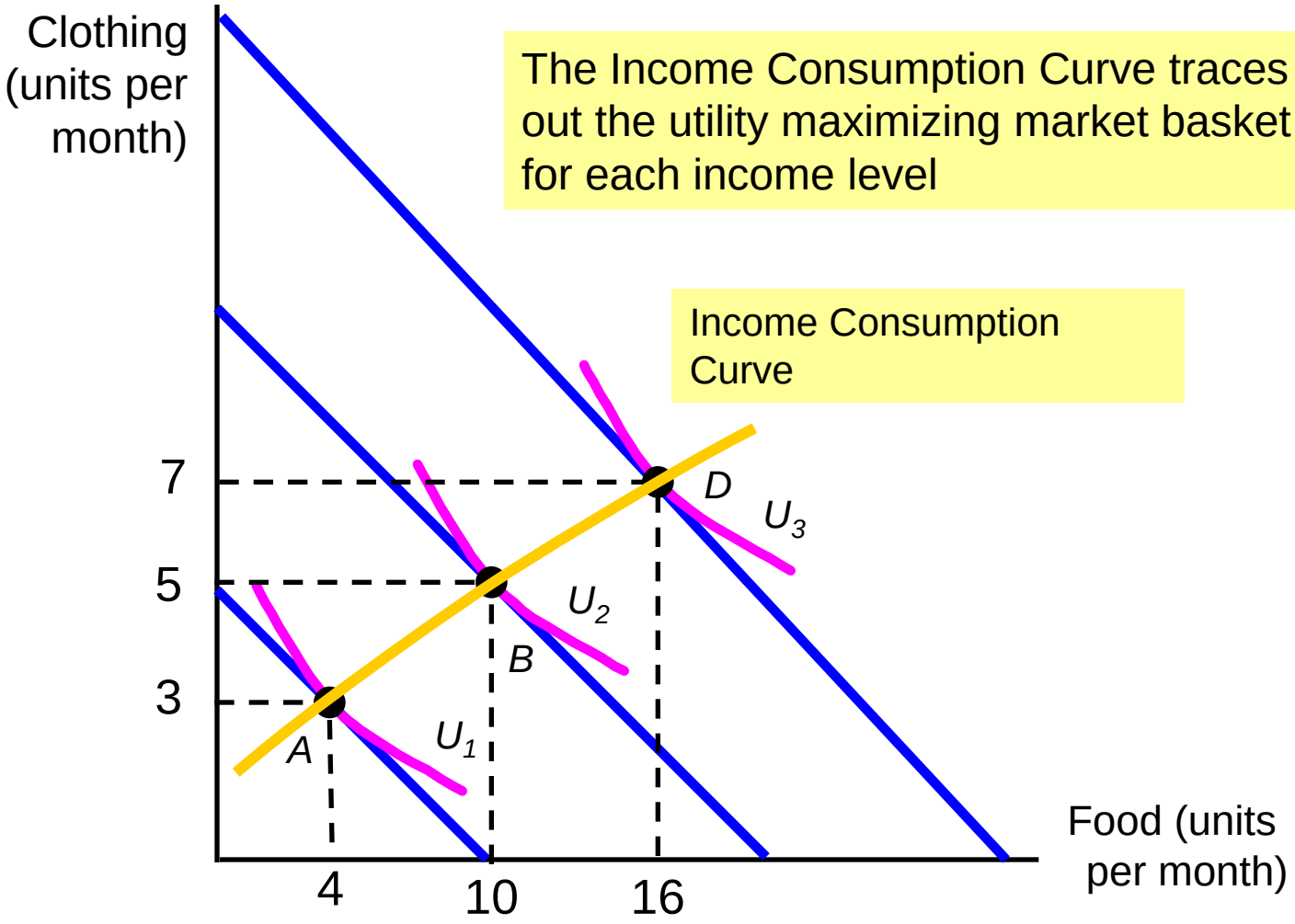
Effects of Income Changes



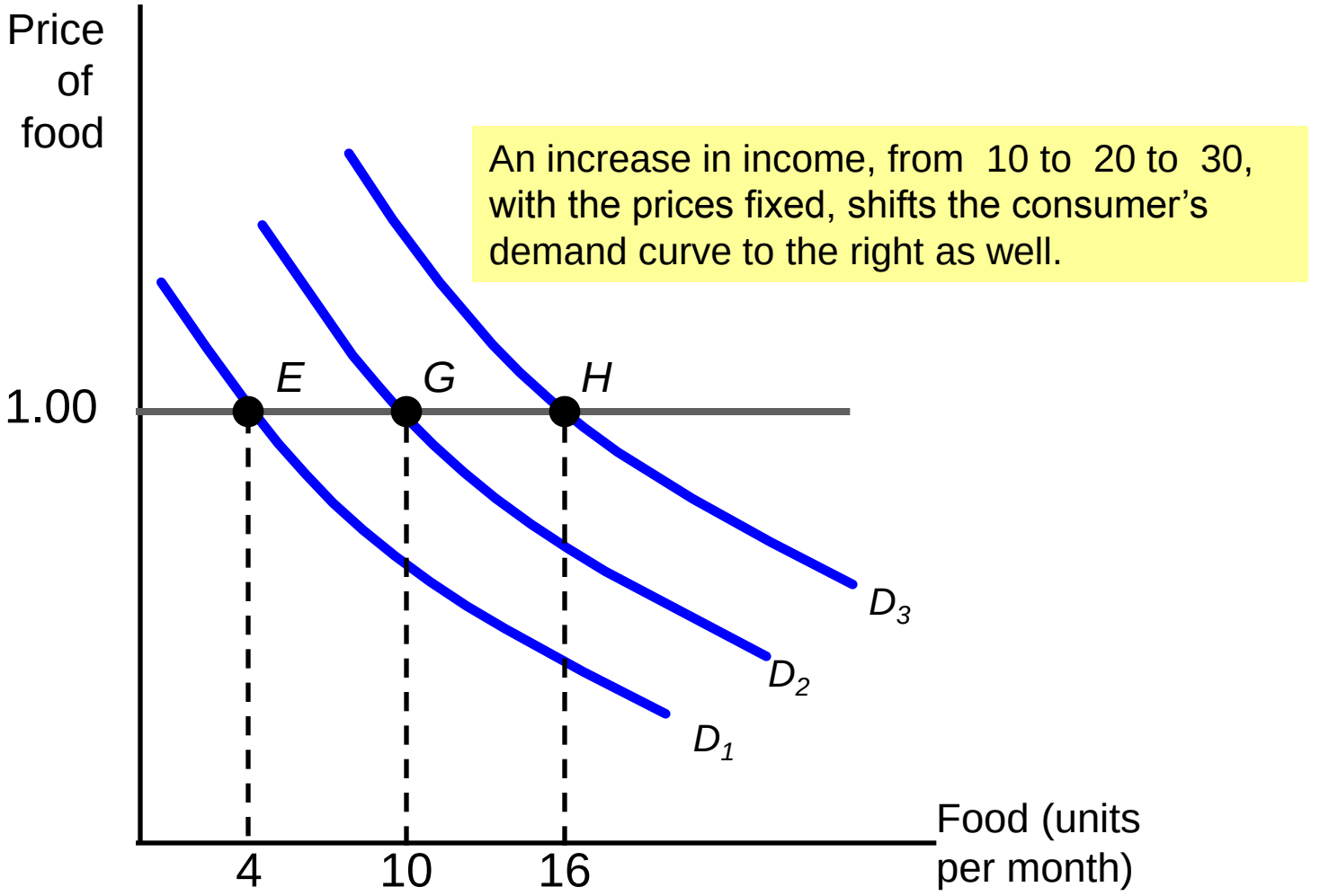
Individual Demand

- Income Changes
  - An increase in income shifts the budget line to the right, increasing consumption along the income-consumption curve.
  - Simultaneously, the increase in income shifts the demand curve to the right.

