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# Consumer Behavior and Demand

AEB 2104

Agricultural Economics

<http://www.geocities.com/dsolisw/AEB2104.html>

# Characteristics of a consumer

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- A consumer spend everything they earn on goods and services, including savings
- A consumer prefer more than less
- A consumer have limited resources (money income)
- Based on the limited resources a consumer will purchase a mix of goods and services that will ***maximize his/her utility*** or satisfaction
- The ***law of diminishing marginal utility***

# *Law of diminishing marginal utility*

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The “**Law of Diminishing Marginal Utility**” states that for any good or service, the marginal (additional) utility (satisfaction) of that good or service decreases as the quantity of the good increases, ***ceteris paribus*** (everything else held constant).

# *Law of diminishing marginal utility:*

## *Example 1*

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- A lost traveler in the desert without water
- He has some money
- Encounters an entrepreneur who sell water
  - 1<sup>st</sup> glass of water will give him a lot of utility, so he will be will to pay a lot
  - 2<sup>nd</sup> glass of water will also give him utility but lesser than the 1<sup>st</sup> one
  - 13<sup>th</sup> glass he will be full; thus, he would not be willing to pay anything

# *Law of diminishing marginal utility: example 1*

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- Note that the concept of utility requires a specified period of time
  - What happen if the supplier of water leave in an hour?????
  - What happened if there is another supplier selling cheaper water close by?????
- Utility changes if the environment changes
- So it is necessary to held other thing constant (*ceteris paribus*)

# *Law of diminishing marginal utility :*

## *Example 2*

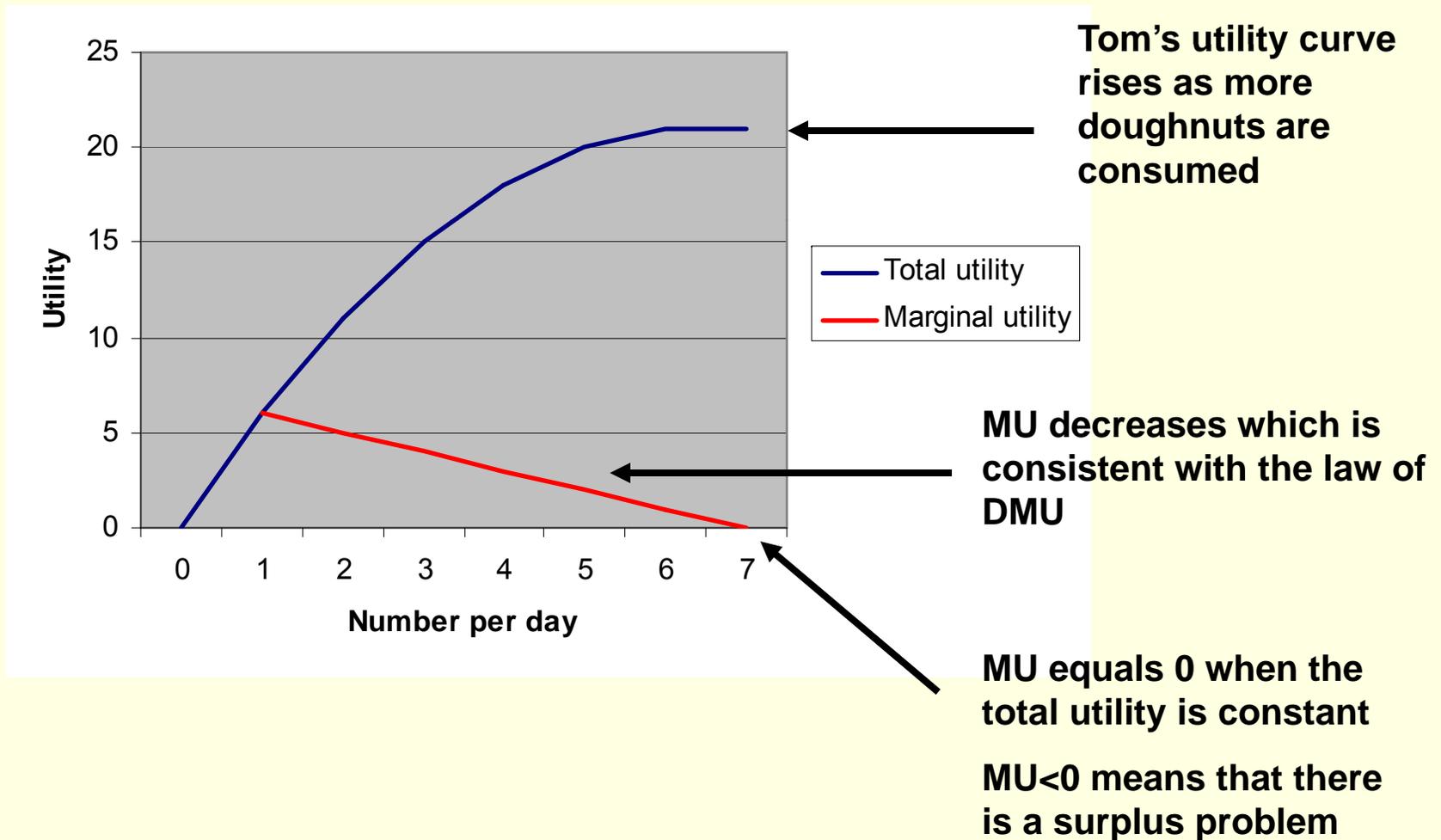
- Tom's utility schedule for doughnuts

Number per day	Total utility	Marginal utility
0	0	
1	6	
2	11	
3	15	
4	18	
5	20	
6	21	
7	21	



