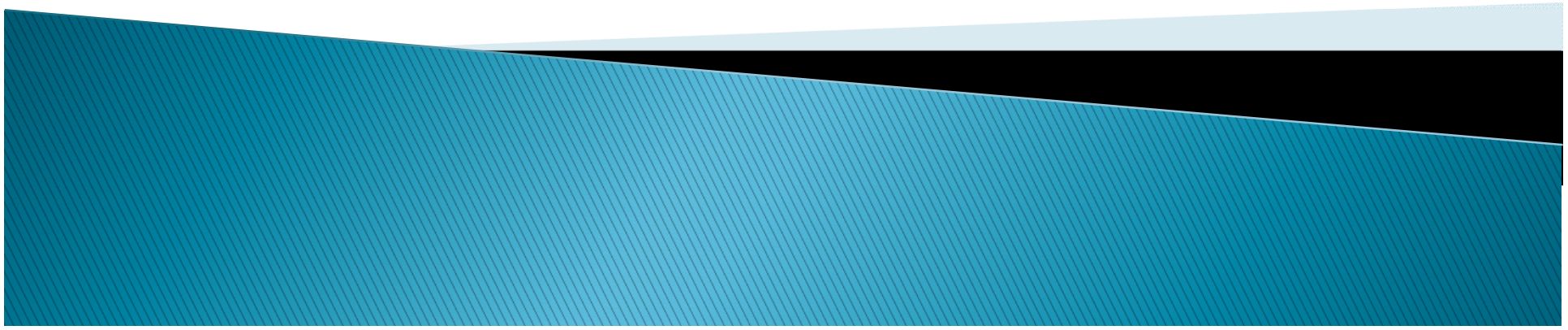
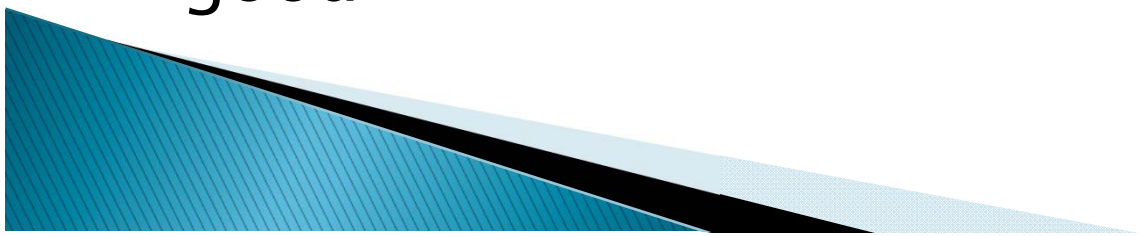
Elasticity and Its Applications

EE 211



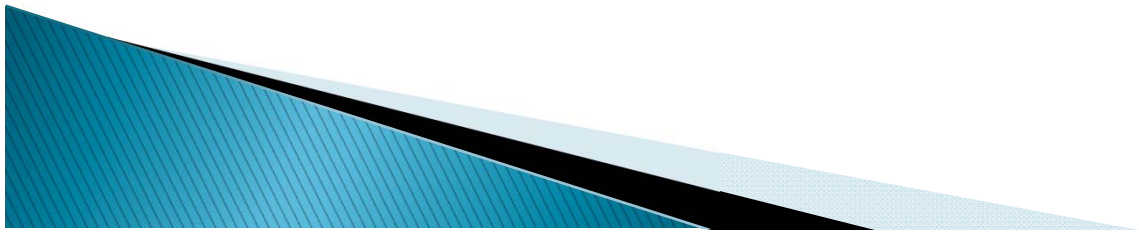
- What is the definition of **elasticity?**
- What is the meaning and importance of
  - **price elasticity of demand?**
  - **income elasticity of demand**
  - **price elasticity of supply?**
- What factors influence the size of these various elasticities?
- How the cross-price elasticity of demand measures the responsiveness of demand for one good to changes in the price of another good



Elasticity

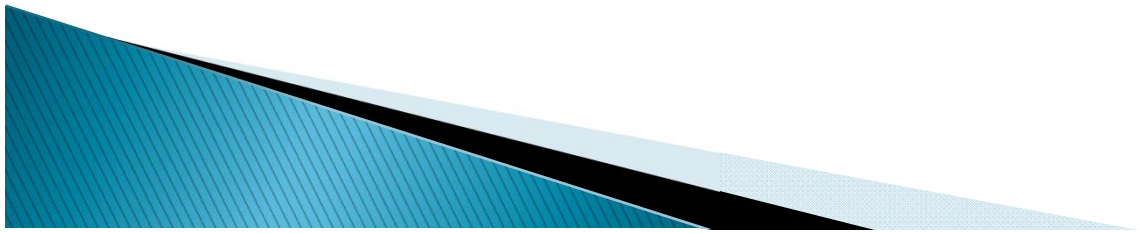
- measures how much one variable responds to changes in another variable.
  - One type of elasticity measures how much demand for your websites will fall if you raise your price.

- is a numerical measure of the responsiveness of Q^d or Q^s to one of its determinants.



Defining and Measuring Elasticity

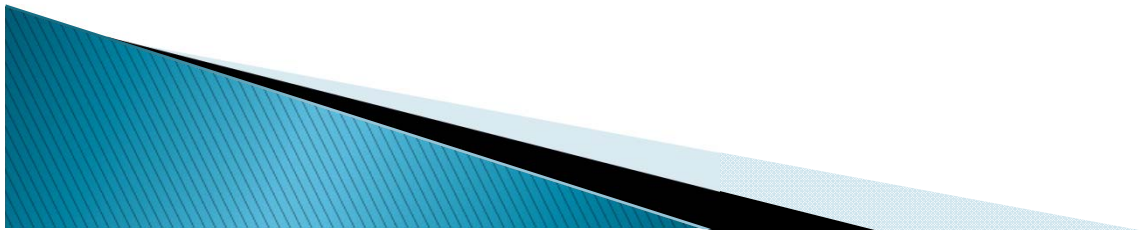
- The **price elasticity of demand** is the ratio of the percent change in the quantity demanded to the percent change in the price as we move along the demand curve (dropping the minus sign).



Price Elasticity of Demand

$$Price\ elasticity\ of\ demand = \frac{Percentage\ change\ in\ Q^d}{Percentage\ change\ in\ P}$$

- **Price elasticity of demand** measures how much Q^d responds to a change in P.
- Loosely speaking, it measures the price-sensitivity of buyers' demand.