Effects of Income Changes



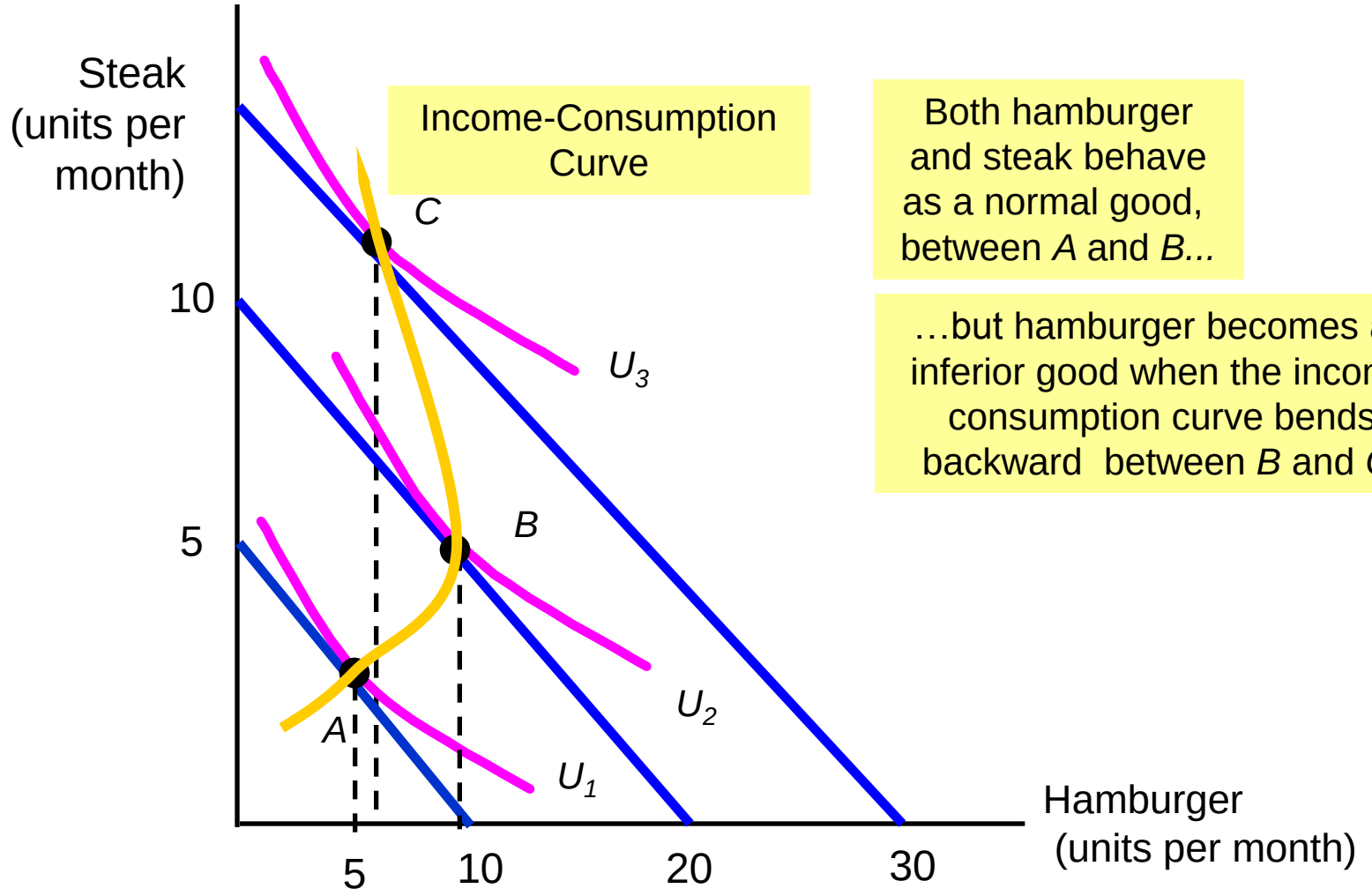
Effects of Income Changes



Normal Goods 정상재 versus Inferior Goods 열등재

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

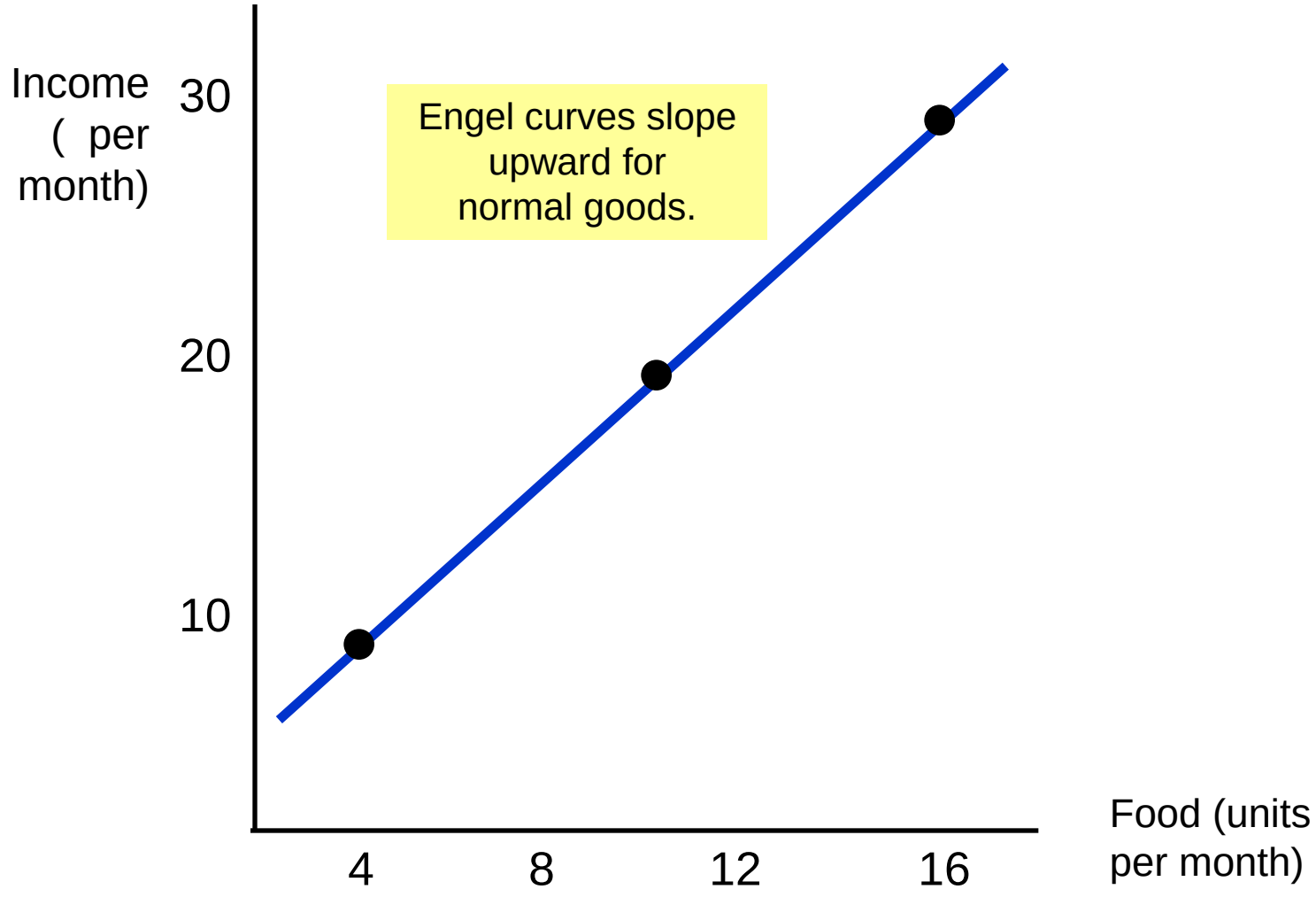
An Inferior Good



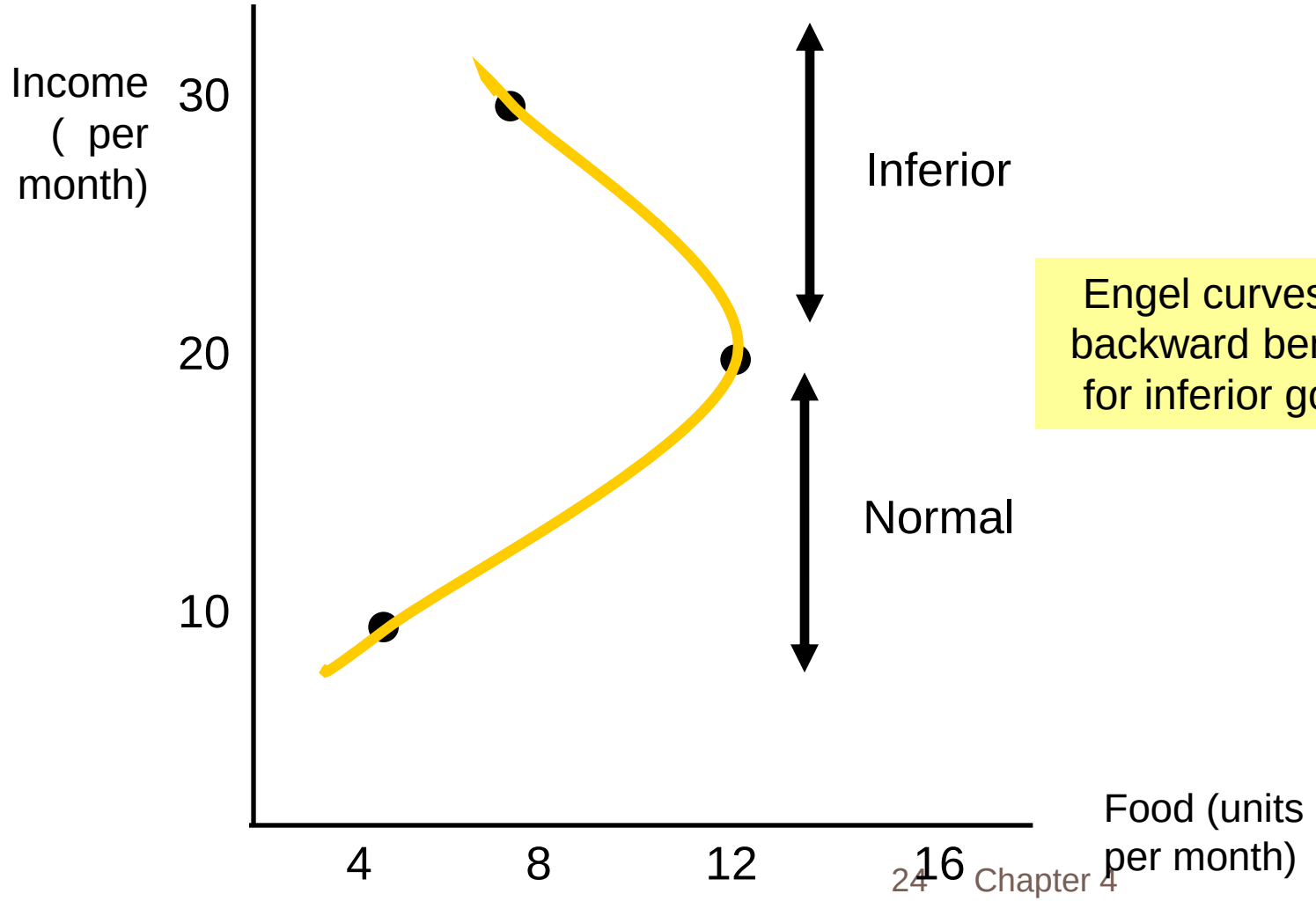
Individual Demand

- Engel Curves 엔겔 곡선
  - 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



Engel Curves



Engel curves are backward bending for inferior goods.