Utility of an additional doughnuts

# *Law of diminishing marginal utility : Example 2*



# Consumer choice

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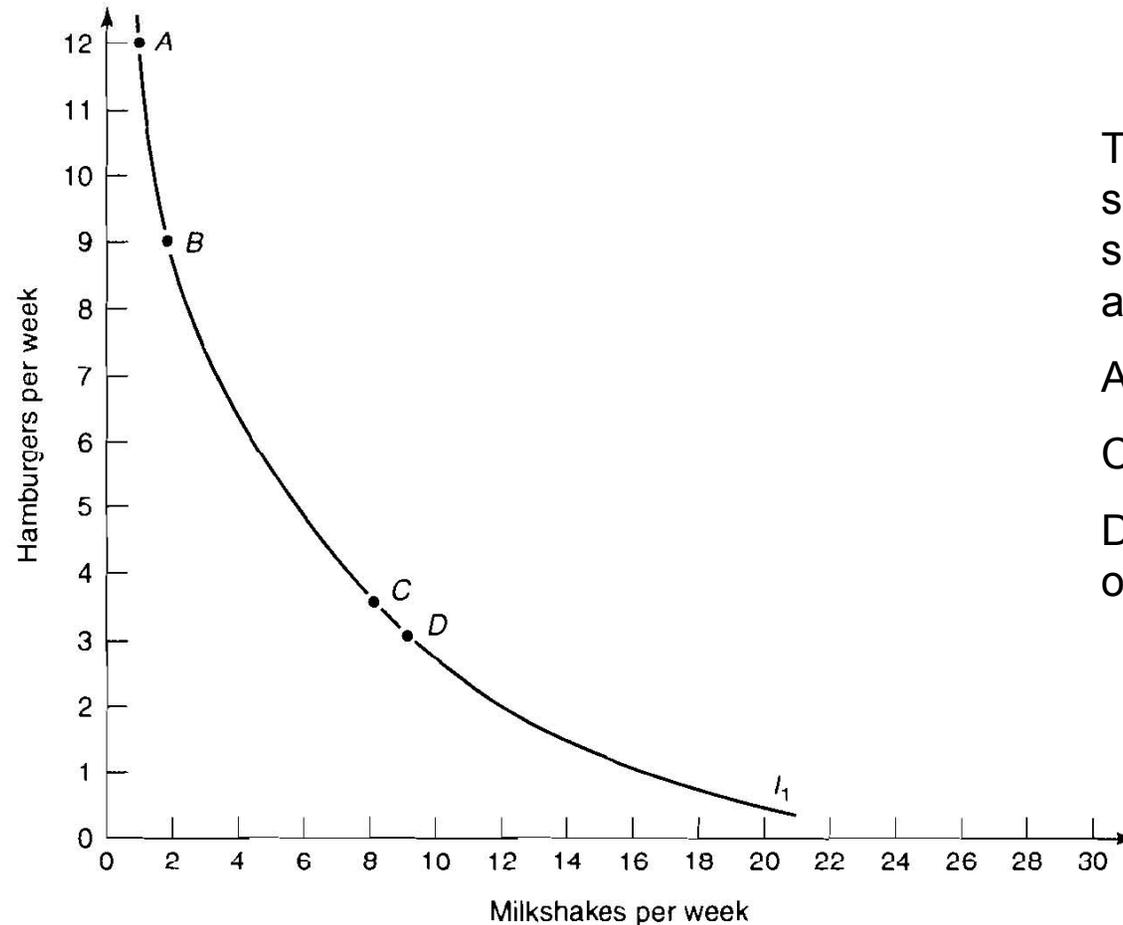
- 3 steps in defining the consumer choice
  - Indifferent curves
  - Budget line
  - Consumer equilibrium

# Indifferent curves

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An indifference curve is a graph showing combinations of two goods to which an economic agent (such as a consumer) is indifferent, that is, it has no preference for one combination over the other.

# Indifferent curves



The shape of the curve shows the willingness to substitute one good for another

A to B

C to D

Diminishing marginal rate of substitution

FIGURE 3-1 Susan's indifference curve.

# Marginal rate of substitution

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**Marginal rate of substitution** is the rate at which a customer is ready to give up one good in exchange for another good while maintaining the same level of satisfaction.

$$\text{MRS}_{mh} = \Delta h / \Delta m$$

# Characteristic of an indifference curve

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- **They are downward sloping**

- The negative slope is a consequence of the fact that the demand for one commodity (X) increases while the demand for another commodity (Y) decreases (because of diminishing marginal utility of Y)

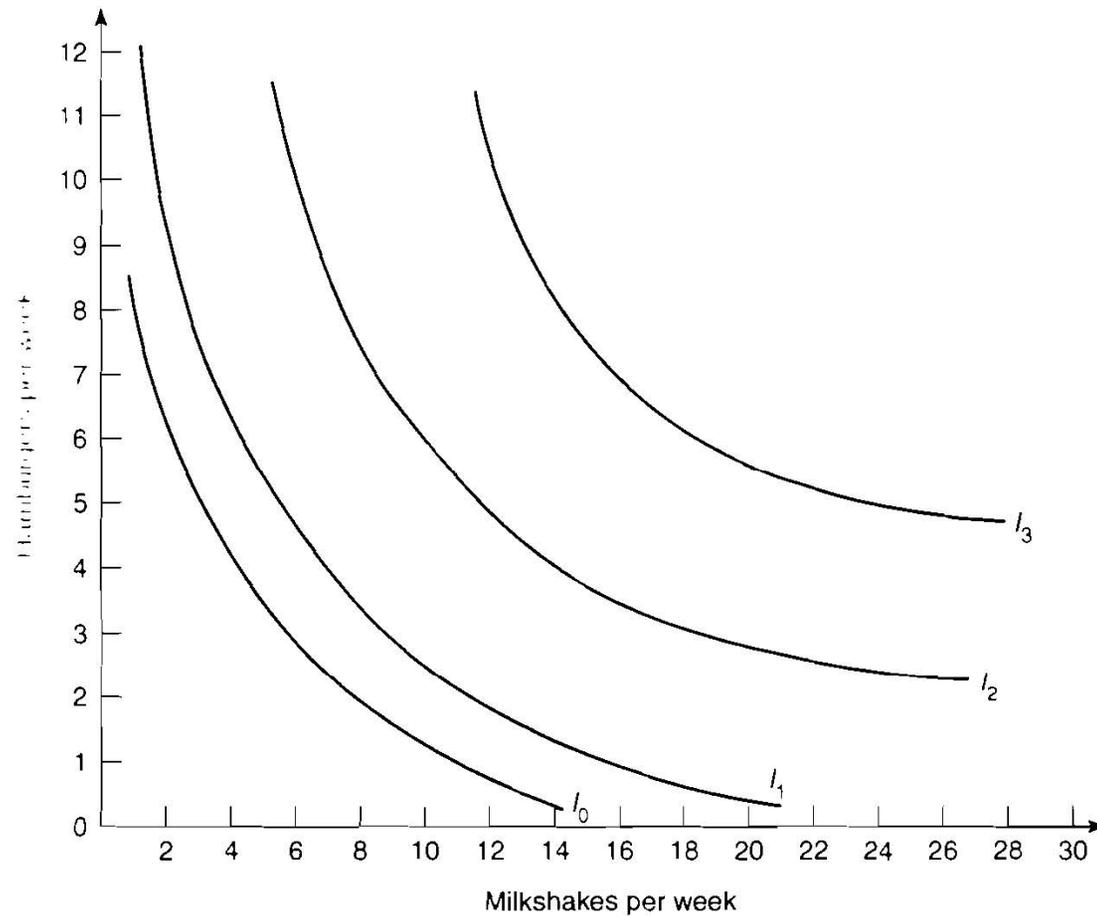
- **Are convex to the origin**

- which is a consequence of the assumption that as consumers have less and less of one good, they require more of the other good to compensate (corresponding to the law of diminishing marginal utility).

- **They can not intersect**

- This is a consequence of the assumption that consumers will always prefer to have more of either good than to have less.