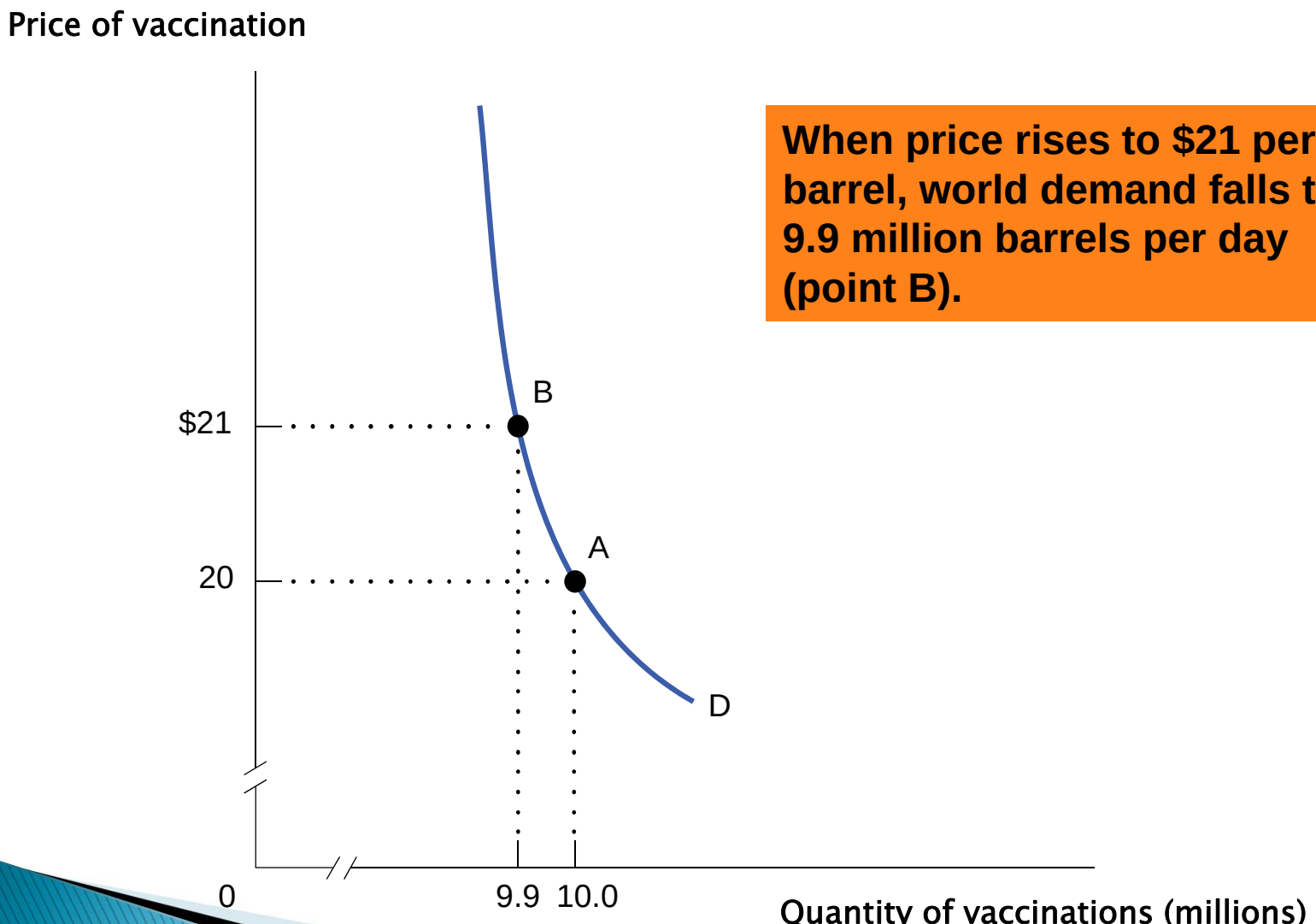


$$\%\ \text{change in quantity demanded} = \frac{\text{Change in quantity demanded}}{\text{Initial quantity demanded}} \times 100$$

$$\%\ \text{change in price} = \frac{\text{Change in price}}{\text{Initial price}} \times 100$$

$$\textbf{Price elasticity of demand} = \frac{\%\ \text{change in quantity demanded}}{\%\ \text{change in price}}$$

Demand for Vaccinations



When price rises to $21 per barrel, world demand falls to 9.9 million barrels per day (point B).

Calculating the Price Elasticity of Demand

$$\%\ \text{change in quantity demanded} = \frac{-0.1\ \text{million vaccinations}}{10\ \text{million vaccinations}} \times 100 = -1\%$$

$$\%\ \text{change in price} = \frac{\$1}{\$20} \times 100 = 5\%$$

$$\text{Price elasticity of demand} = \frac{\%\ \text{change in quantity demanded}}{\%\ \text{change in price}}$$

$$\text{Price elasticity of demand} = \frac{1\%}{5\%} = 0.2$$

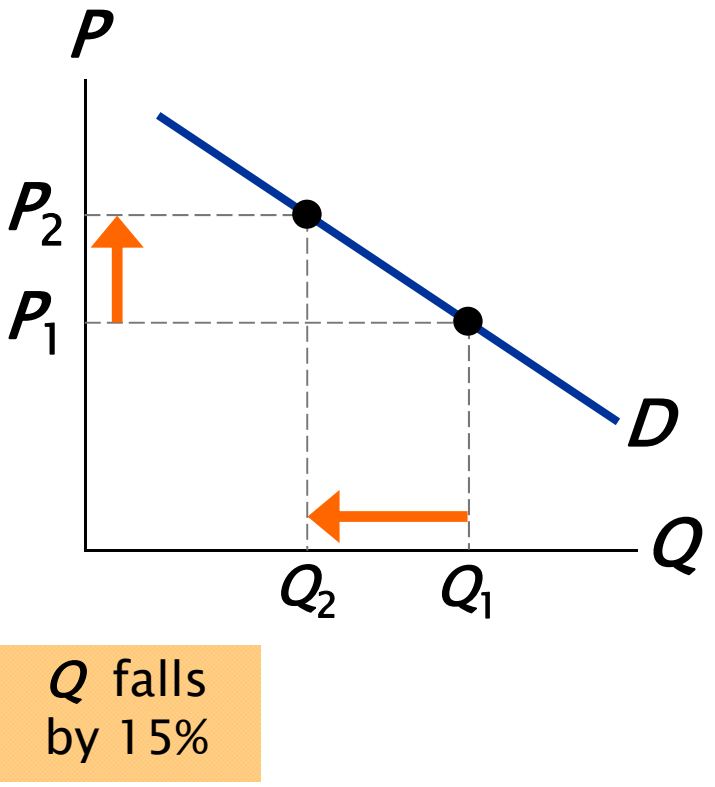
Price Elasticity of Demand

$$Price\ elasticity\ of\ demand = \frac{Percentage\ change\ in\ Q^d}{Percentage\ change\ in\ P}$$

Example:

Price elasticity of demand equals

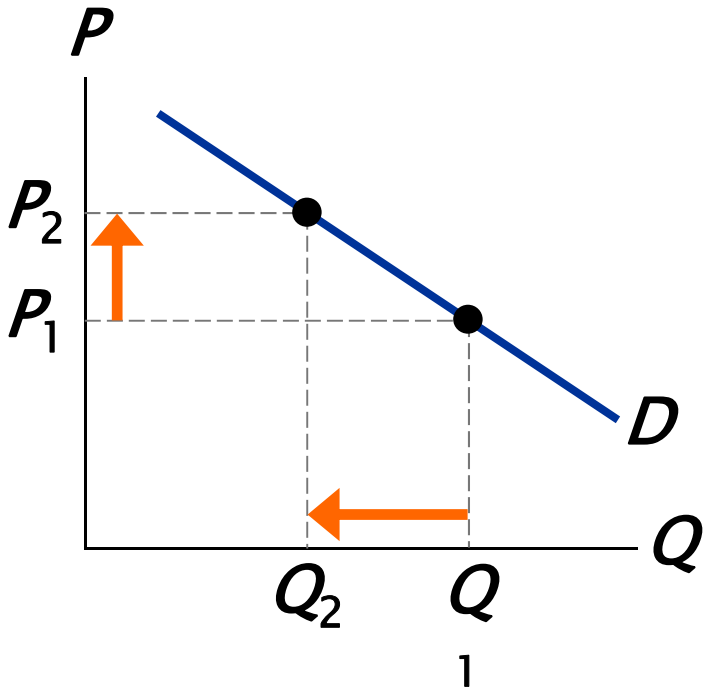
$$\frac{15\%}{10\%} = 1.5$$



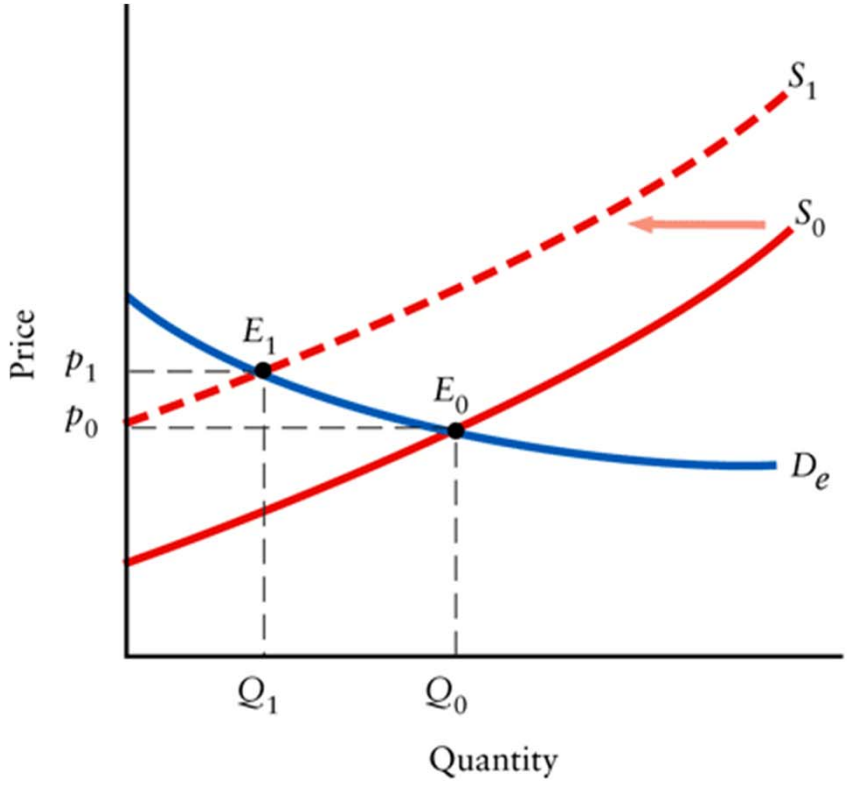
Price Elasticity of Demand

Along a *D* curve, *P* and *Q* move in opposite directions, which would make price elasticity negative.

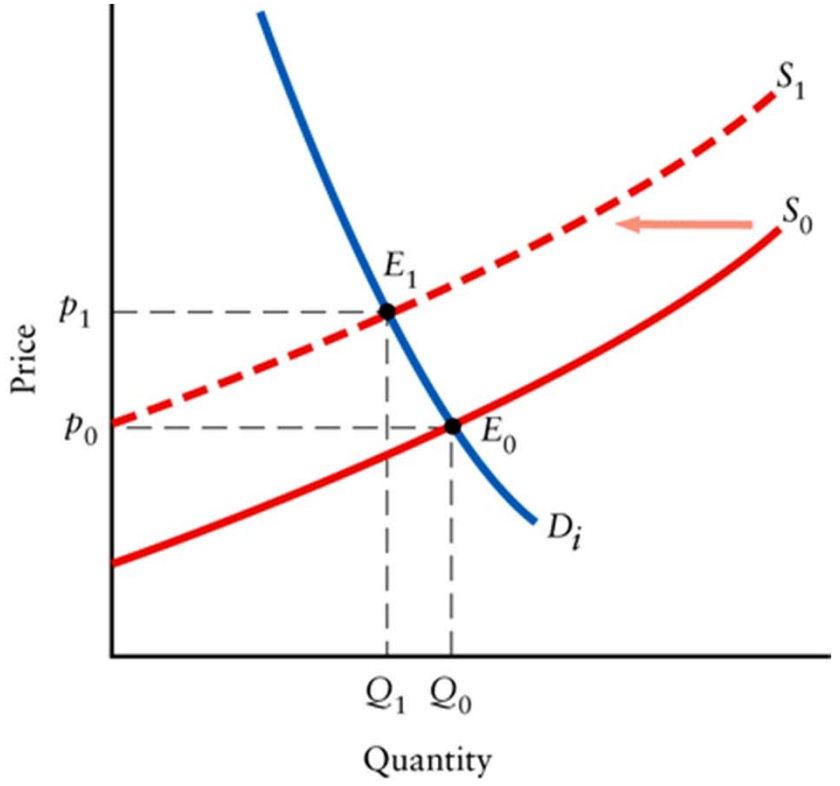
We will drop the minus sign and report all price elasticities as positive numbers.