Substitutes 대체재 & Complements 보완재

- Two goods are considered substitutes if an increase (decrease) in the price of one leads to an increase (decrease) in the quantity demanded of the other.
  - Ex: movie tickets and video rentals
- Two goods are considered complements if an increase (decrease) in the price of one leads to a decrease (increase) in the quantity demanded of the other.
  - Ex: gasoline and motor oil

Substitutes & Complements

- Two goods are independent then a change in the price of one good has no effect on the quantity demanded of the other
  - Ex: chicken and airplane tickets
- If the price consumption curve is downward-sloping, the two goods are considered substitutes.
- If the price consumption curve is upward-sloping, the two goods are considered complements.
  - They could be both Substitutes & Complements.

Income and Substitution Effects

- A change in the price of a good has two effects:
  - Substitution Effect 대체효과
  - Income Effect 소득효과
- Substitution Effect
  - Relative price of a good changes when price changes
  - Consumers will tend to buy more of the good that has become relatively cheaper, and less of the good that is relatively more expensive.

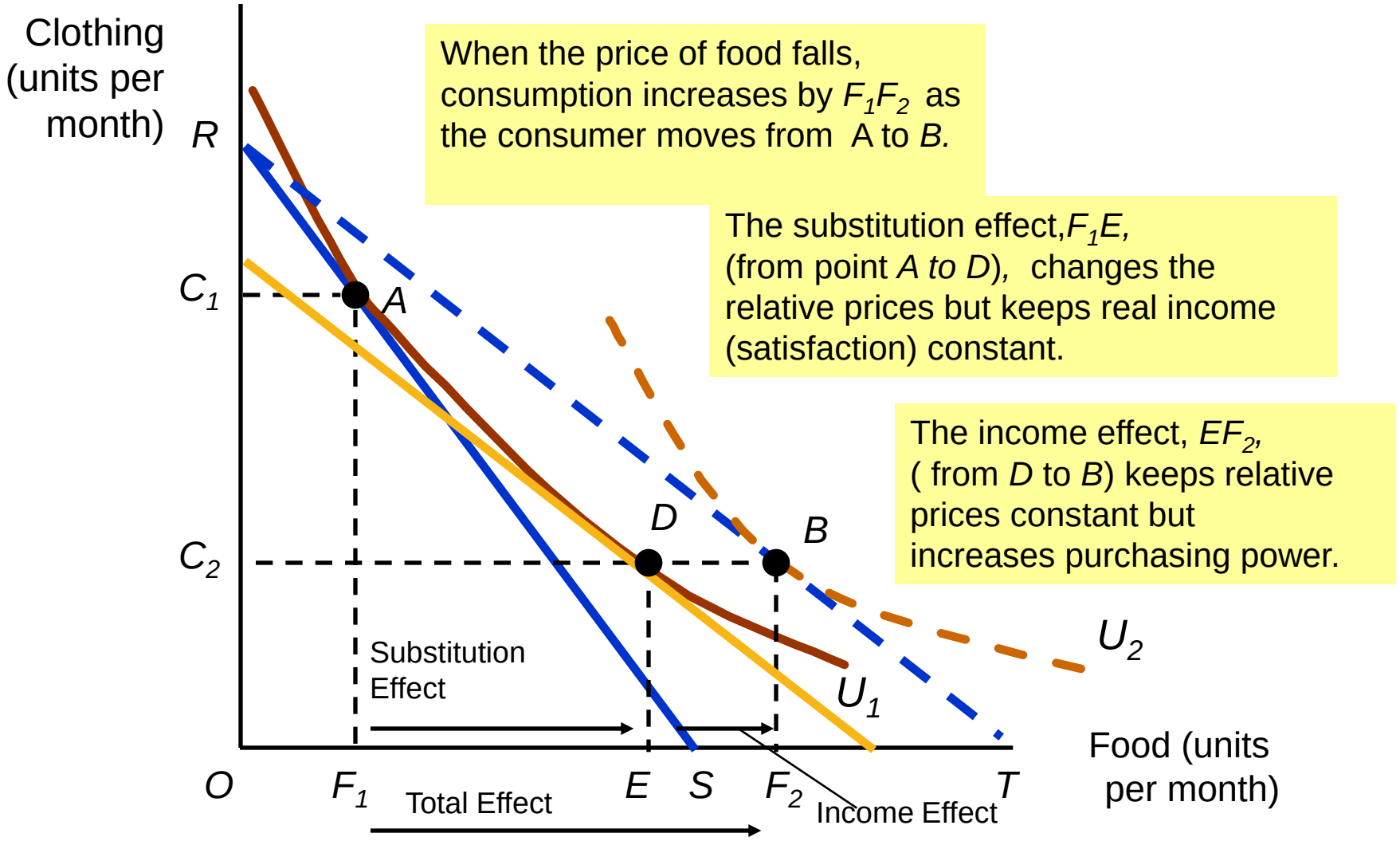
Income and Substitution Effects

- Income Effect
  - Consumers experience an increase in real purchasing power when the price of one good falls.
- Substitution Effect
  - 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 demanded of the good.

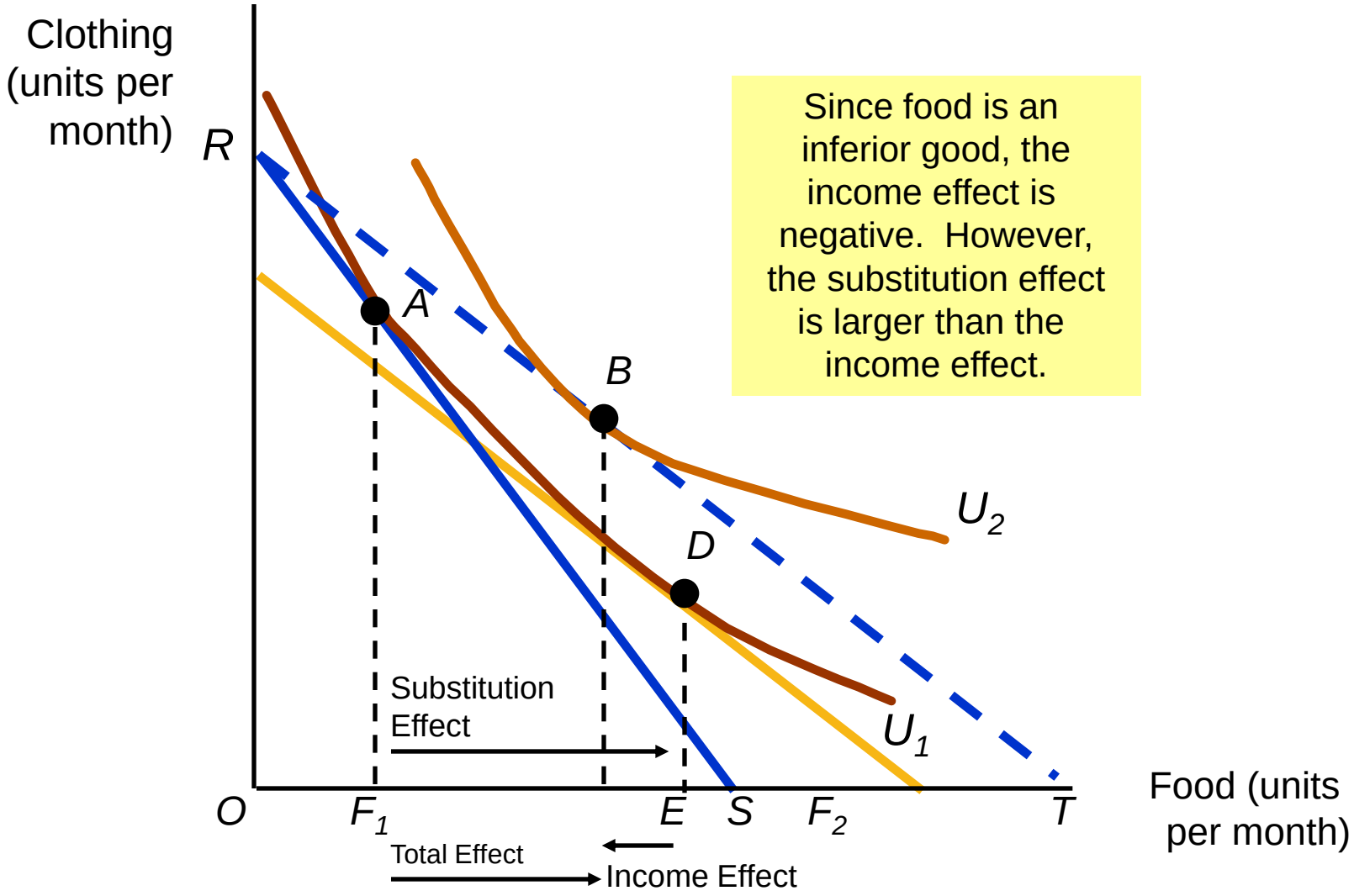
Income and Substitution Effects

- Income Effect
  - The income effect is the change in an item's consumption brought about by the increase in purchasing power, with the **price of the item held constant**.
  - When a person's 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