# Indifference Map



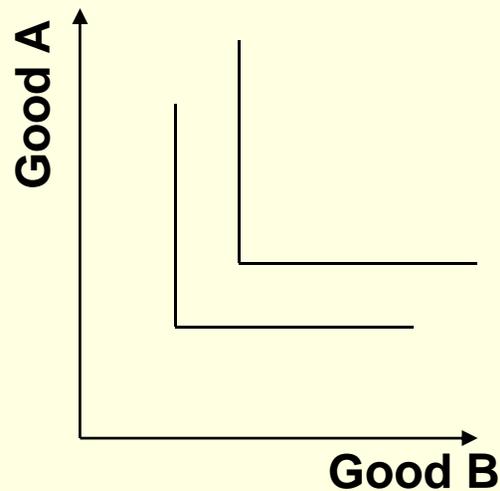
The entire set of a consumer's indifference curves is called the consumer's indifference map

FIGURE 3-2 Susan's indifference map.

# Indifference curves: special cases

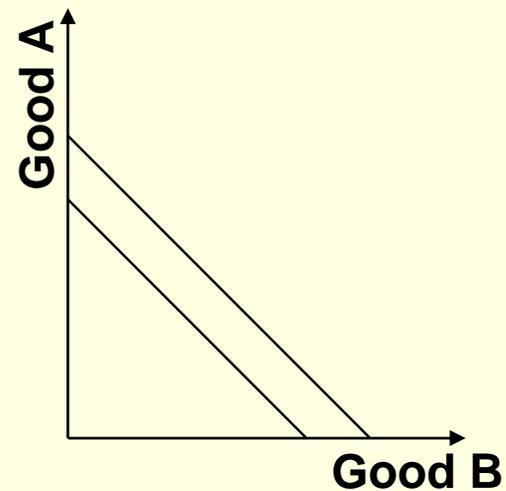
The shape of the indifference curve tells a great deal about consumer preferences

*Perfect complements*



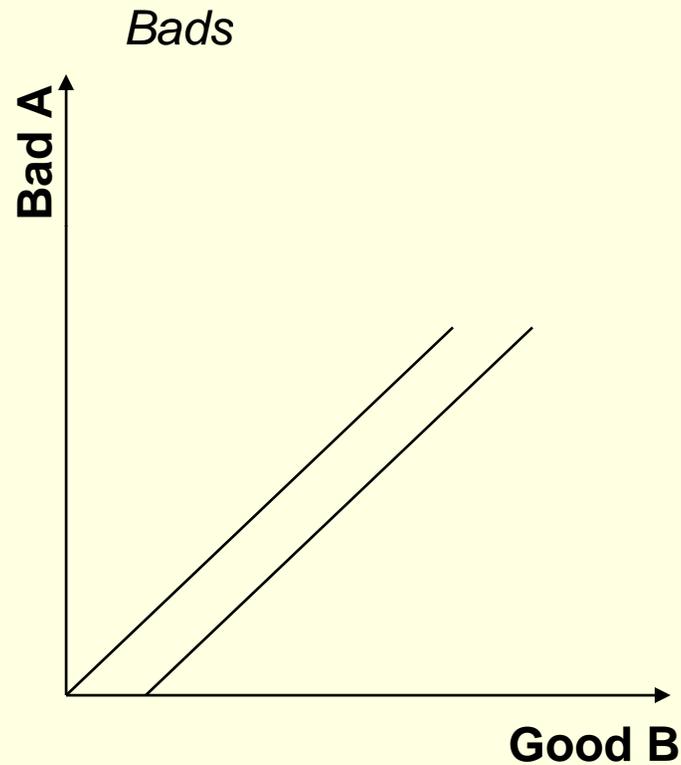
- 1) cookie recipe that called for 3 cups flour to 1 cup sugar
- 2) left shoe and a right shoe

*Perfect substitutes*

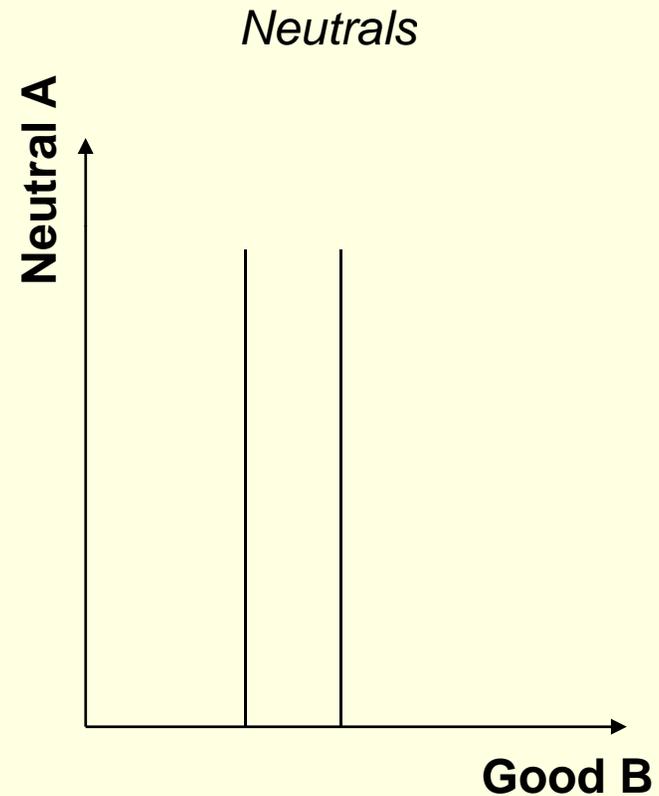


- 1) Butter vs. Margarine
- 2) Coca-Cola Vs Pepsi

# Indifference curves: special cases



1) Anchovies vs. pepperoni



More consumption on a neutral doesn't improve consumer's utility.

