

Dartmouth College, Department of Economics: Economics 1, Fall '02

Topic 2: Supply and Demand

Economics 1, Fall 2002

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Based Primarily on Frank Chapters 2, 4

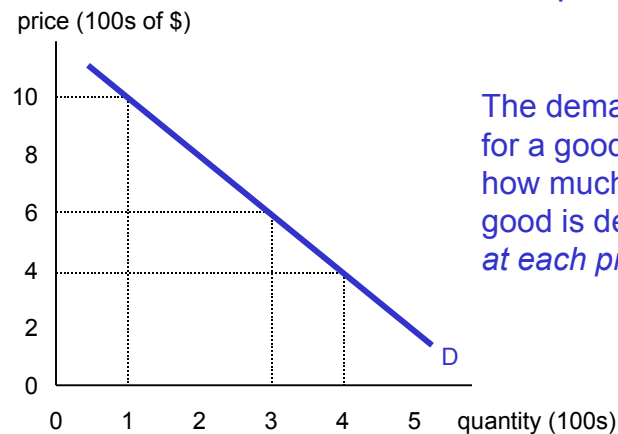
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Supply and Demand: Equilibrium

Example: The Market for Apartments

The (Market) Demand Curve

- ◆ Demand curve for one bedroom apartments:



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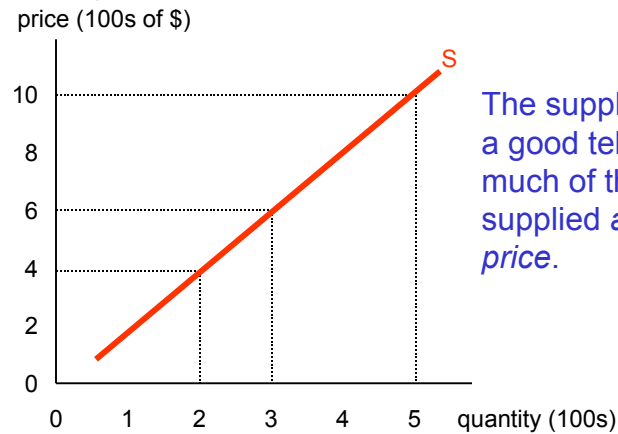
The Demand Curve, cont'd

- ◆ A downward-sloping demand curve tells us that:
 - The higher the price, the less the demand for the good.
- 💡 ◆ Why?
 - As price increases, fewer potential buyers can afford to buy the good (*income/wealth effect*).
 - As price increases, some potential buyers substitute other goods (*substitution effect*).
- ◆ We can write the (inverse) demand curve as $p(q)$. Then we know that $dp / dq < 0$.

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The (Industry) Supply Curve

- ◆ Supply curve for one bedroom apartments:



The supply curve for a good tells us how much of that good is supplied *at each price*.

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The Supply Curve, cont'd

- ◆ An upward-sloping supply curve tells us that:
 - The higher the price, the greater the supply for the good.



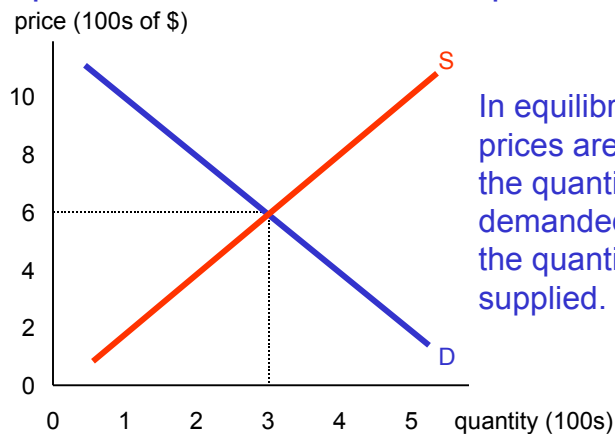
- ◆ Why?

- Typically: the more you produce, the greater the production cost for each additional unit. In order to be willing to supply more, you therefore need to be able to charge a higher price for each unit. (The price must cover the production cost.)