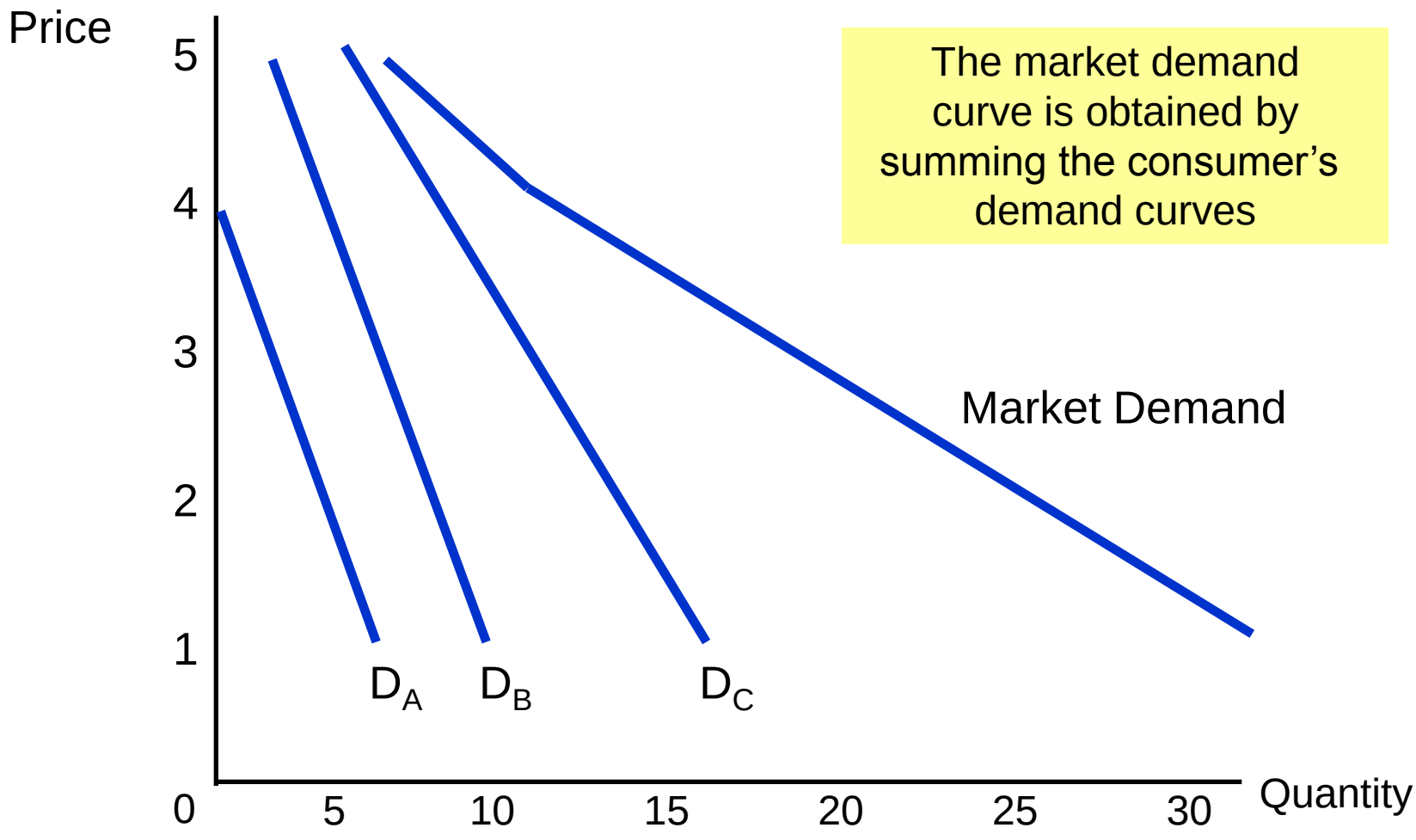
Income and Substitution Effects

- A Special Case--The Giffen Good
  - The income effect may theoretically be large enough to cause the demand curve for a good to slope upward.
  - This rarely occurs and is of little practical interest.

Market Demand

- Market Demand Curves
  - A curve that relates the quantity of a good that all consumers in a market buy to the price of that good.
  - The sum of all the individual demand curves in the market

Summing to Obtain a Market Demand Curve 시장수요곡선



Market Demand

- From this analysis one can see two important points
  - The market demand will shift to the right as more consumers enter the market.
  - Factors that influence the demands of many consumers will also affect the market demand.
- Aggregation is important to be able to discuss demand for different groups
  - Households with children
  - Consumers aged 20 – 30, etc.

Market Demand

- Price Elasticity of Demand
  - Measures the percentage change in the quantity demanded resulting from a percent change in price.

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

Price Elasticity of Demand

- Inelastic Demand
  - E_p is less than 1 in absolute value
  - Quantity demanded is relative unresponsive to a change in price
  - $\%\Delta Q < \%\Delta P$
  - Total expenditure (P*Q) increases when price increases

Price Elasticity of Demand

- Elastic Demand
  - E_p is greater than than 1 in absolute value
  - Quantity demanded is relative responsive to a change in price
  - $\%\Delta Q > \%\Delta P$
  - Total expenditure (P*Q) decreases when price increases

Price Elasticity of Demand

- Isoelastic Demand
  - When price elasticity of demand is constant along the entire demand curve
  - Demand curve is bowed inward (not linear)

The Aggregate Demand For Wheat

- The demand for U.S. wheat is comprised of two components
  - Domestic demand
  - Export demand
- Total demand for wheat can be obtained by aggregating these two demands

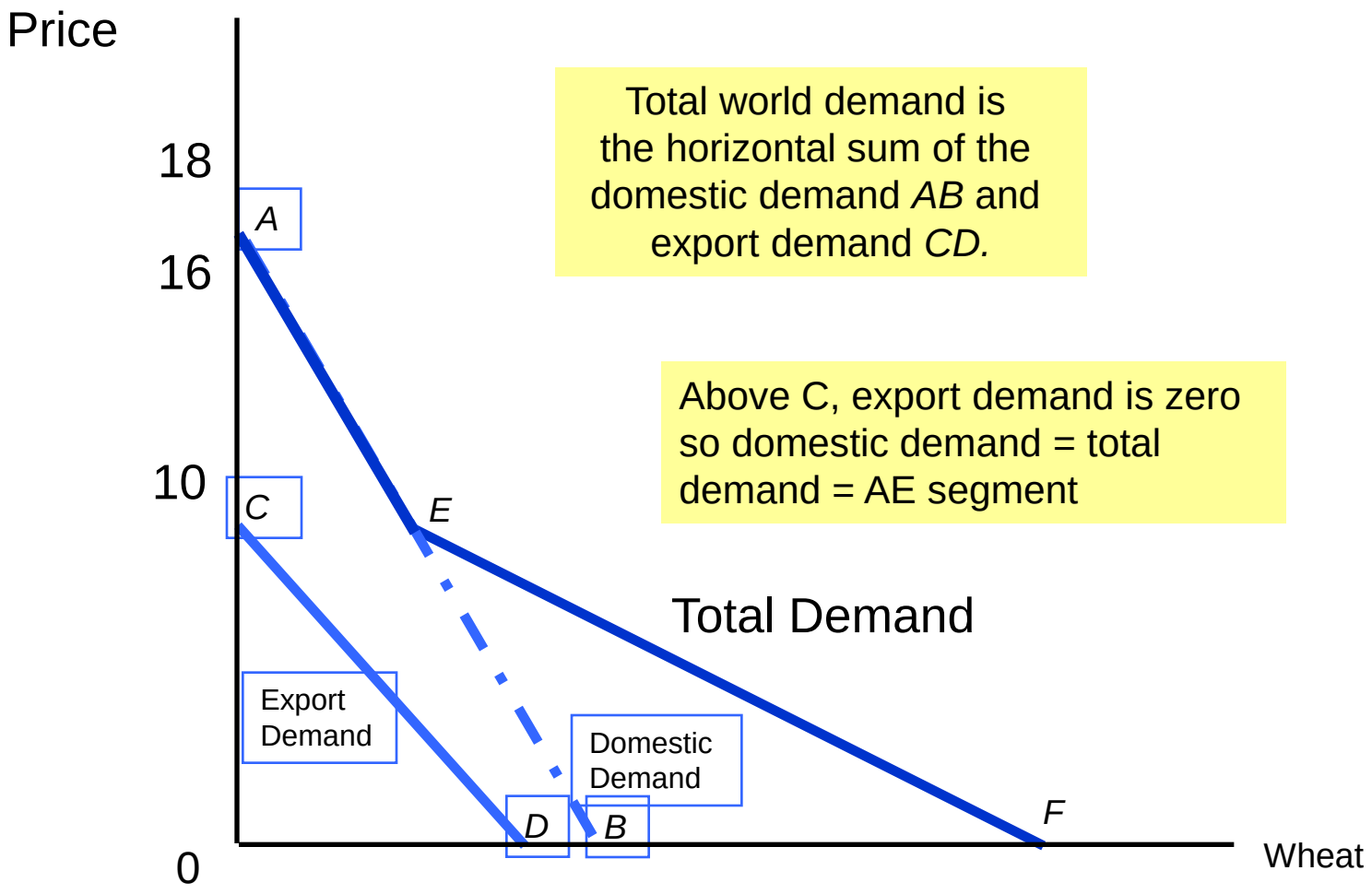
The Aggregate Demand For Wheat

- The domestic demand for wheat is given by the equation:
  - QDD = 1465 - 88P
- The export demand for wheat is given by the equation:
  - QDE = 1344 - 138P