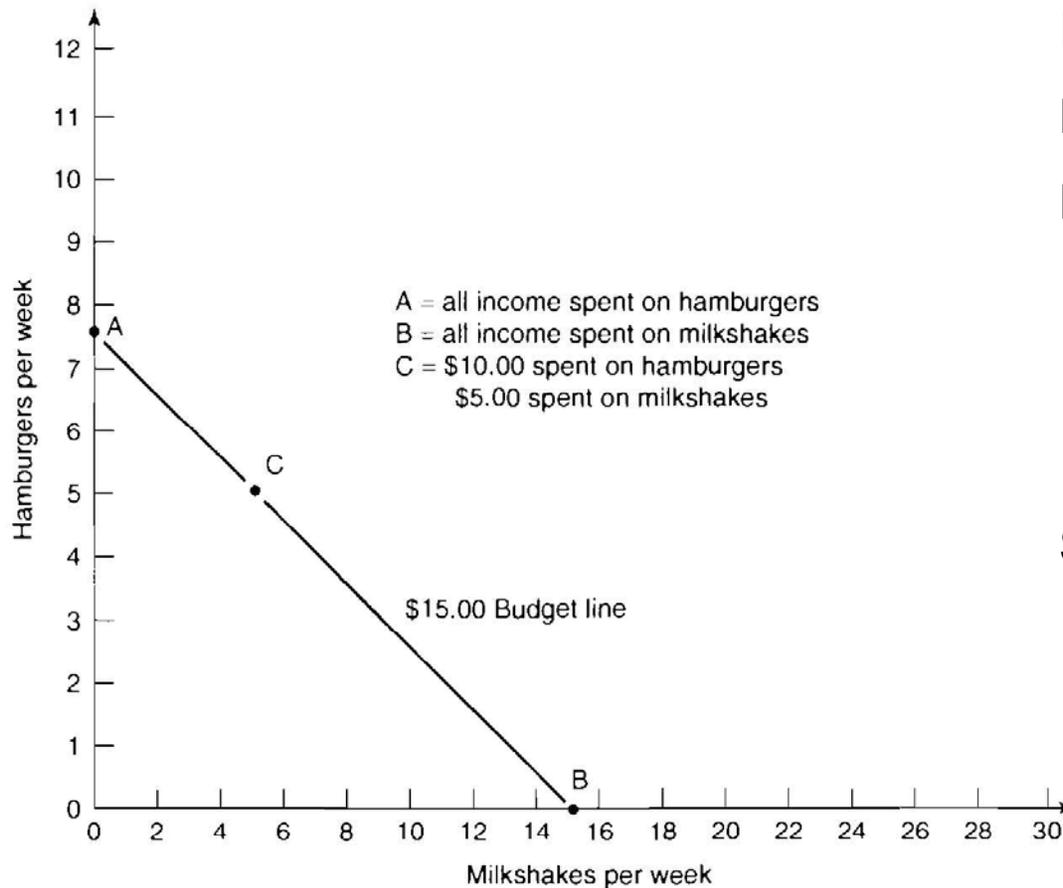
# Budget line

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A **Budget Constraint** represents the combinations of goods and services that a consumer can purchase given current prices and his income

$$I = P_x X + P_y Y$$

# Budget line: example



$I = \$15$  per week

$P_h = \$2$

$P_m = \$1$

Slope =  $-(7.5/15) = -1/2$

=  $-(P_m/P_h) = -1/2$

FIGURE 3-3 The consumer's budget line.

# Consumer equilibrium

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- A rational consumer wants to get the highest utility (indifference curve) given the budget constraint
- We reach an equilibrium when the slope of the indifferent curve (MRS) is equal to the slope of the budget line

$$MU_m/MU_h = P_m/P_h$$

Or

$$MU_m/P_m = MU_h/P_h$$

$\underbrace{\hspace{1.5cm}}$   
MU per purchased good

# Consumer equilibrium: example

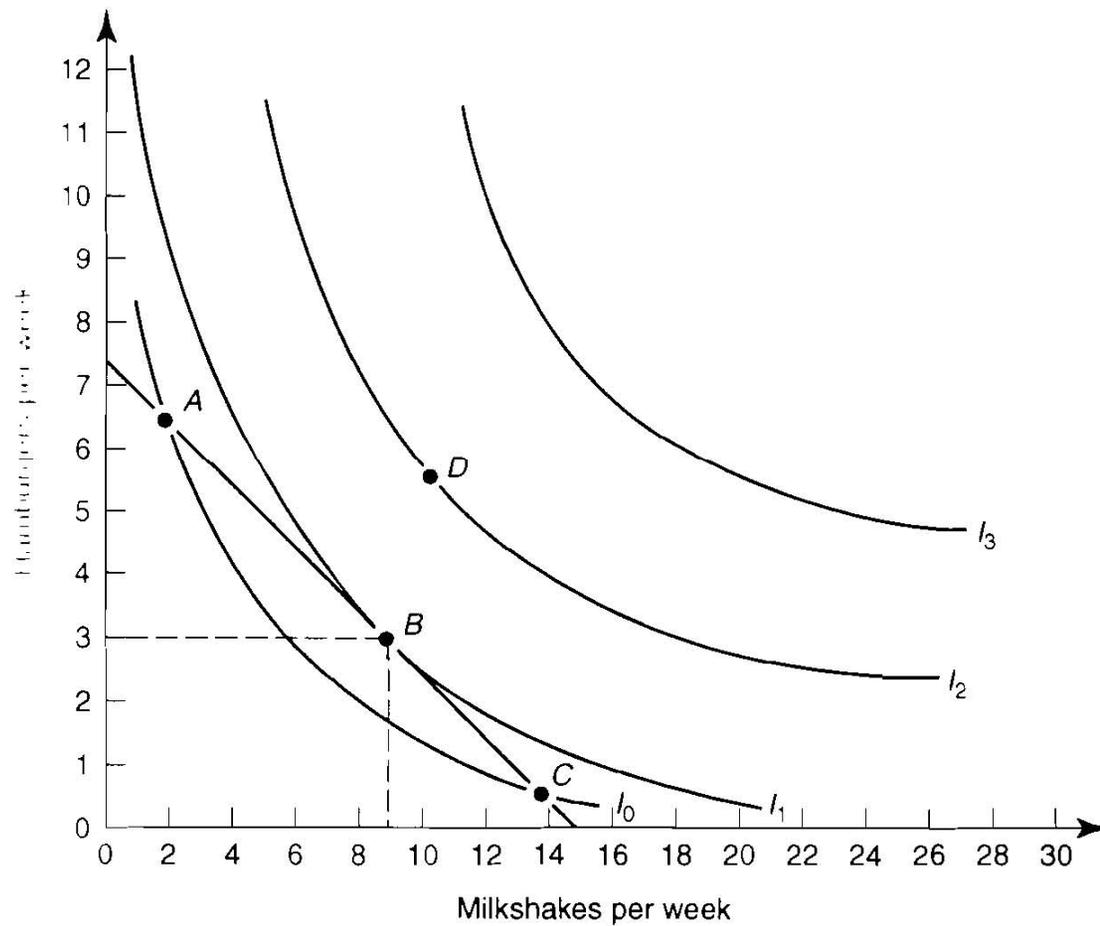
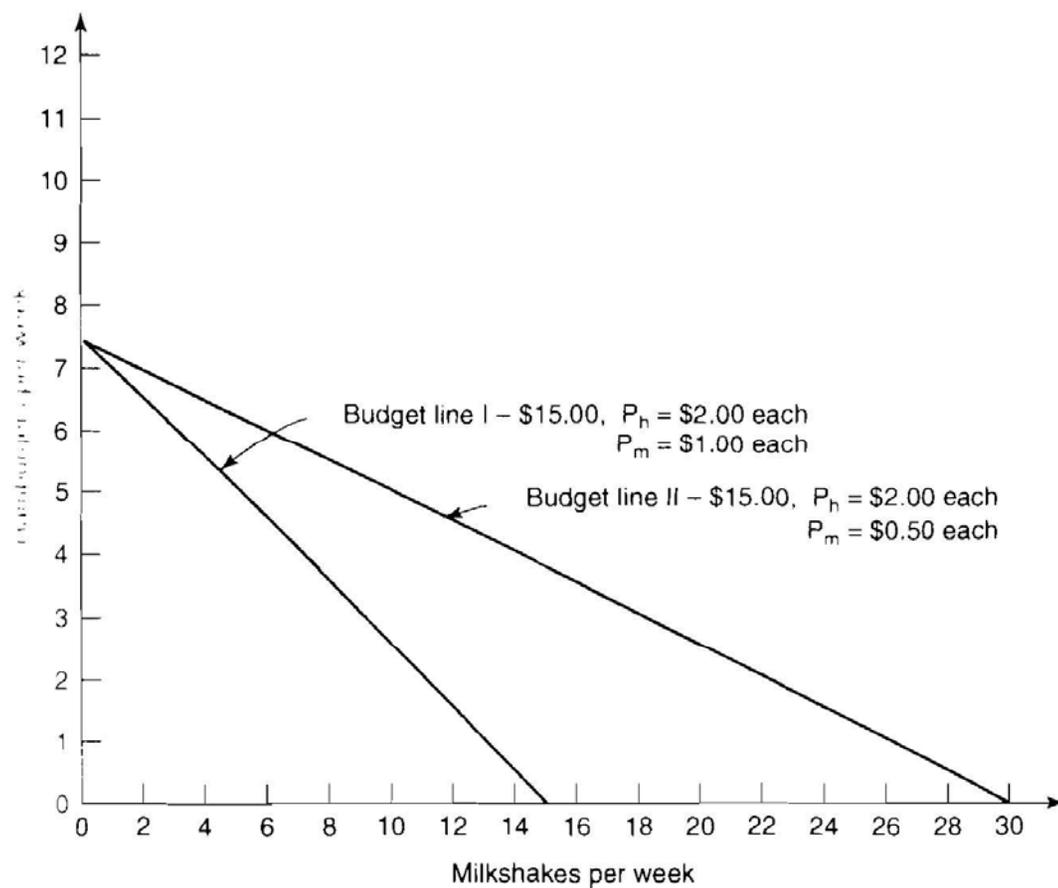