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Equilibrium

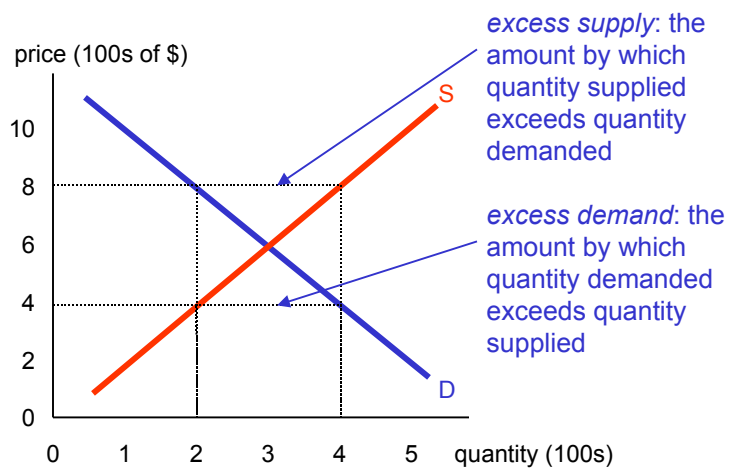
◆ Equilibrium in the market for apartments:



In equilibrium, prices are such that the quantity demanded equals the quantity supplied.

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Excess Supply / Excess Demand



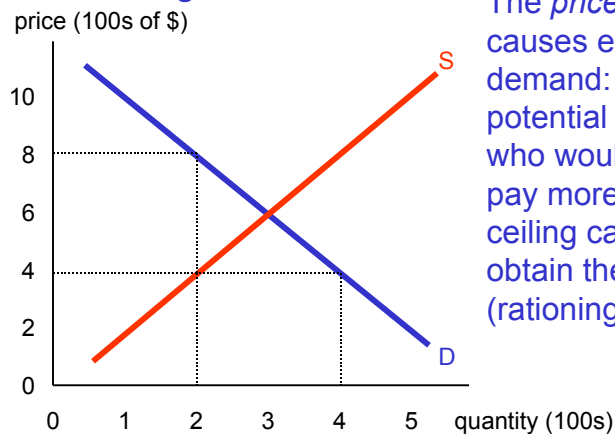
excess supply: the amount by which quantity supplied exceeds quantity demanded

excess demand: the amount by which quantity demanded exceeds quantity supplied

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Price Ceiling (Rent Control)

◆ Price ceiling at \$400:

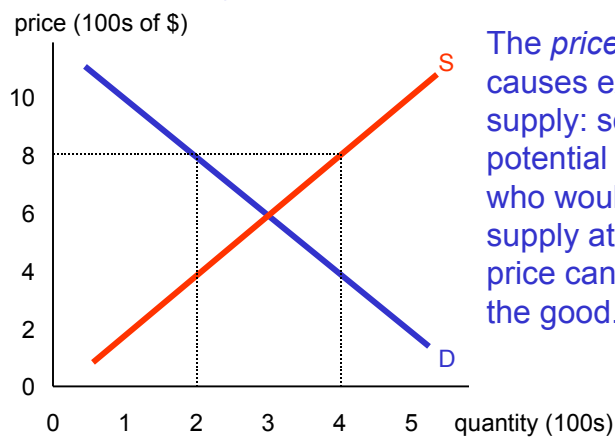


The *price ceiling* causes excess demand: some potential buyers who would want to pay more than the ceiling cannot obtain the good (rationing).

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Price Floor

◆ Price floor at \$800:

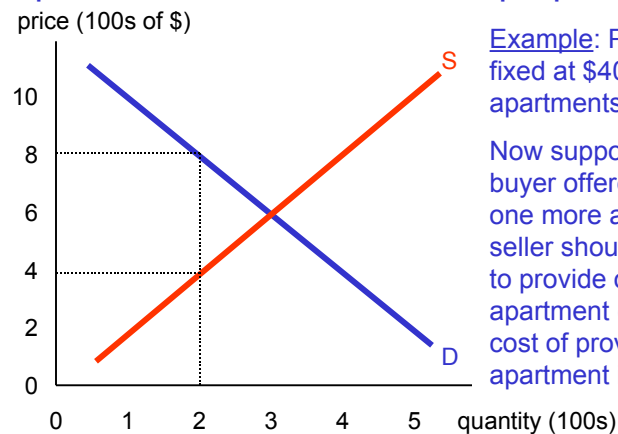


The *price floor* causes excess supply: some potential suppliers who would want to supply at a lower price cannot sell the good.

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Welfare Properties of Equilibrium

- ◆ Equilibrium has “nice” welfare properties:



Example: Prices are fixed at \$400, so 200 apartments are rented.

Now suppose some buyer offered \$700 for one more apartment. A seller should be happy to provide one more apartment (since the cost of providing that apartment is \$400).

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Prices

- ◆ Prices serve two important functions:

- Rationing function:

- » We live in a world of scarcity. If all goods were free, how could we ration people's unlimited wants?