The Aggregate Demand For Wheat

- Domestic demand is relatively price inelastic (Ed = -0.2)
- Export demand is more price elastic (Ed = -0.4).
  - Poorer countries that import US wheat turn to other grains and food if wheat prices increase

The Aggregate Demand For Wheat



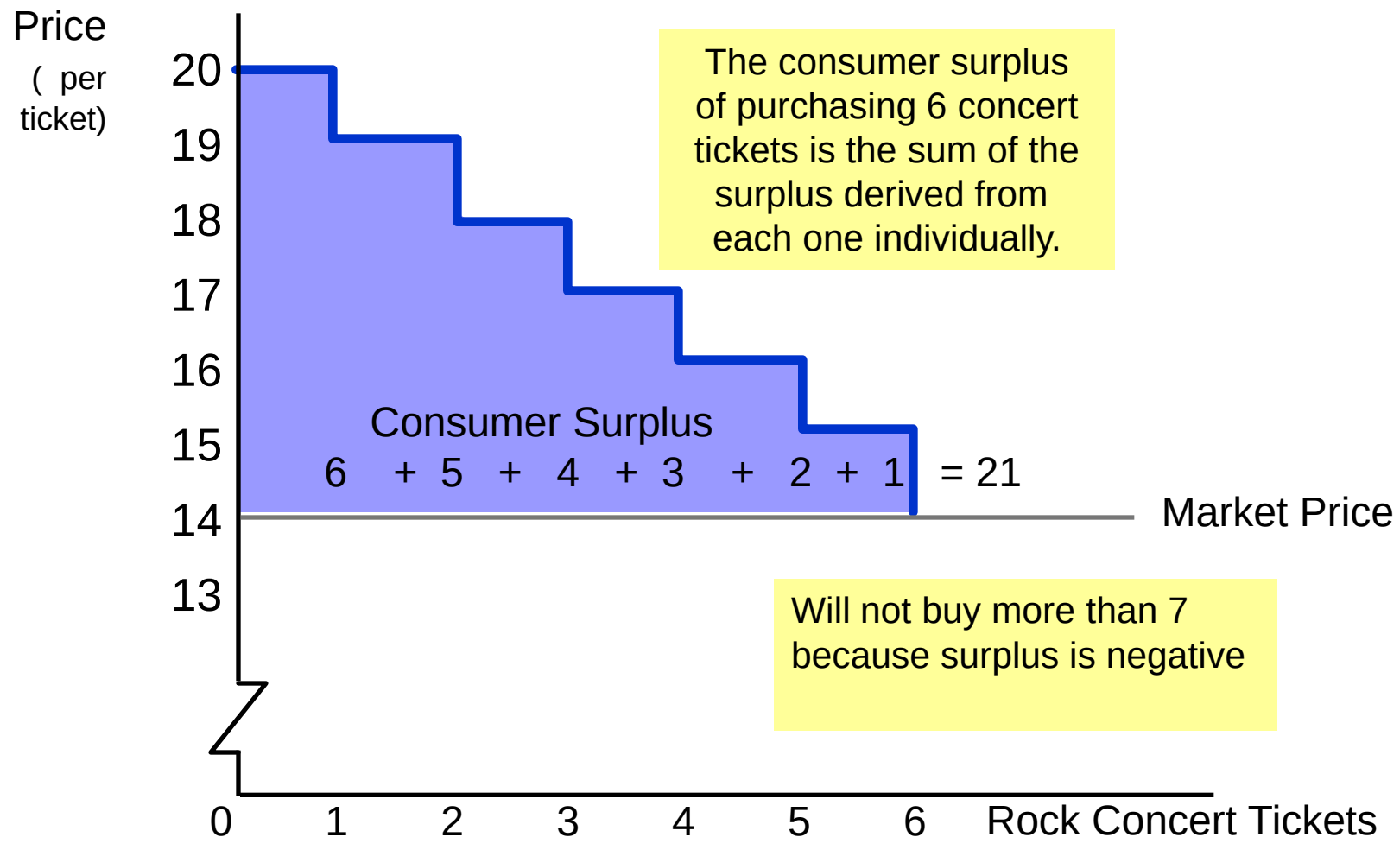
Consumer Surplus 소비자 잉여

- **Consumer Surplus** 소비자 잉여
  - The difference between the maximum amount a consumer is willing to pay for a good and the amount actually paid.
  - Can calculate consumer surplus from the demand curve
- Consumers buy goods because it makes them better off
- Consumer Surplus measures how much better off they are

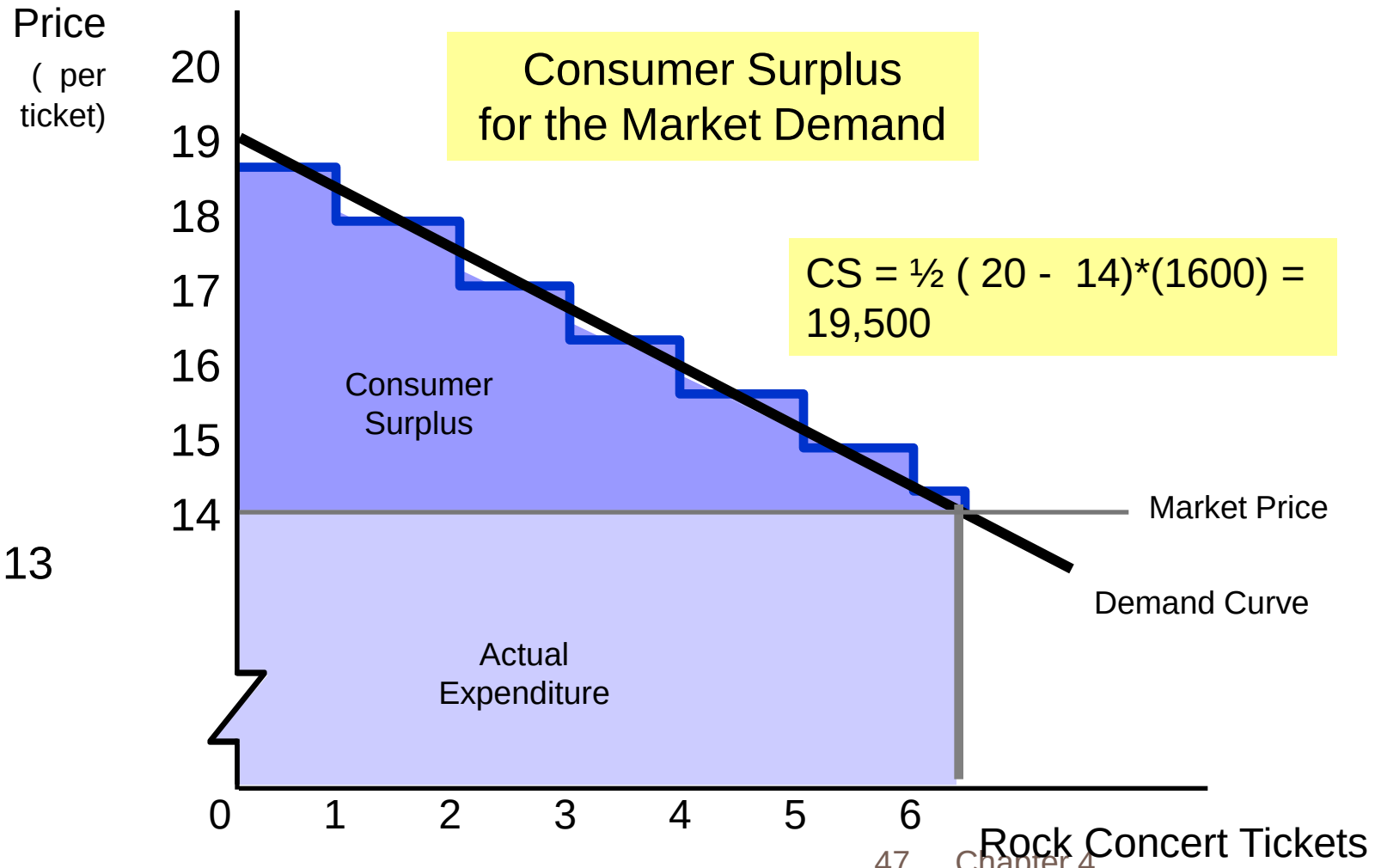
Consumer Surplus - Example

- Student wants to buy concert tickets
- Demand curve tells us willingness to pay for each concert ticket
  - 1st ticket worth 20 but price is 14 so student generates 6 worth of surplus
  - Can measure this for each ticket
  - Total surplus is addition of surplus for each ticket purchased

Consumer Surplus - Example



Consumer Surplus



Network Externalities 망(그물)외부성

- Up to this point we have assumed that people's demands for a good are independent of one another.
- For some goods, one person's demand also depends on the demands of other people
- If this is the case, a **network externality** exists.
- Network externalities can be positive or negative.