The Effects of a Supply Shift with Two Different Demand Curves



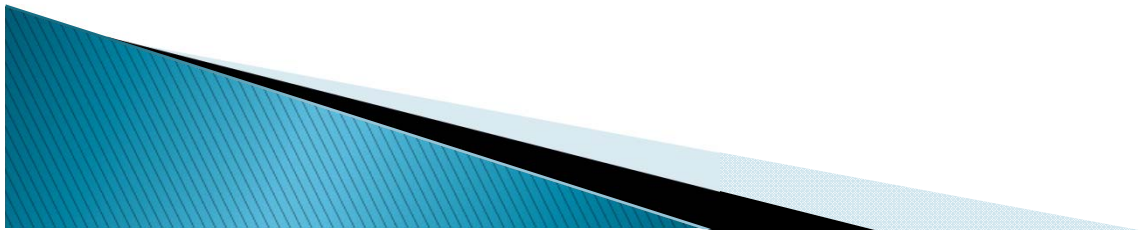
(i) Relatively elastic demand



(ii) Relatively inelastic demand

Using the Midpoint Method to Calculate Elasticities

- The **midpoint method** is a technique for calculating the percent change. In this approach, we calculate changes in a variable compared with the average, or midpoint, of the starting and final values.



Using the Midpoint Method to Calculate Elasticities

$$\%\ \text{change in } X = \frac{\text{Change in } X}{\text{Average value of } X} \times 100$$

$$\text{Average value of } X = \frac{\text{Starting value of } X + \text{final value of } X}{2}$$

$$\text{Price elasticity of demand} = \frac{\dfrac{Q_2 - Q_1}{(Q_1 + Q_2)/2}}{\dfrac{P_2 - P_1}{(P_1 + P_2)/2}}$$

Using the Midpoint Method to Calculate Elasticities

	Price	Quantity demanded
Situation A	\$0.90	1,100
Situation B	\$1.10	900

$$\%\text{ change in quantity demanded} = \frac{-200}{(1{,}100 + 900)/2} \times 100 = \frac{-200}{1{,}000} \times 100 = -20\%$$

$$\%\text{ change in price} = \frac{\$0.20}{(\$0.90 + \$1.10)/2} \times 100 = \frac{\$0.20}{\$1.00} \times 100 = 20\%$$

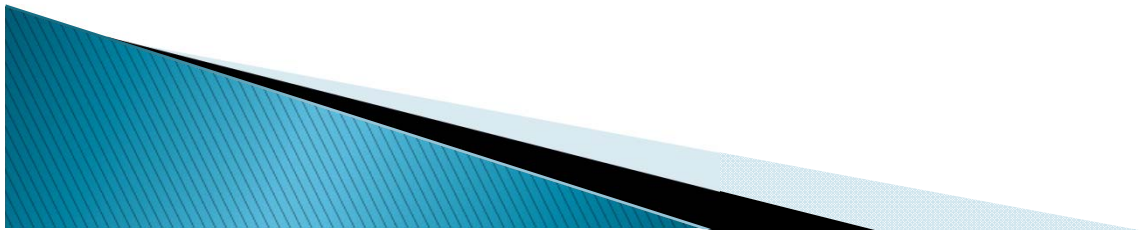
$$\text{Price elasticity of demand} = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}} = \frac{20\%}{20\%} = 1$$

Price Elasticity of Demand

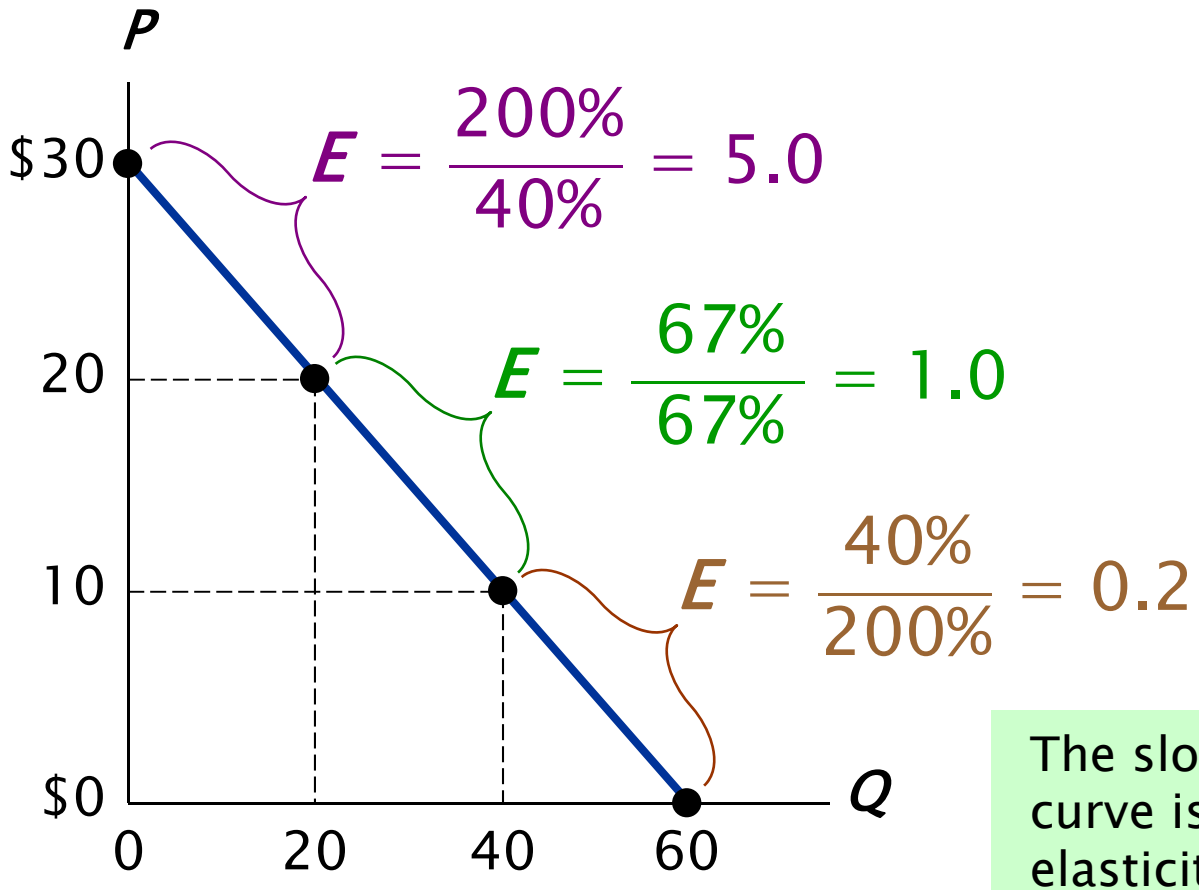
Demand is elastic when quantity demanded is relatively responsive to a change in the product's own price.

Demand is inelastic if quantity demanded is relatively unresponsive to changes in price.

Elasticity is related to the slope of the demand curve, but it is not exactly the same.