FIGURE 3-4 Consumer equilibrium in consumption.

# Effect of price change: example



$P_m \downarrow$  from \$1 to \$0.5

FIGURE 3-5 A rotation of the budget line due to a milkshake price decrease.

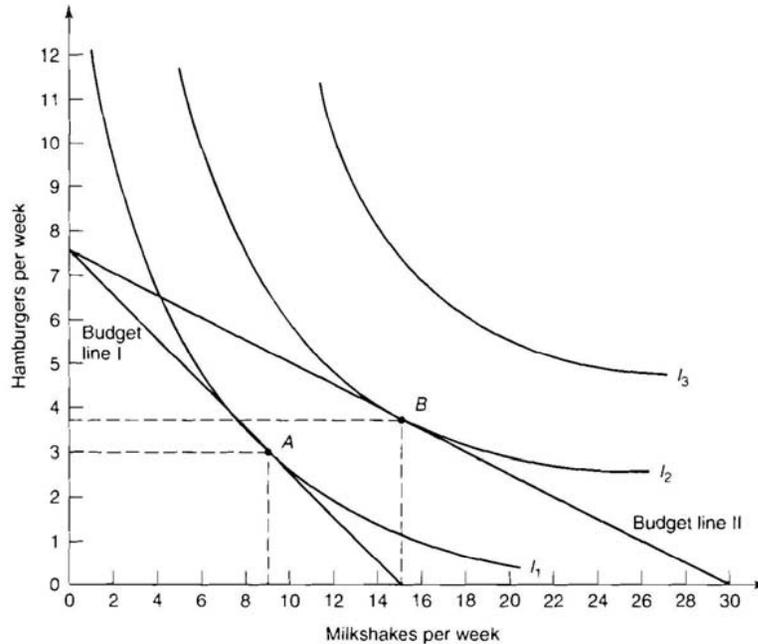


FIGURE 3-6 The effect of a price change for milkshakes.

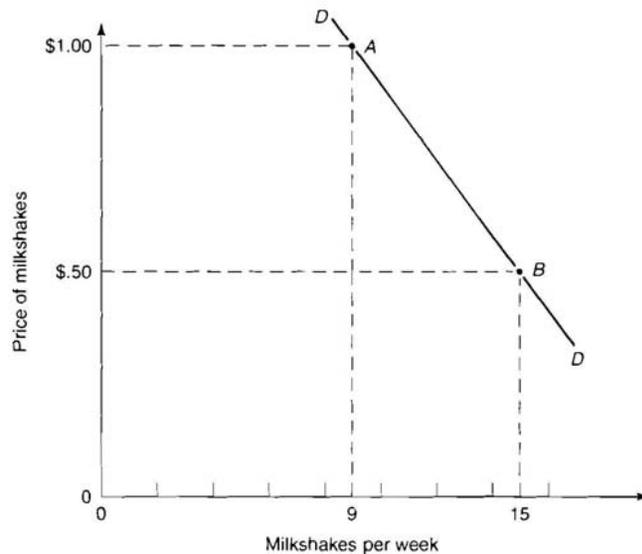


FIGURE 3-7 Individual demand curve for milkshakes.

## Demand Curve

The demand curve shows the quantities of a good that consumers will buy at different prices for that good at a point of time, *ceteris paribus*