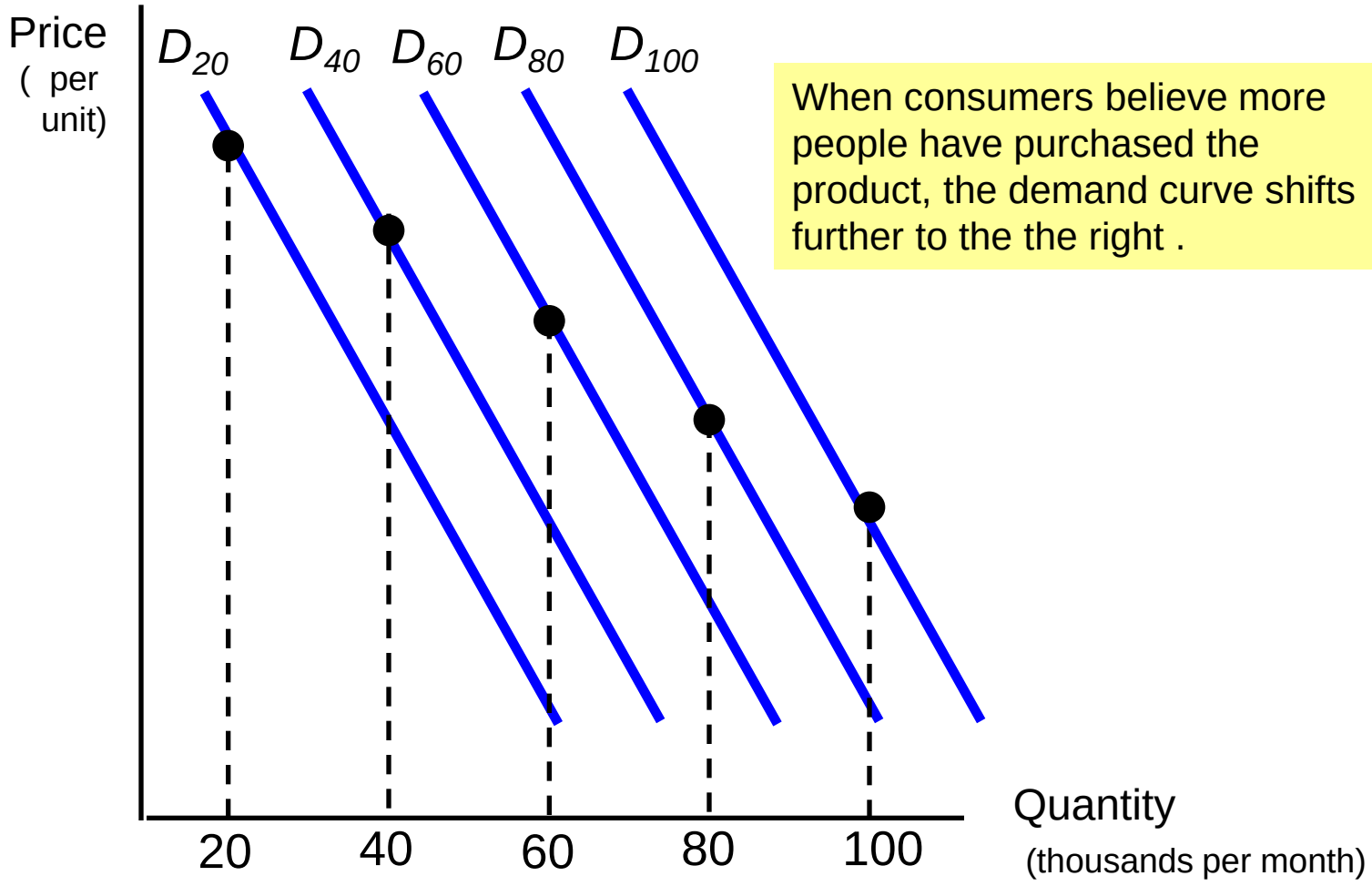
Network Externalities

- A *positive network externality* *편승 또는 동승효과* exists if the quantity of a good demanded by a consumer increases in response to an increase in purchases by other consumers.
- *Negative network externalities* (The Snob Effect) 속물효과 are just the opposite.

Network Externalities

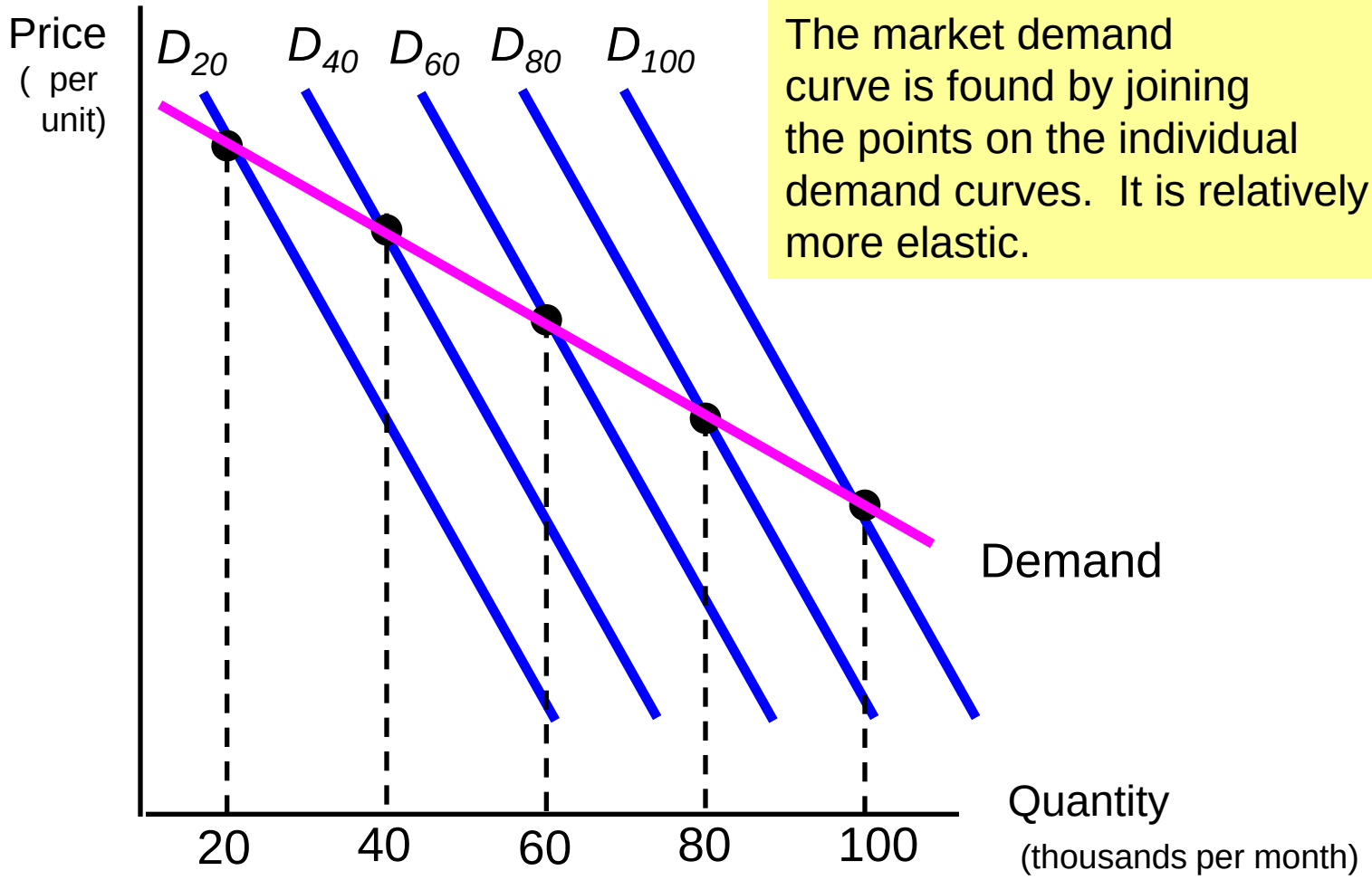
- The Bandwagon Effect
  - This is the desire to be in style, to have a good because almost everyone else has it, or to indulge in a fad.
  - This is the major objective of marketing and advertising campaigns (e.g. toys, clothing).
  - Positive network externality in which a consumer wishes to possess a good in part because others do