Elasticity of a Linear Demand Curve



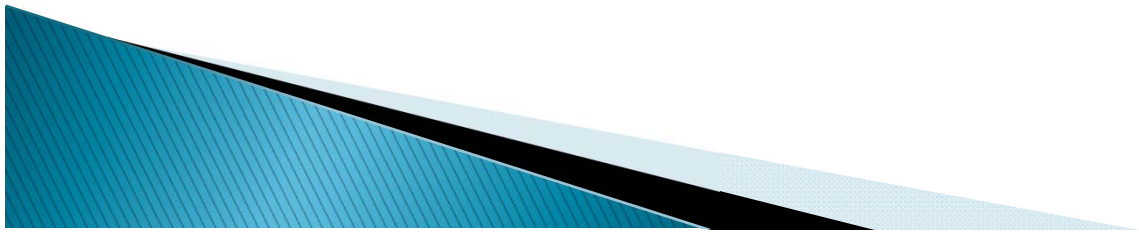
The slope of a linear demand curve is constant, but its elasticity is not.

Interpreting Numerical Elasticities

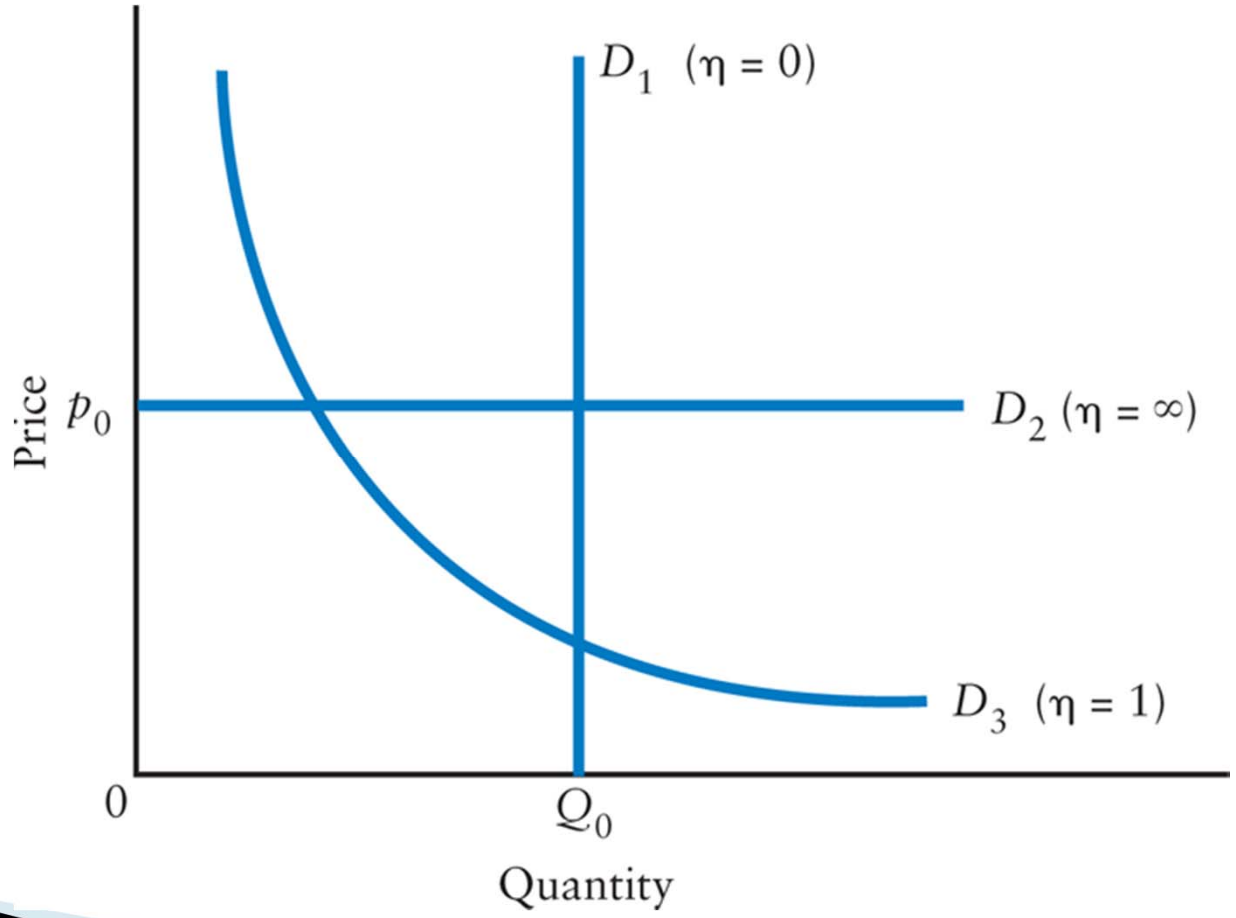
Inelastic Demand (<1):
A given % change in p results in a smaller % change in Q^D.

Inelastic Demand (>1):
A given % change in p results in a larger % change in Q^D.

Inelastic Demand ($=1$):
A given % change in p results in the same % change in Q^D.



Three Demand Curves with Constant Elasticity

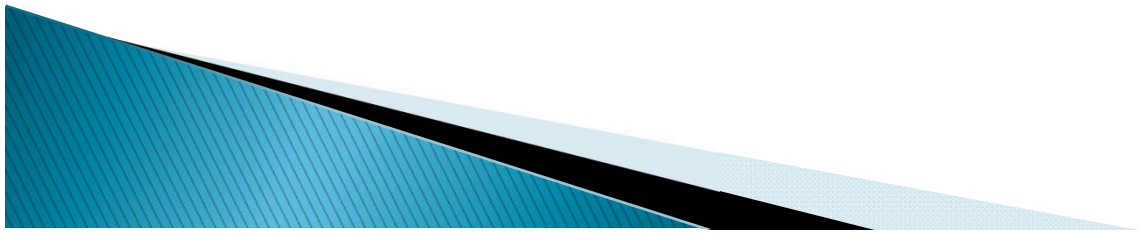


Interpreting the Price Elasticity of Demand

Two Extreme Cases of Price Elasticity of Demand

- Demand is **perfectly inelastic** when the quantity demanded does not respond at all to changes in the price. When demand is perfectly inelastic, the demand curve is a vertical line.

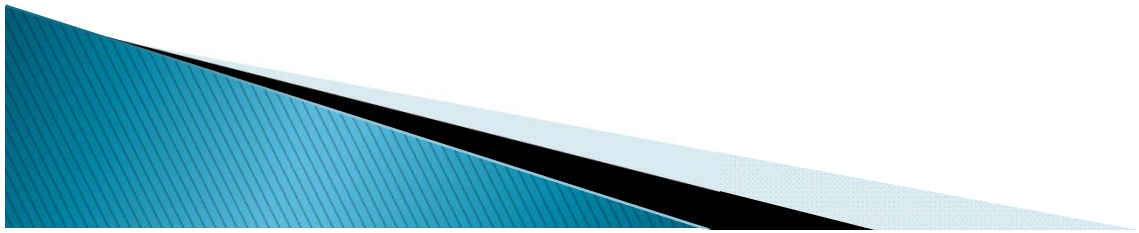
- Demand is **perfectly elastic** when any price increase will cause the quantity demanded to drop to zero. When demand is perfectly elastic, the demand curve is a horizontal line.