- Allocative function:

- » Since we live in a world of scarcity, we need to allocate the available resources so that:
 - those who value goods most highly obtain them;
 - those goods that are most wanted are being produced (suppose there is excess demand in one market: firms would have an incentive to expand production in that market, because supernormal profits can be made).

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Using Supply and Demand

Changes in Demand
Changes in Supply
Application: Taxes
Elasticity

Changes in Demand

- ◆ What shifts the demand curve? (Alternatively: What causes a rise (fall) in the quantity demanded *at every price*?)
 - Changes in income/wealth: as consumers' income/wealth increases, they will want to buy more of a good at each price.
 - 💡 - Prices of substitutes/complements:
 - » complements (e.g. coffee and cream): if the price of coffee rises, your demand for cream will fall;
 - » substitutes (e.g. coffee and tea): if the price of coffee rises, your demand for tea will increase.
 - etc.

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Changes in Supply

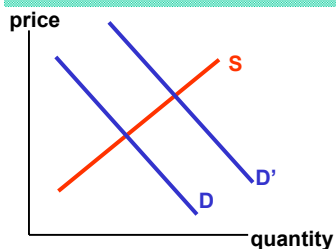
- ◆ What shifts the supply curve? (Alternatively: What causes a rise (fall) in the quantity supplied *at every price*?)
 - Technology: better technology reduces cost of production.
 - Factor prices: higher factor prices (e.g. cost of labor) means higher cost of production.
 - Number of suppliers (e.g. computer manufacturers)
 - etc.

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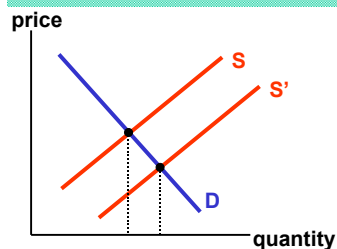
Demand v. Quantity Demanded

- ◆ Distinguish between:
 - a change in demand (the entire demand curve shifts), and
 - a change in the quantity demanded (a movement along the demand curve).

Example: consumers expect a future price rise



Example: good weather before harvest



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Supply v. Quantity Supplied

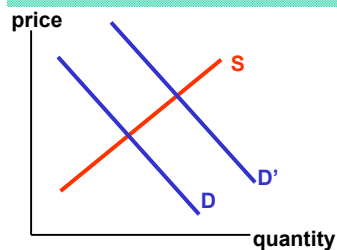
- ◆ Similarly ...
- ◆ Distinguish between:
 - a change in supply (the entire supply curve shifts), and
 - a change in the quantity supplied (a movement along the supply curve).

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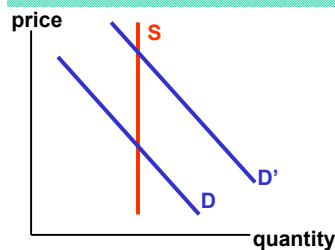
Using Supply and Demand

- ◆ Example: Why do airfares increase in summer?

Example (a): carriers can expand capacity



Example (b): carriers cannot expand capacity



- ◆ Think about your own example with a fall in demand!

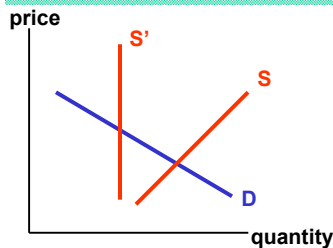
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Using Supply and Demand, cont'd

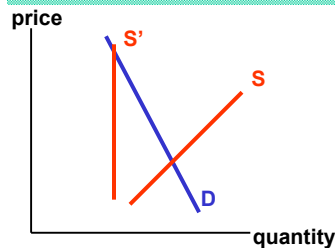
- ◆ Example: What happened during the oil price shock?



Example (a): demand for gas is (relatively) elastic



Example (b): demand for gas is (relatively) inelastic



- ◆ Think about your own example with a supply increase!

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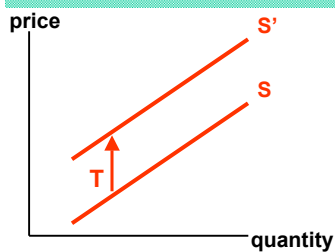
Application: Taxes

Producer/Consumer Taxes
(Economic) Tax Incidence

Taxes

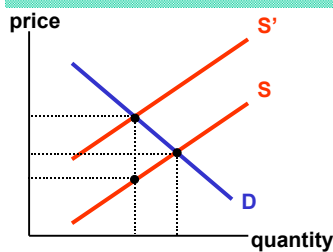
- Suppose a tax of T is levied on each unit sold by the producer.