Positive Network Externality: Bandwagon Effect 동승효과



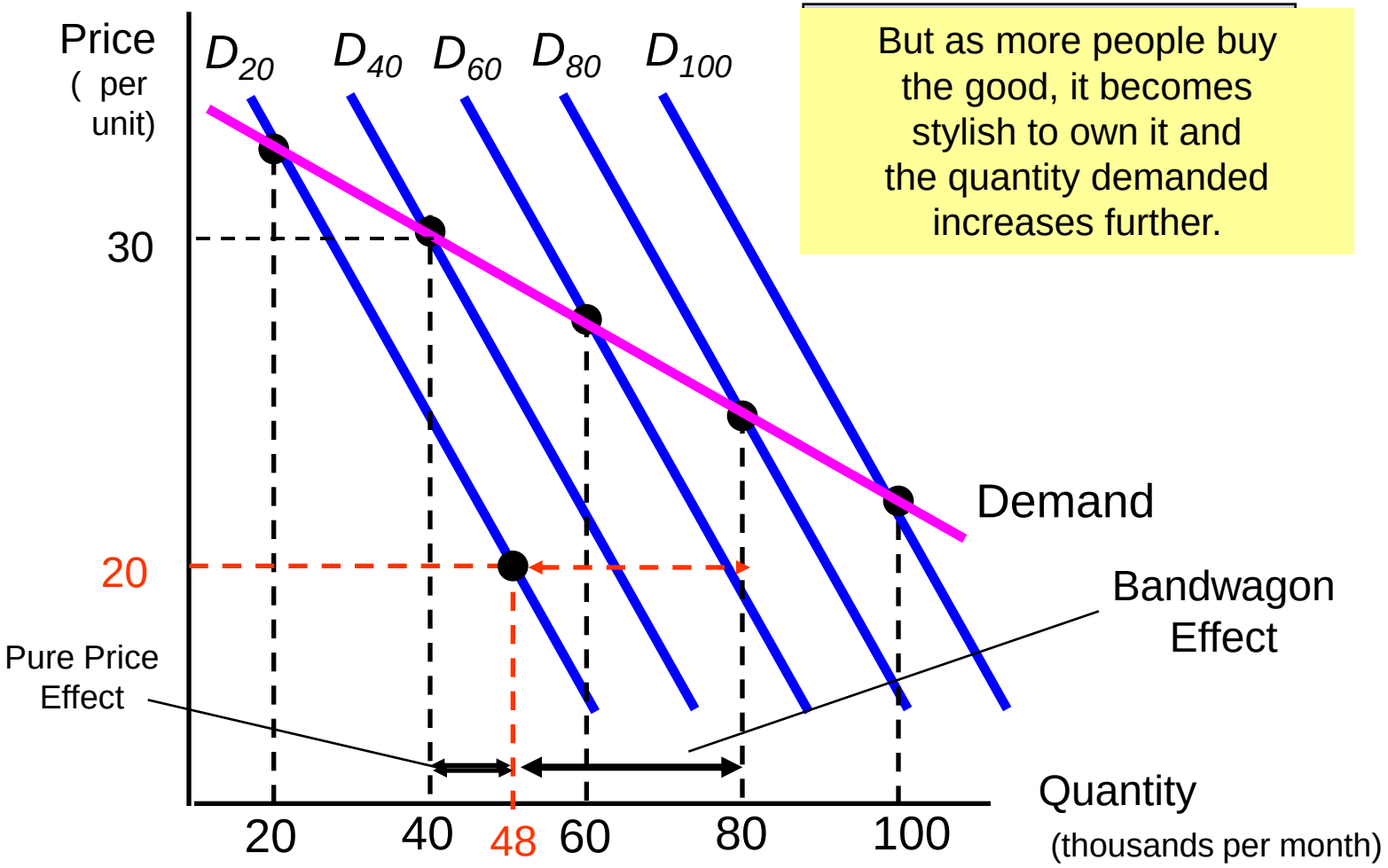
When consumers believe more people have purchased the product, the demand curve shifts further to the the right .

Positive Network Externality: Bandwagon Effect



The market demand curve is found by joining the points on the individual demand curves. It is relatively more elastic.

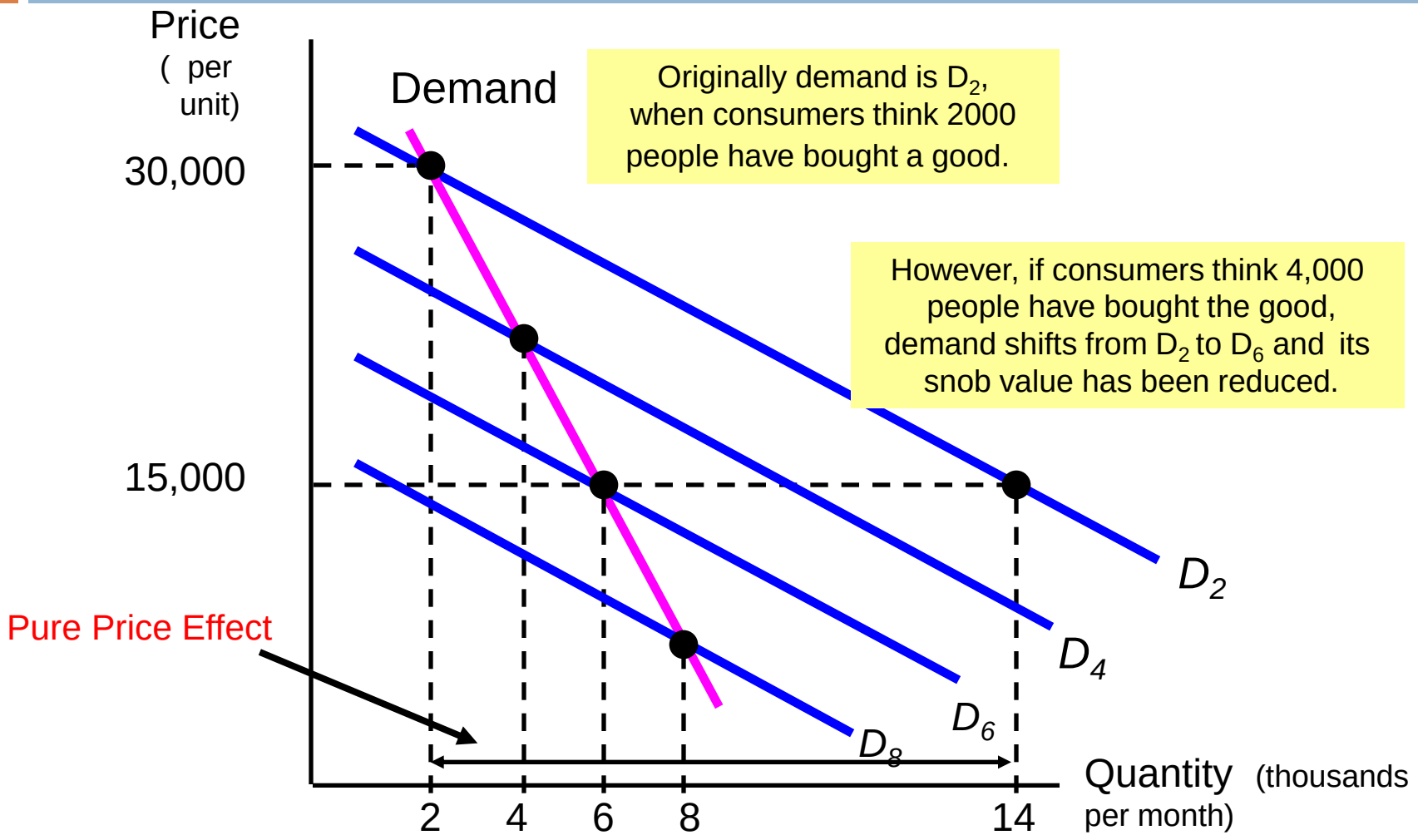
Positive Network Externality: Bandwagon Effect



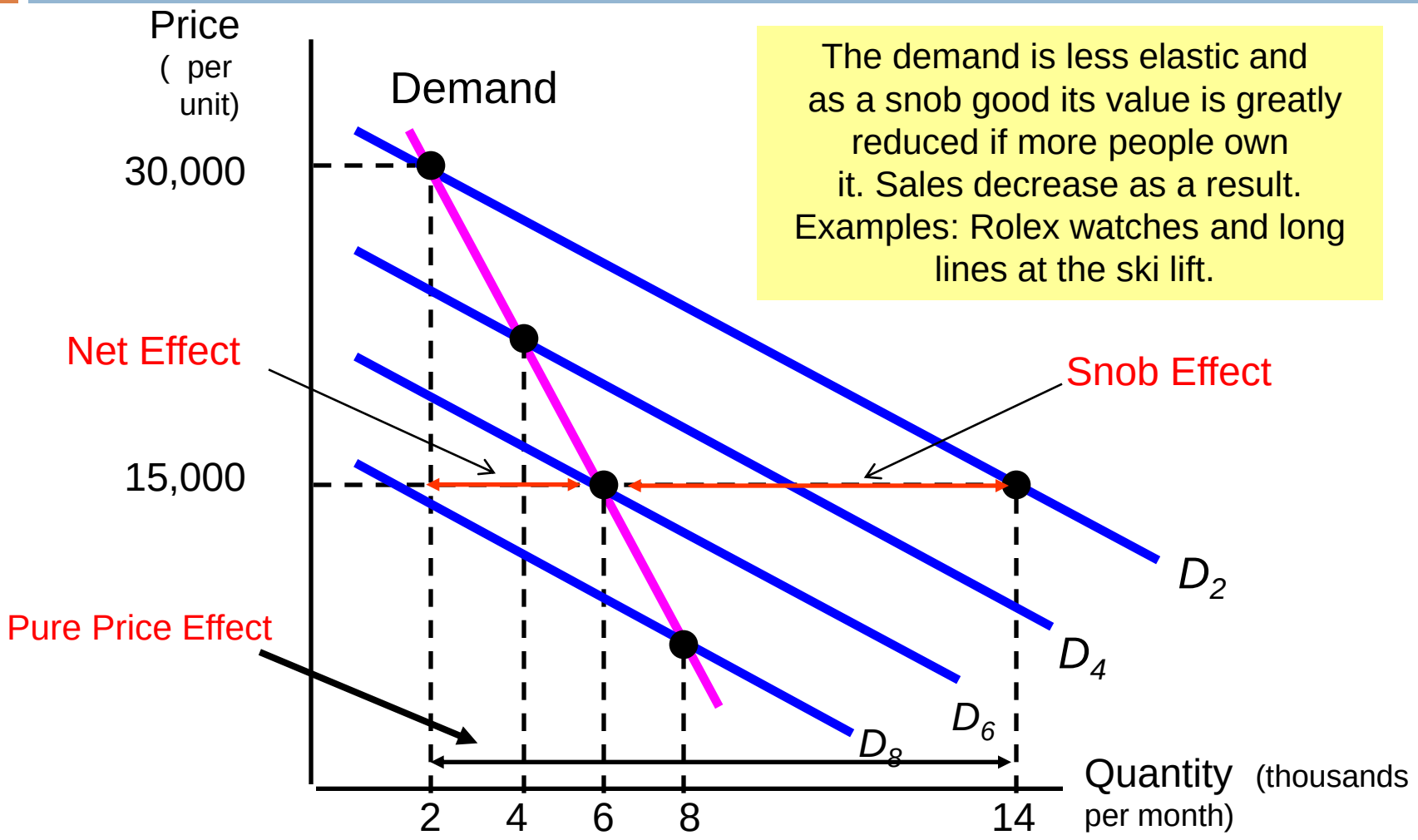
Network Externalities 속물효과

- The Snob Effect 속물효과
  - If the network externality is negative, a snob effect exists.
- The snob effect refers to the desire to own exclusive or unique goods.
- The quantity demanded of a "snob" good is higher the fewer the people who own it.