# Market demand

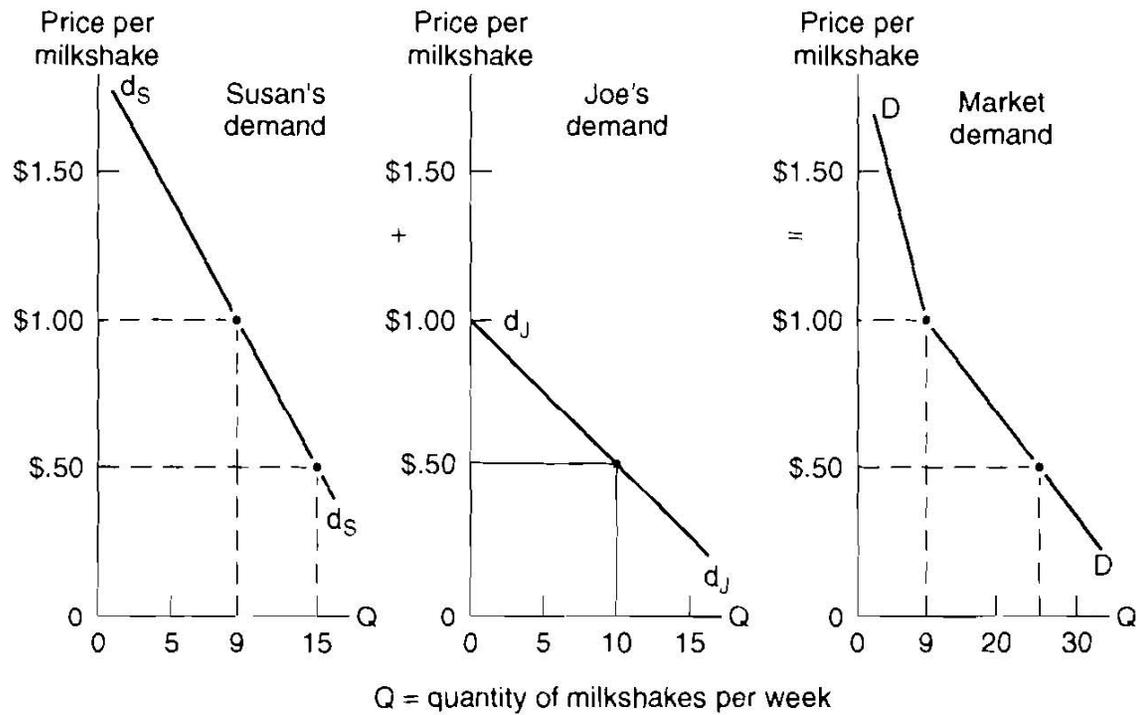


FIGURE 3-8 Market demand curve for milkshakes.

The market demand is the *horizontal sum* of the individual demands

# Price elasticity of demand

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- **Price elasticity of demand** ( $E_d$ ) is a measure of the sensitivity of quantity demanded to changes in price, *ceteris paribus*.
- $E_d$  is computed as the percentage change in quantity demanded divided by the percentage change in prices

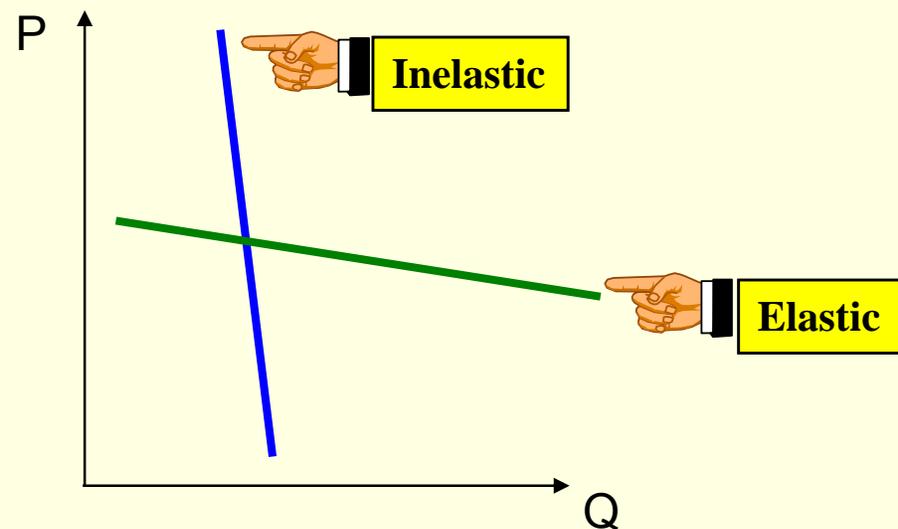
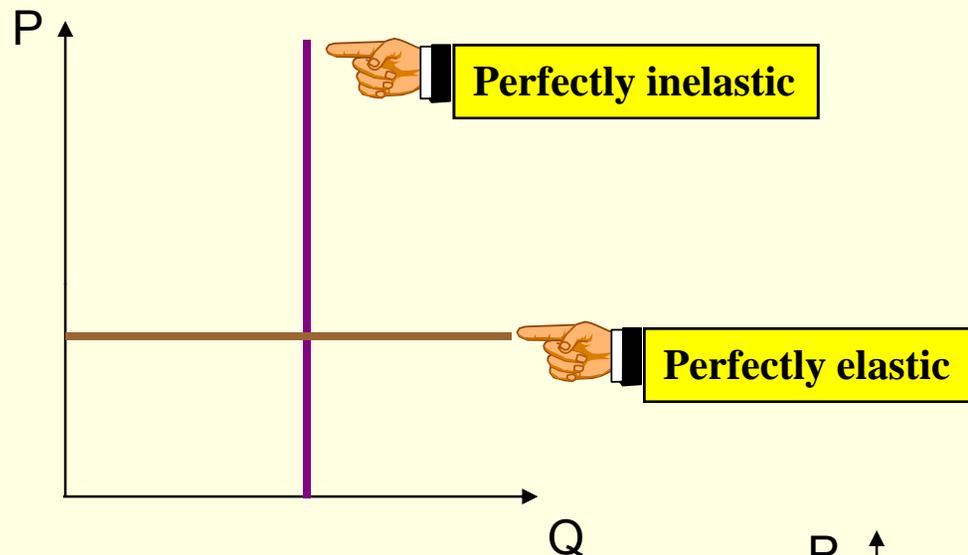
$$E_d = \frac{(Q_1 - Q_2) / (Q_1 + Q_2)}{(P_1 - P_2) / (P_1 + P_2)}$$

# Types of elasticities

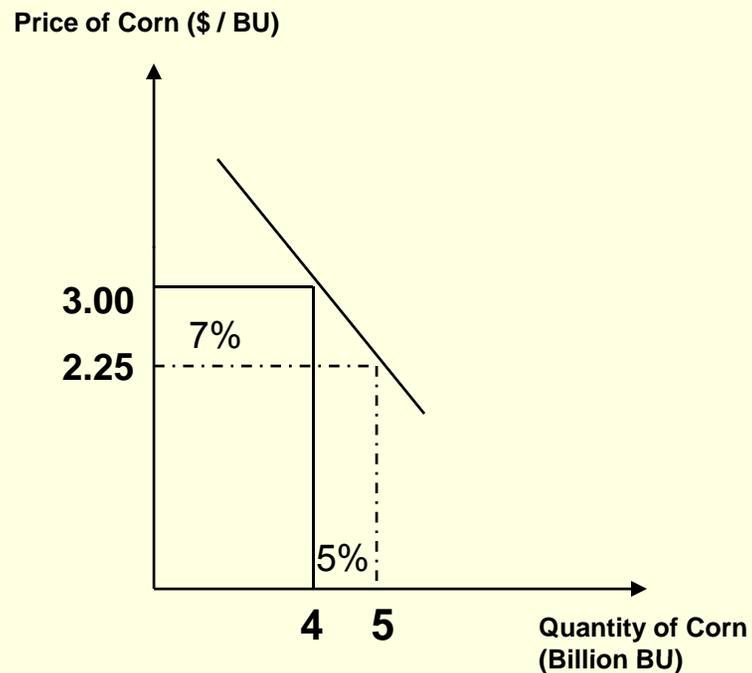
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Magnitude	Meaning
$E_d = 0$	Perfectly inelastic.
$0 < E_d < 1$	Relatively inelastic.
$E_d = 1$	Unitary elastic.
$1 < E_d < \infty$	Relatively elastic.
$E_d = \infty$	Perfectly elastic