Supply curve shifts up by the amount T .



In order to cover cost, the producer needs to charge T more for each unit sold.

Tax incidence: who bears the tax?



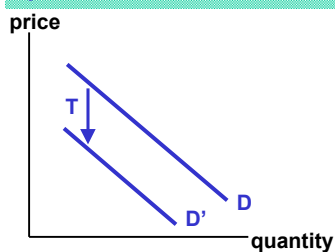
But some of the cost T of the tax is borne by consumers.

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Taxes, cont'd

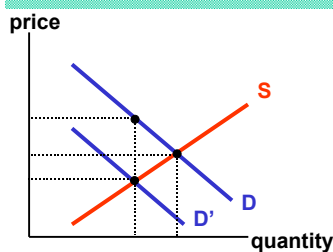
- Suppose a tax of T is levied on each unit bought by the buyer.

Demand curve shifts down by the amount T .



In order to buy the same quantity as before, the price has to fall by T .

Tax incidence: who bears the tax?



But some of the cost T of the tax is borne by producers.

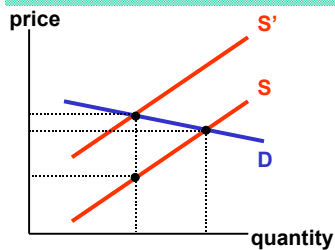
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Tax Incidence



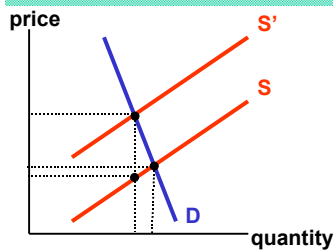
- Who bears the tax depends on the elasticities of supply and demand. Example: demand.

Example (a): Relatively elastic demand curve



Tax borne largely by producers.

Example (b): Relatively inelastic demand curve



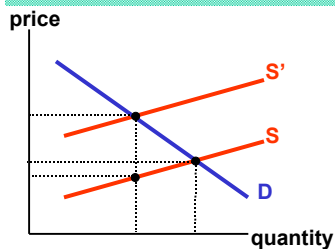
Tax borne largely by consumers.

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Tax Incidence, cont'd

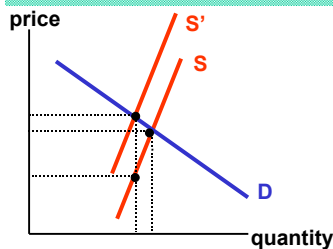
- Who bears the tax depends on the elasticities of supply and demand. Example: supply.

Example (a): Relatively elastic supply curve



Tax borne largely by consumers.

Example (b): Relatively inelastic supply curve



Tax borne largely by producers.

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Tax Incidence, cont'd

- ◆ Similarly, supply and demand elasticities determine the incidence of a tax levied on consumers.
- ◆ Workout: Try this at home!

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Elasticity

Price Elasticity of Demand
Cross-Price Elasticity of Demand
Income Elasticity of Demand

Price Elasticity of Demand

- ◆ The price elasticity of demand measures the responsiveness of demand for a good with respect to changes in the price of that good.
- ◆ Definition: The *price elasticity of demand* is the percentage change in the quantity demanded that results from a 1 percent change in price.
- ◆ Precisely, it is: $\eta = \frac{\Delta q / q}{\Delta p / p}$
- ◆ or, rewritten: $\eta = \frac{\Delta q / q}{\Delta p / p} = \frac{\Delta q}{\Delta p} \cdot \frac{p}{q} = \frac{dq}{dp} \cdot \frac{p}{q} = \left(1 / \frac{dp}{dq}\right) \cdot \frac{p}{q}$

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Price Elasticity of Demand, cont'd

- ◆ $\eta = \left(1 / \frac{dp}{dq}\right) \cdot \frac{p}{q}$ says that:
 - The price elasticity of demand at some point on the demand curve is
 - » the inverse of the slope of the (inverse) demand curve,
 - » times the ratio of price to quantity at that point on the demand curve.
- ◆ Implications: the price elasticity of demand is
 - (probably) different at every point on the demand curve;
 - nonpositive.