Interpreting the Price Elasticity of Demand

Unit-Elastic Demand, Inelastic Demand, and Elastic Demand

- Demand is **elastic** if the price elasticity of demand is greater than 1, **inelastic** if the price elasticity of demand is less than 1, and **unit-elastic** if the price elasticity of demand is exactly 1.



"Perfectly inelastic demand" (one extreme case)

$$\text{Price elasticity of demand} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{0\%}{10\%} = 0$$

D curve:

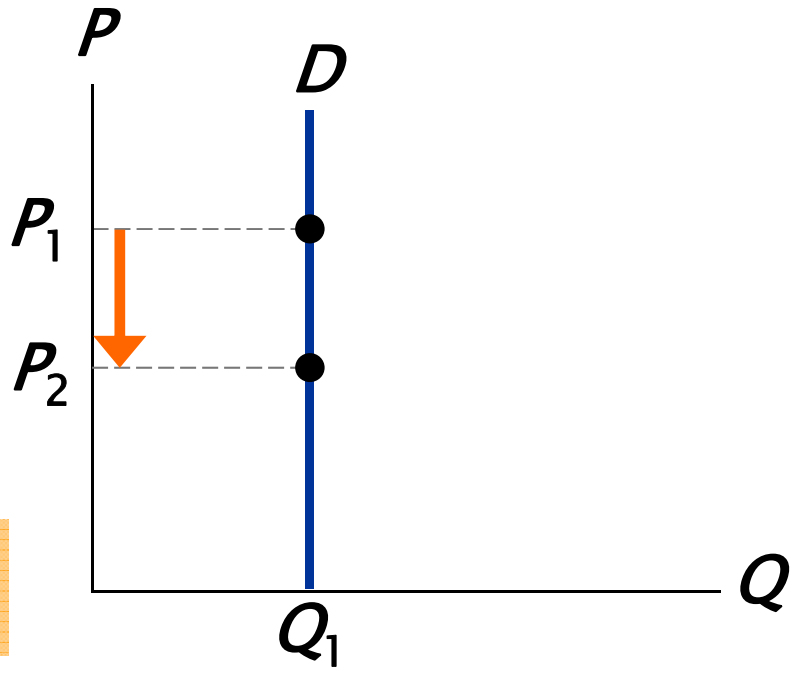
vertical

Consumers' price sensitivity:

none

Elasticity:

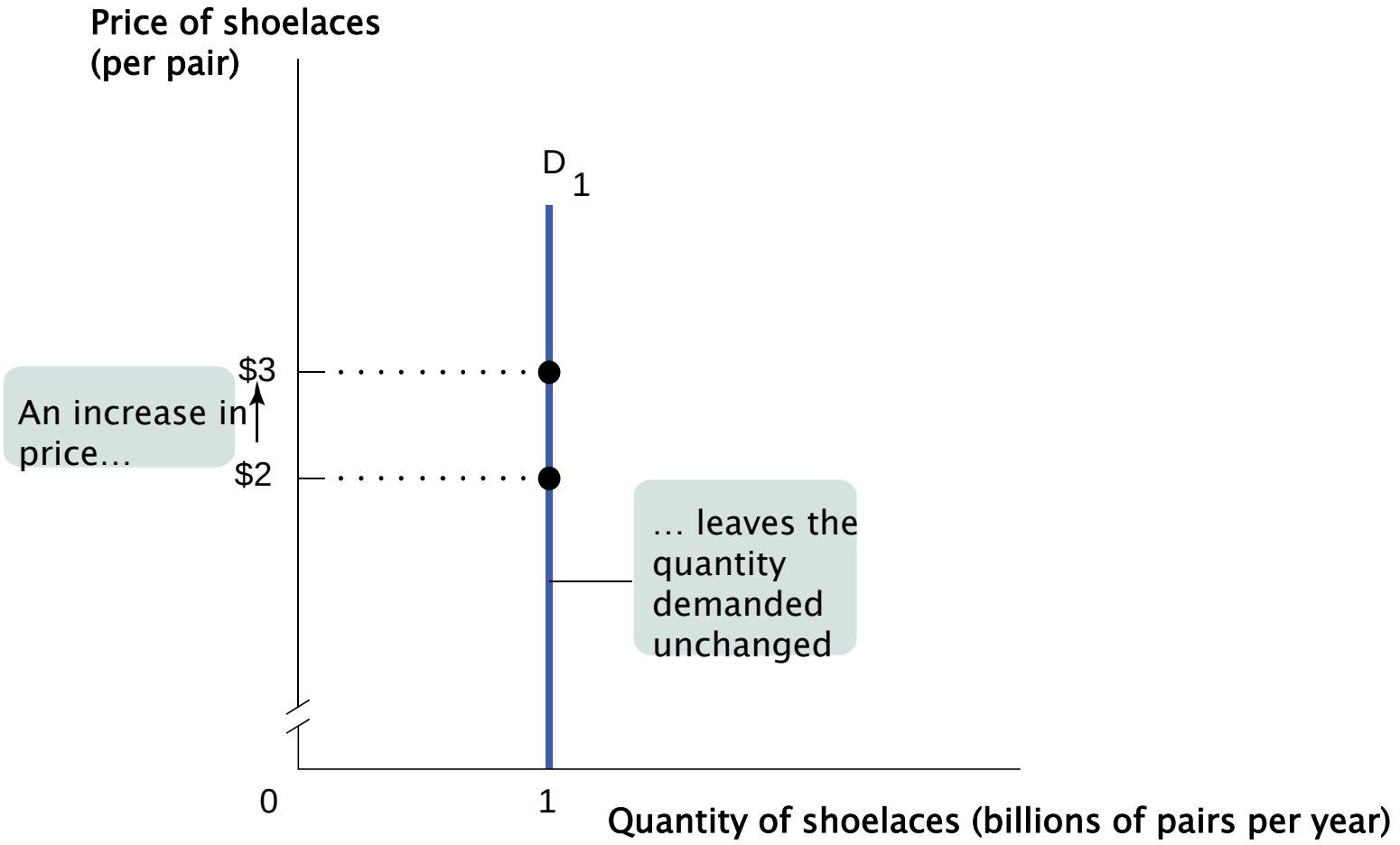
0



P falls by 10%

Q changes by 0%

Perfectly Inelastic Demand: Price Elasticity of Demand = 0



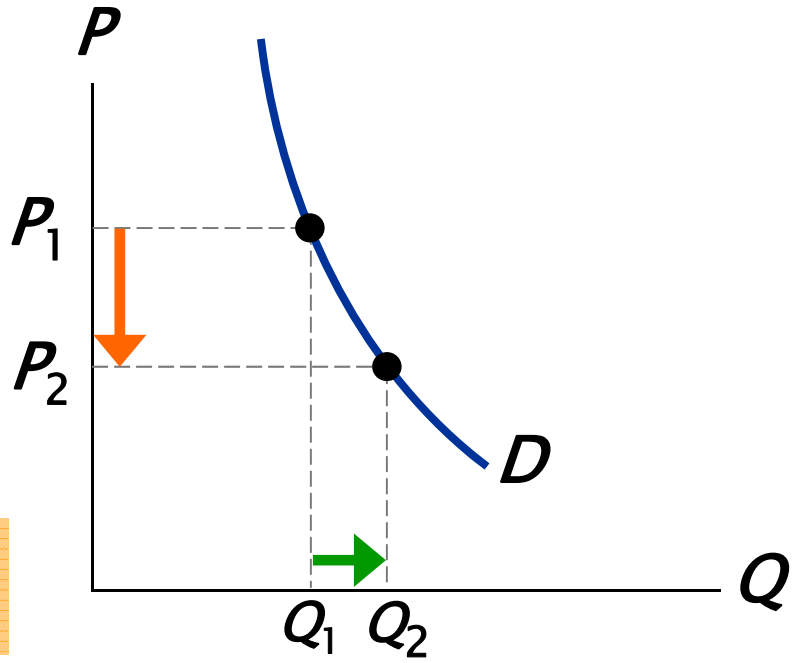
"Inelastic demand"

$$\text{Price elasticity of demand} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{< 10\%}{10\%} < 1$$

D curve:
relatively steep

Consumers' price sensitivity:
relatively low

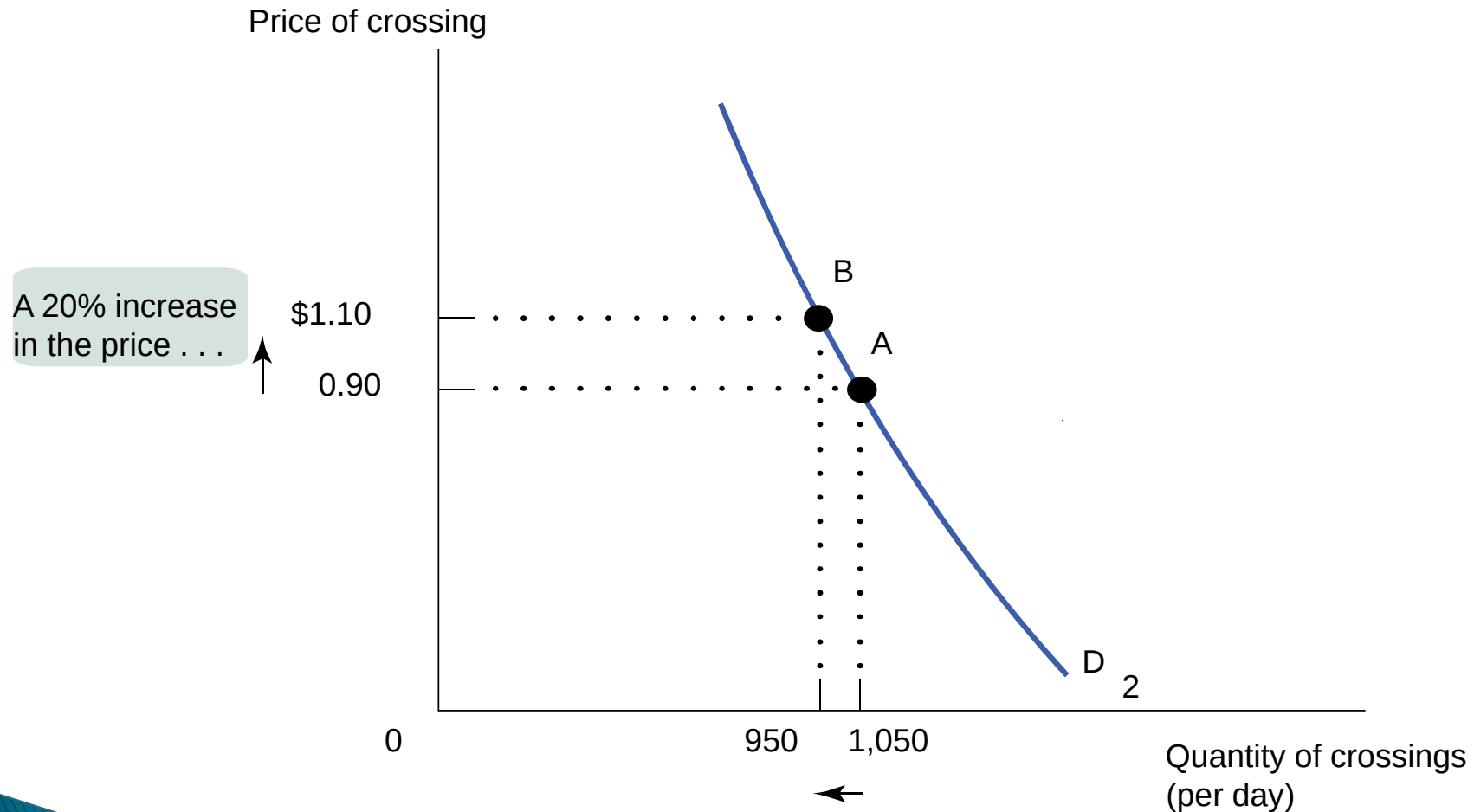
Elasticity : < 1



P falls by 10%

Q rises less than 10%

Inelastic Demand: Price Elasticity of Demand = 0.5



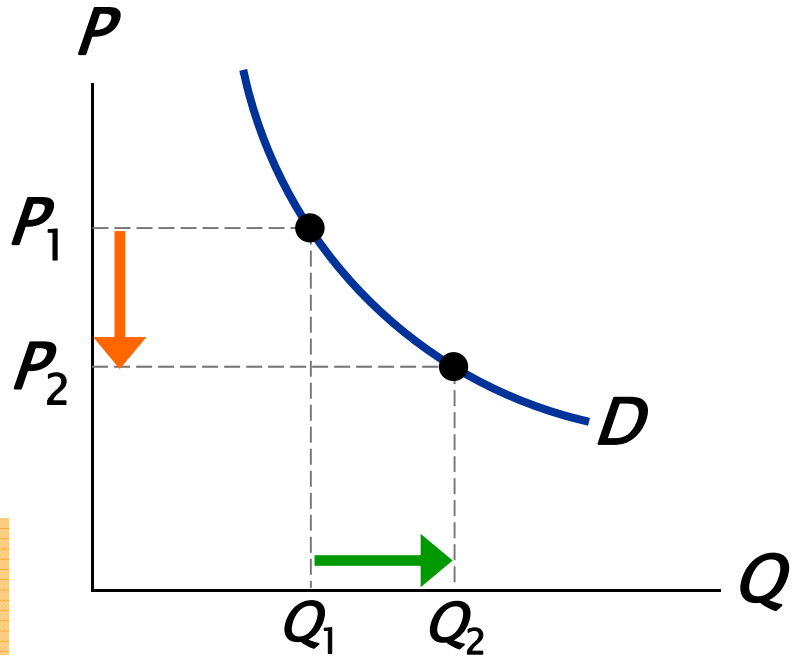
"Unit elastic demand"

$$\text{Price elasticity of demand} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{10\%}{10\%} = 1$$