Network Externality: Snob Effect



Network Externality: Snob Effect



The demand is less elastic and as a snob good its value is greatly reduced if more people own it. Sales decrease as a result. Examples: Rolex watches and long lines at the ski lift.

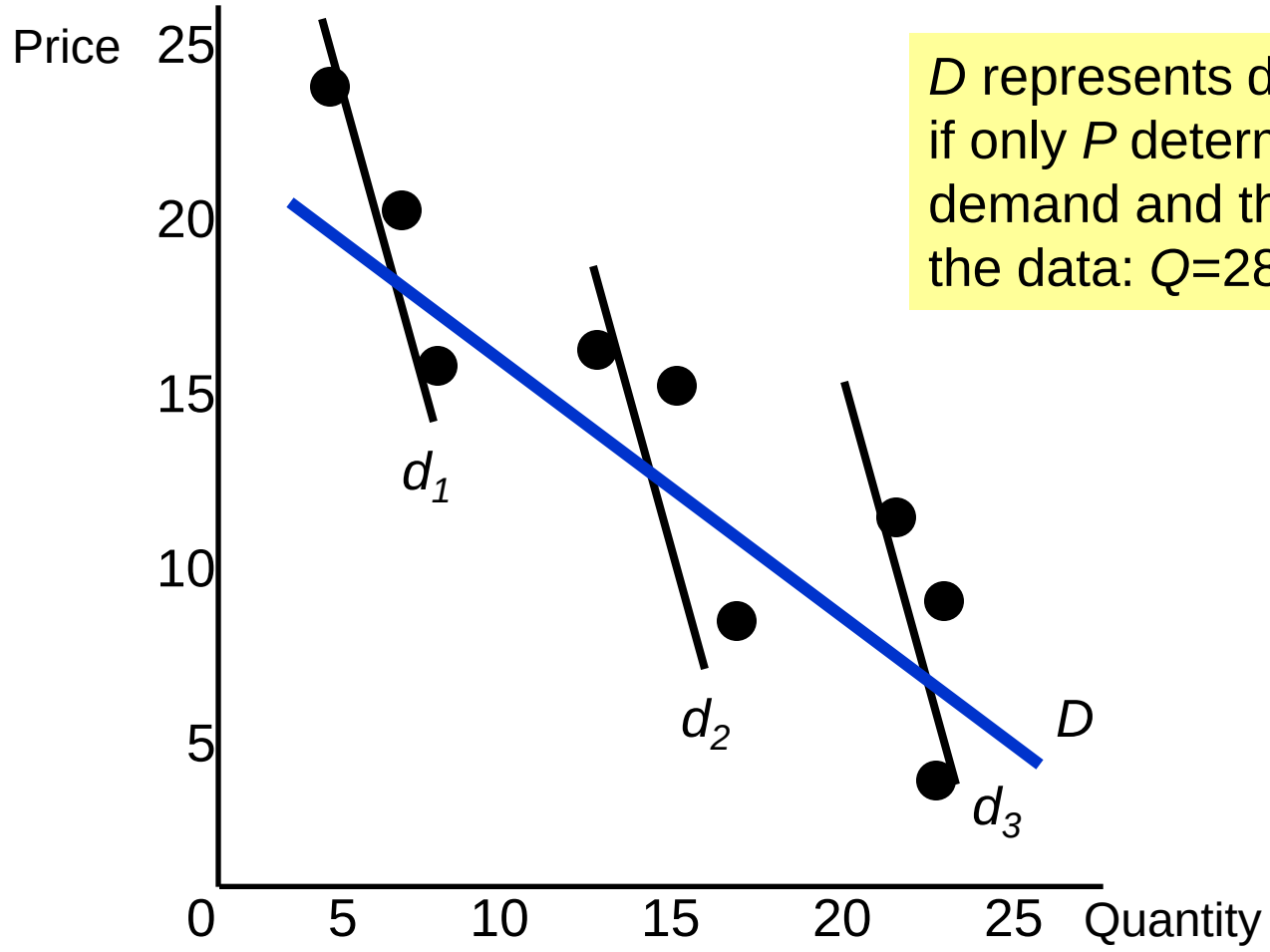
Empirical Estimation of Demand

- The most direct way to obtain information about demand is through interviews where consumers are asked how much of a product they would be willing to buy at a given price.
  - Problem
    - Consumers may lack information or interest, or be mislead by the interviewer.
- In direct marketing experiments, actual sales offers are posed to potential customers and the responses of customers are observed.

Empirical Estimation of Demand

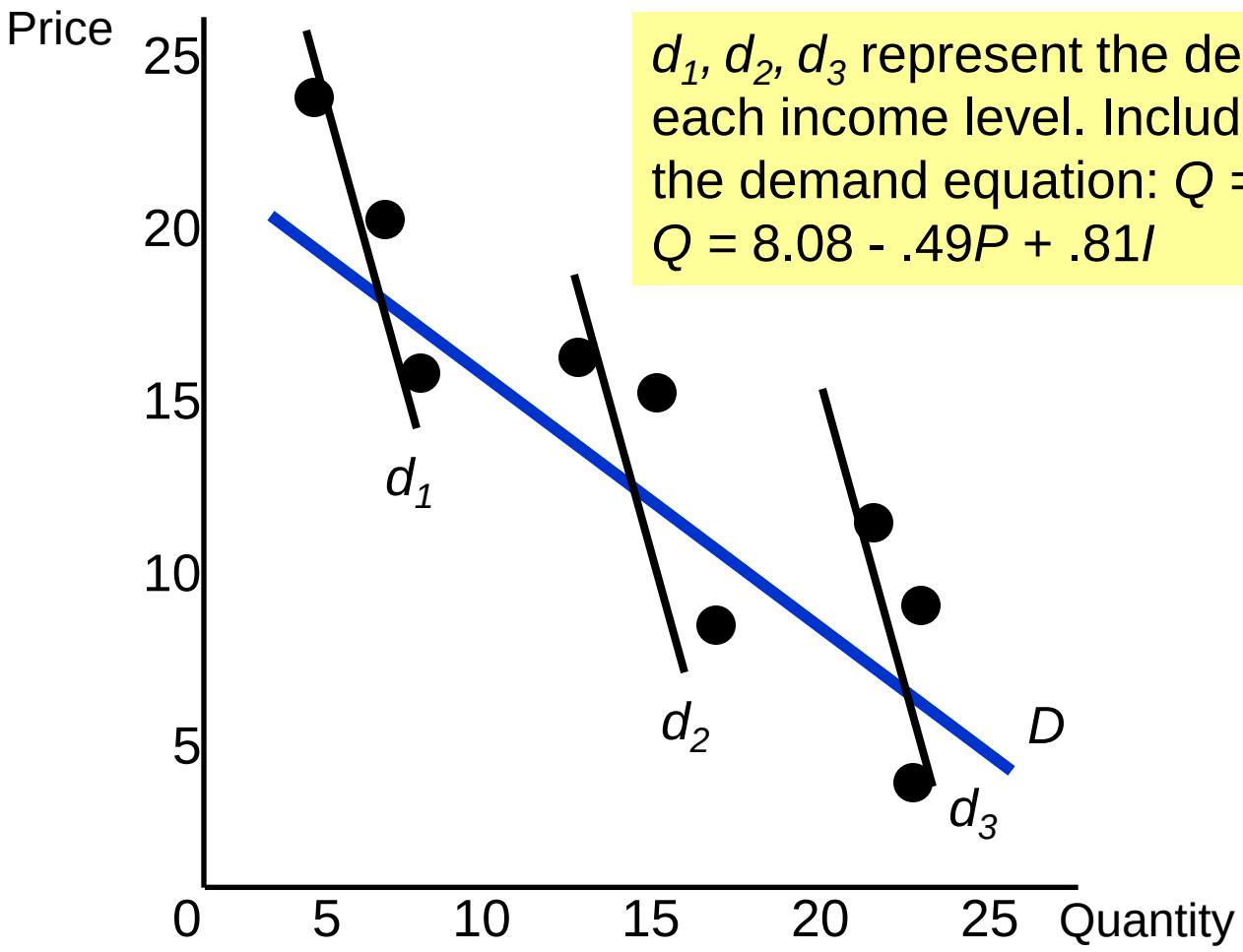
- The Statistical Approach to Demand Estimation
  - Properly applied, the statistical approach to demand estimation can enable one to sort out the effects of variables on the quantity demanded of a product.
  - "Least-squares" regression is one approach.
- Assuming only price determines demand:
  - $Q = a - bP$
  - $Q = 28.2 - 1.00P$

Estimating Demand



D represents demand if only *P* determines demand and then from the data: $Q=28.2-1.00P$

Estimating Demand – Changes in Income



d_1, d_2, d_3 represent the demand for each income level. Including income in the demand equation: $Q = a - bP + cI$ or $Q = 8.08 - .49P + .81I$