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Price Elasticity of Demand, cont'd

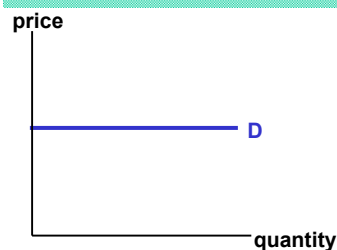
- ◆ We call demand (at some point) *elastic*, if the quantity demanded is relatively *responsive* to changes in price.
 - Definition: demand is elastic whenever $\eta < -1$.
- ◆ We call demand (at some point) *inelastic*, if the quantity demanded is relatively *unresponsive* to changes in price.
 - Definition: demand is inelastic whenever $-1 < \eta < 0$.
- ◆ We call demand (at some point) *unit elastic*, if the quantity demanded changes proportionately to changes in price.
 - Definition: demand is unit elastic whenever $\eta = -1$.

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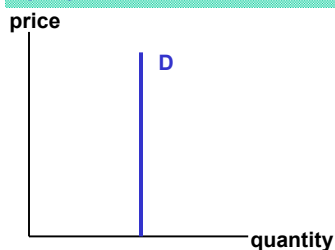
Price Elasticity of Demand, cont'd

- ◆ Two extreme cases:
- ◆ Perfectly elastic demand ($\eta = -\infty$)
- ◆ Perfectly inelastic demand ($\eta = 0$)

Demand curve with slope
 $dp/dq = 0$



Demand curve with slope
 $dp/dq = \infty$



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Using Price Elasticity of Demand

- ◆ Example: Suppose you know that the price elasticity of demand for pizza at Thayer is -2.
 - That is, every 1% increase in price results in a 2% reduction in the quantity demanded.
- ◆ Currently, 100 slices of pizza are sold, at \$1.75 each. So revenue from pizza is \$175.
- ◆ If the price of pizza increased to \$2.10, would total revenue increase or decrease?

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Using Price Elasticity, cont'd

- ◆ An increase from \$1.75 to \$2.10 is an increase of 20%.
 - Since the elasticity is -2, we know that demand will fall by 40%.
- ◆ Only 60 slices of pizza will be sold after the price increase.
 - 60 slices of pizza at \$2.10 each create revenue of \$126, which is less than \$175.
- ◆ Total revenue would decrease.

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Buzz Group

- ◆ What effect does a 20% increase in price have on total revenue from pizza if the price elasticity of demand were -0.5?

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Cross-Price Elasticity of Demand

- ◆ We have already seen that prices of other goods may influence demand for a good.
 - 💡 - Example: If tea and coffee are substitutes, an increase in the price of coffee will increase your demand for tea.
- ◆ The cross-price elasticity of demand measures the responsiveness of demand for a good with respect to changes in the price of some other good.

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Cross-Price Elasticity, cont'd

- ◆ Definition: The *cross-price elasticity of demand* is the percentage change in the quantity demanded of one good that results from a 1 percent change in price of some other good.
- ◆ Precisely, for two goods, x and y, it is:

$$\eta_{xy} = \frac{\Delta q_x / q_x}{\Delta p_y / p_y}$$

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Cross-Price Elasticity, cont'd

- ◆ We can now be specific about substitutes and complements:
- ◆ Two goods, x and y, are substitutes if an increase in price of good y increases demand for good x.
 - Definition: x and y are *substitutes* if $\eta_{xy} > 0$.
- ◆ Two goods, x and y, are complements if an increase in price of good y decreases demand for good x.
 - Definition: x and y are *complements* if $\eta_{xy} < 0$.

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Cross-Price Elasticity, cont'd

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Income Elasticity of Demand

- ◆ We have also seen that changes in income/wealth may have an effect on the quantity demanded of some good.
 - 💡 - Example: As your income/wealth rises, you can afford to buy more of everything.
- ◆ The income elasticity of demand measures the responsiveness of demand for a good with respect to changes in a consumer's income/wealth.

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Income Elasticity, cont'd

- ◆ Definition: The *income elasticity of demand* is the percentage change in the quantity demanded of some good that results from a 1 percent change in a consumer's income/wealth.
- ◆ Precisely, it is:

$$\varepsilon = \frac{\Delta q / q}{\Delta m / m}$$

(where m is income/wealth).

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Income Elasticity, cont'd

- ◆ Income elasticity of demand is usually positive (normal goods).
- ◆ But there are goods of which you want to buy *less* as your income increases (inferior goods).

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Income Elasticity, cont'd

- ◆ We can now be specific about which goods are necessities and which are luxuries:
- ◆ A good is a necessity if quantity demanded is relatively unresponsive to changes in income/wealth.
 - Definition: a good is a *necessity* if $0 < \epsilon < 1$.
- ◆ A good is a luxury if quantity demanded is relatively responsive to changes in income/wealth.
 - Definition: a good is a *luxury* if $\epsilon > 1$.

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