# Types of elasticities



# Inelastic demand



$$E_d = \frac{(Q_1 - Q_2) / (Q_1 + Q_2)}{(P_1 - P_2) / (P_1 + P_2)}$$

$$E_d = \frac{(4 - 5) / (4 + 5)}{(3.00 - 2.25) / (3.00 + 2.25)}$$

$$E_d = -0.78$$

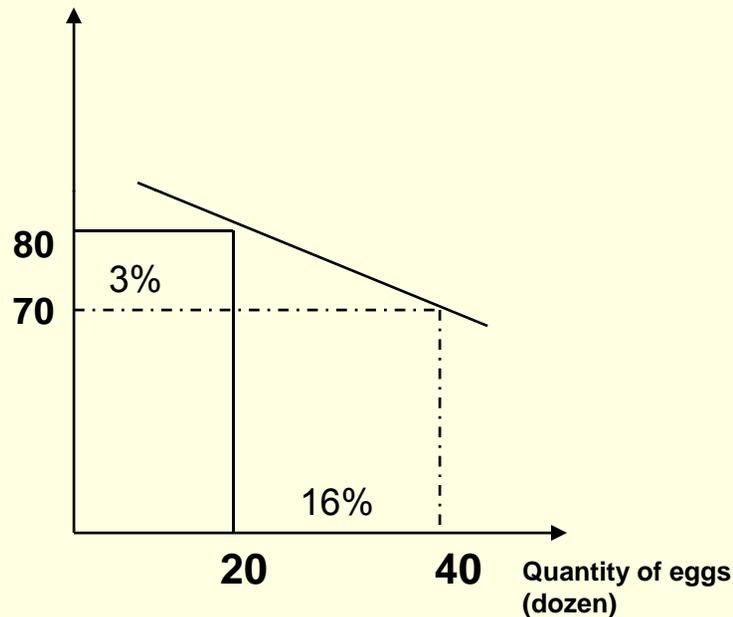
A decrease in \$0.75 in corn price increases the quantity demanded in 1 B bushels.

However the total expenditures drop from \$12 B to \$11.25 B

A ***demand is inelastic*** when the quantity demanded changes relatively little compared to the change in prices

# Elastic demand

Price per dozen (cents)



$$E_d = \frac{(Q_1 - Q_2)/(Q_1 + Q_2)}{(P_1 - P_2)/(P_1 + P_2)}$$

$$E_d = \frac{(20 - 40)/(20 + 40)}{(80 - 70)/(80 + 70)}$$

$$E_d = -5$$

A decrease in \$0.10 in price increases the quantity demanded in 20 dozen.

However the total expenditures increase from \$16 to \$28

A **demand is elastic** when the change in quantity demanded is large relative to the change in prices

# Unitary demand

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- ***Unitary demand*** occurs when a percentage change in price results in an equal and opposite percentage change in demand. For example, if the price of a product increases by 10%, the demand for the product is likely to decline by 10%.
- With ***Unitary demand***, total expenditure do not change as price changes

# Examples

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<b>Comodity</b>	<b>Elasticity</b>
Rice	-0.14
Beef	-0.61
Oranges	-0.99
Grapes	-1.37

# Factors that influence demand elasticity

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- Three primary factors influence the elasticity of demand:
  - Whether good substitutes for the product are available
  - Whether or not there are many alternative uses for a product
  - Whether the product is an important expenditure in a consumer's total budget

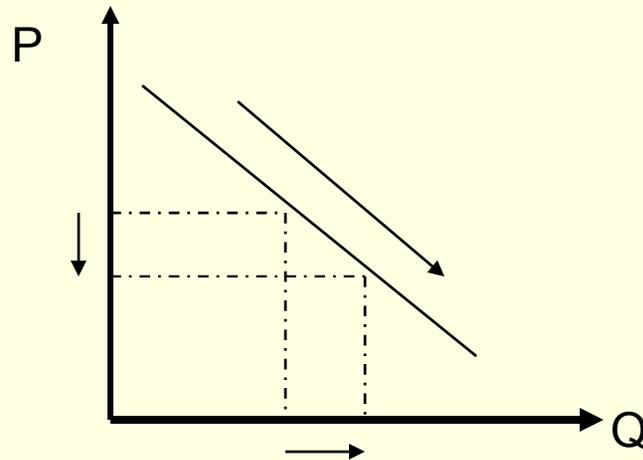
# Factors that influence demand elasticity

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- Most row agricultural products have inelastic demands because there are few substitute products for them
  - Wheat flour  $\neq$  Corn flour.
- The greater the number of alternative uses for a commodity, the greater is its price elasticity
  - Ground beef is relatively elastic because it is used for many things
- Expensive items are more elastic (house, car, etc.)
  - Large expenditure tends to make consumers more careful

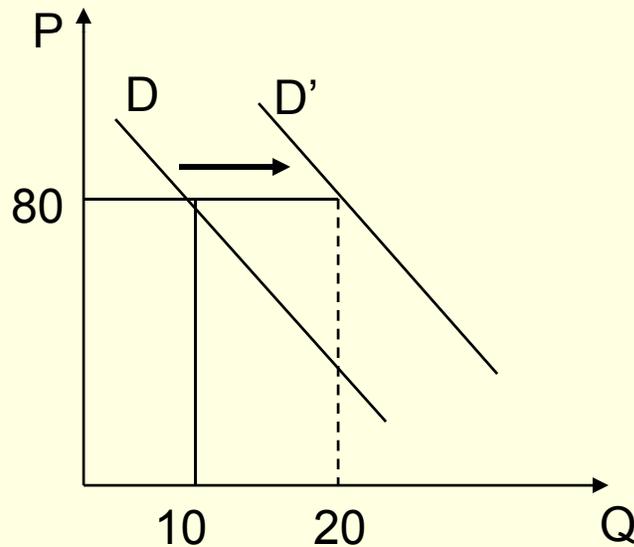
# Change in the quantity demanded

- So far, the discussion has been limited to a single demand curve and movements along that curve.
- Any movement along a given demand curve indicates a ***change in the quantity demanded*** in response to a change in price

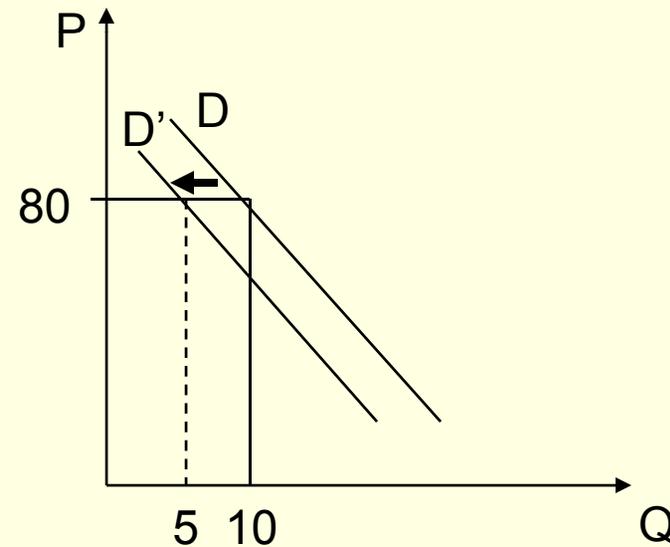


# Changes in demand

- A change in demand is a shift in the entire demand curve



Increase in the demand



Decrease in the demand

# Changes in demand

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- When we draw a demand curve many factors are held constant.
- When any of these factors change, a shift in the demand curve results.
- These factors include:
  - Increases in the disposable income
    - $\uparrow$  income  $\uparrow$  demand for some goods
  - Increases in the number of people
    - More people, more housing, clothing, etc. is needed

# Changes in demand

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- Change in related products
  - Substitutes (barley and corn as feed grains)
  - Complementary (milk and cereal)
- Taste and preference
  - People's taste and preference change through time
- Consumer expectations
  - US housing market

# Income elasticity of demand

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- ***Income elasticity of demand*** measures the responsiveness of the quantity demanded of a good to the change in the income of the people demanding the good.
- It is calculated as the ratio of the percent change in quantity demanded to the percent change in income.

$$E_I = \frac{(Q_1 - Q_2) / (Q_1 + Q_2)}{(I_1 - I_2) / (I_1 + I_2)}$$

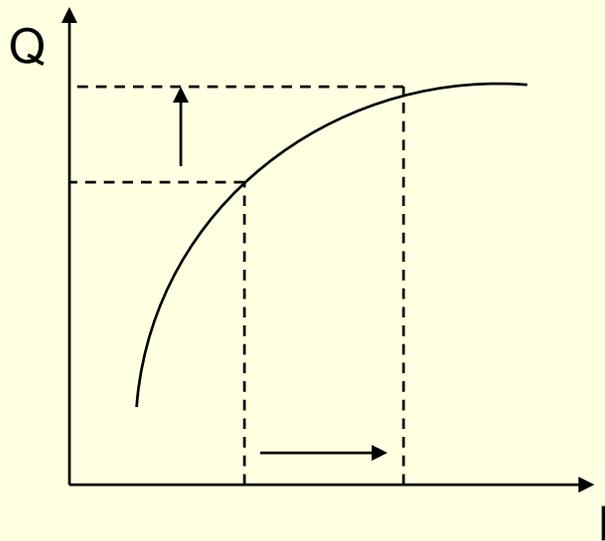
# Interpretation

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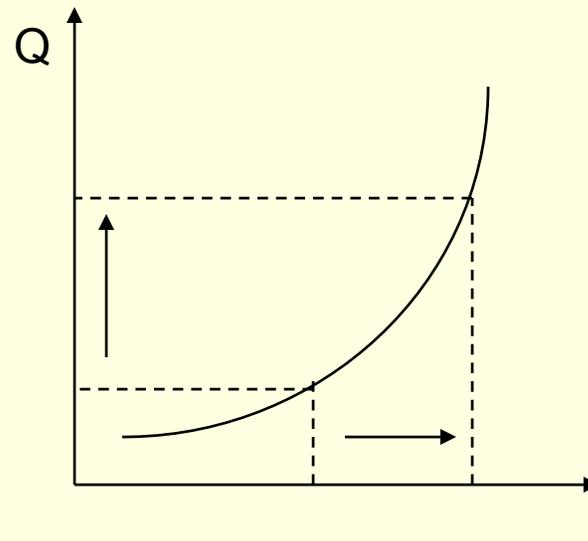
- **A negative** income elasticity of demand is associated with ***inferior goods***; an increase in income will lead to a fall in the quantity demanded and may lead to changes to more luxurious substitutes.
  - ***inferior goods***: bus service, hamburger, mass-market beer, frozen dinners, and canned goods
- ***A positive*** income elasticity of demand is associated with ***normal goods***; an increase in income will lead to a rise in the quantity demanded.

# Engel curve

- **Engel curve** shows how the quantity demanded of a good or service changes as the consumers income level changes

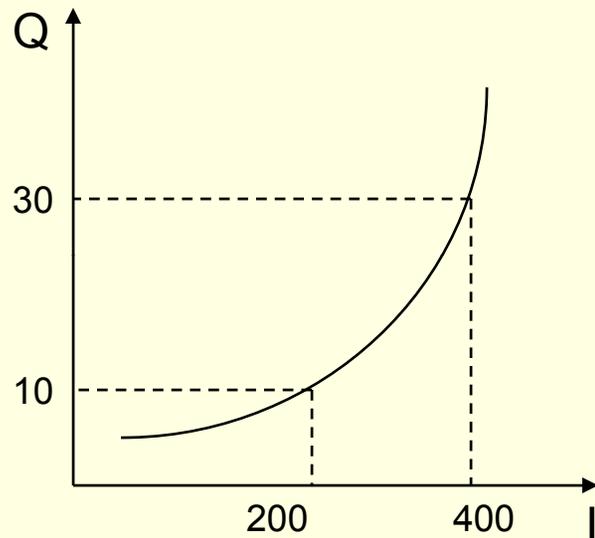


Engel curve for food



Engel curve for clothing

# Engel curve for steak



$$E_I = \frac{(Q_1 - Q_2) / (Q_1 + Q_2)}{(I_1 - I_2) / (I_1 + I_2)}$$

$$E_I = \frac{(10 - 30) / (10 + 30)}{(200 - 400) / (200 + 400)}$$

$$E_I = 1.5$$

This means that a 1% increase in income results in 1.5% increase in the quantity of steak purchased

# Cross elasticity of demand

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- The **cross elasticity of demand** or **cross price elasticity of demand** measures the responsiveness of the quantity demanded of a good to a change in the price of another good.
- It is measured as the in quantity demanded for the first good that occurs in response to a percentage change in price of the second good

$$E_{XY} = \frac{(Q_{X1} - Q_{X2}) / (Q_{X1} + Q_{X2})}{(P_{Y1} - P_{Y2}) / (P_{Y1} + P_{Y2})}$$

# Interpretation

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- Where the two goods are **substitutes** the cross elasticity of demand will be positive, so that as the price of one goes up the quantity demanded of the other will increase.
  - For example, in response to an increase in the price of butter, the demand for margarine will rise.
- Where the two goods are **complements** the cross elasticity of demand will be negative, so that as the price of one goes up the quantity demanded of the other will decrease.
  - For example, in response to an increase in the price of fuel, the demand for new cars will decrease.
- Where the two goods are **independent**, the cross elasticity demand will be zero: as the price of one good changes, there will be no change in quantity demanded of the other good.

# Example

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$$E_{\text{Pork,Beef}} = 0.15$$

That means that the quantity of pork purchased will increase 0.15% for each 1% increase in the price of beef, *ceteris paribus*.