D curve:
intermediate slope

Consumers' price sensitivity:
intermediate

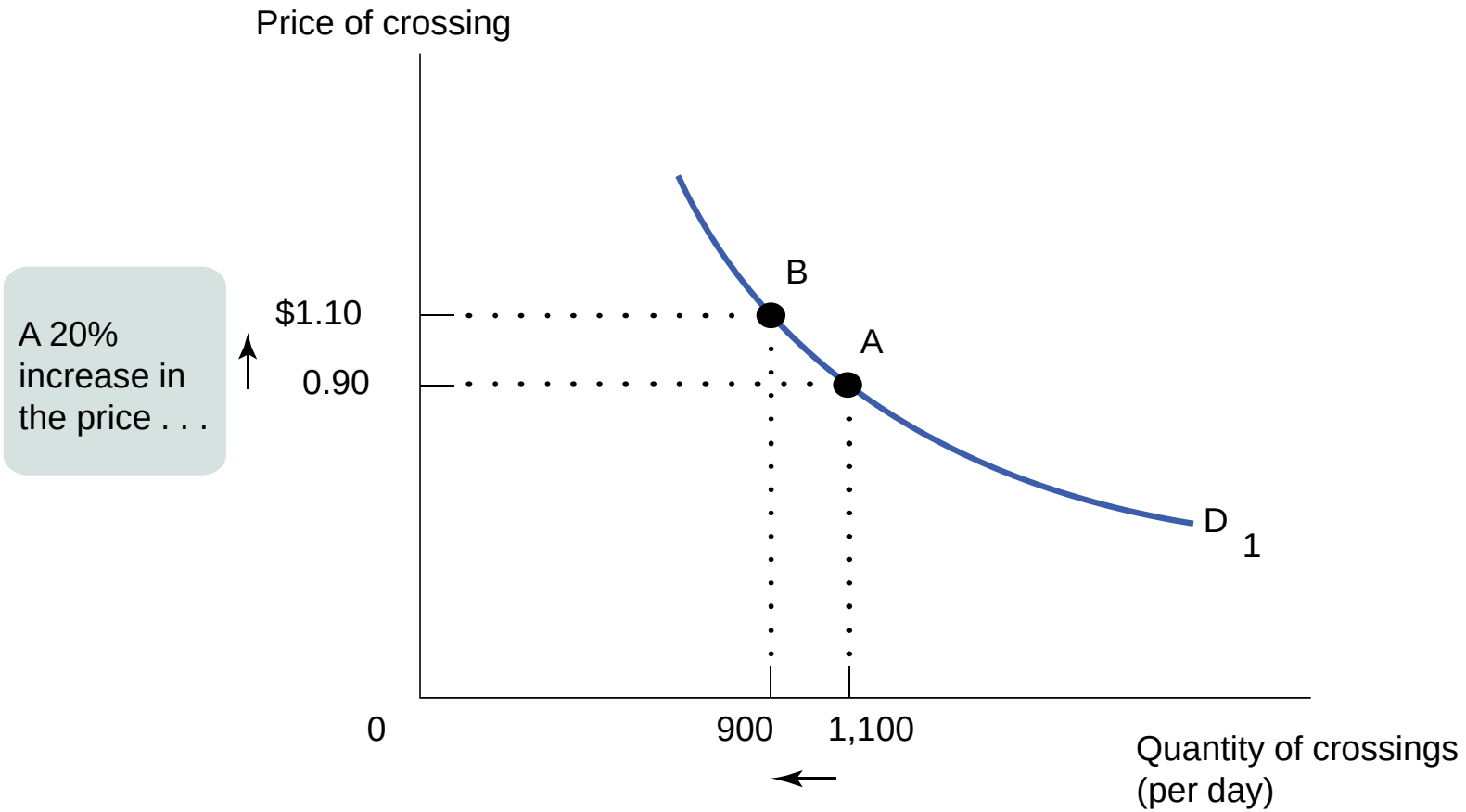
Elasticity : 1



P falls by 10%

Q rises by 10%

Unit-Elastic Demand: Price Elasticity of Demand = 1



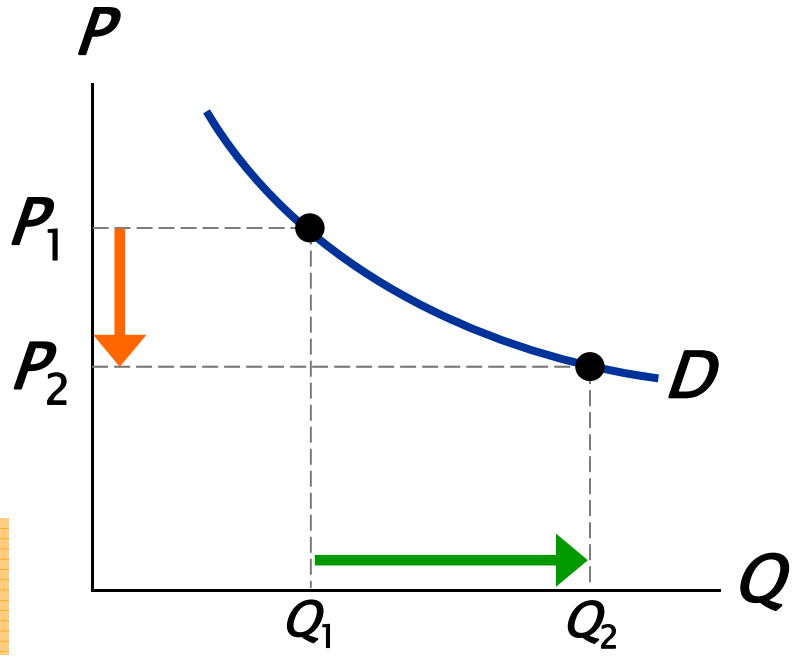
"Elastic demand"

$$\text{Price elasticity of demand} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{> 10\%}{10\%} > 1$$

D curve:
relatively flat

Consumers' price sensitivity:
relatively high

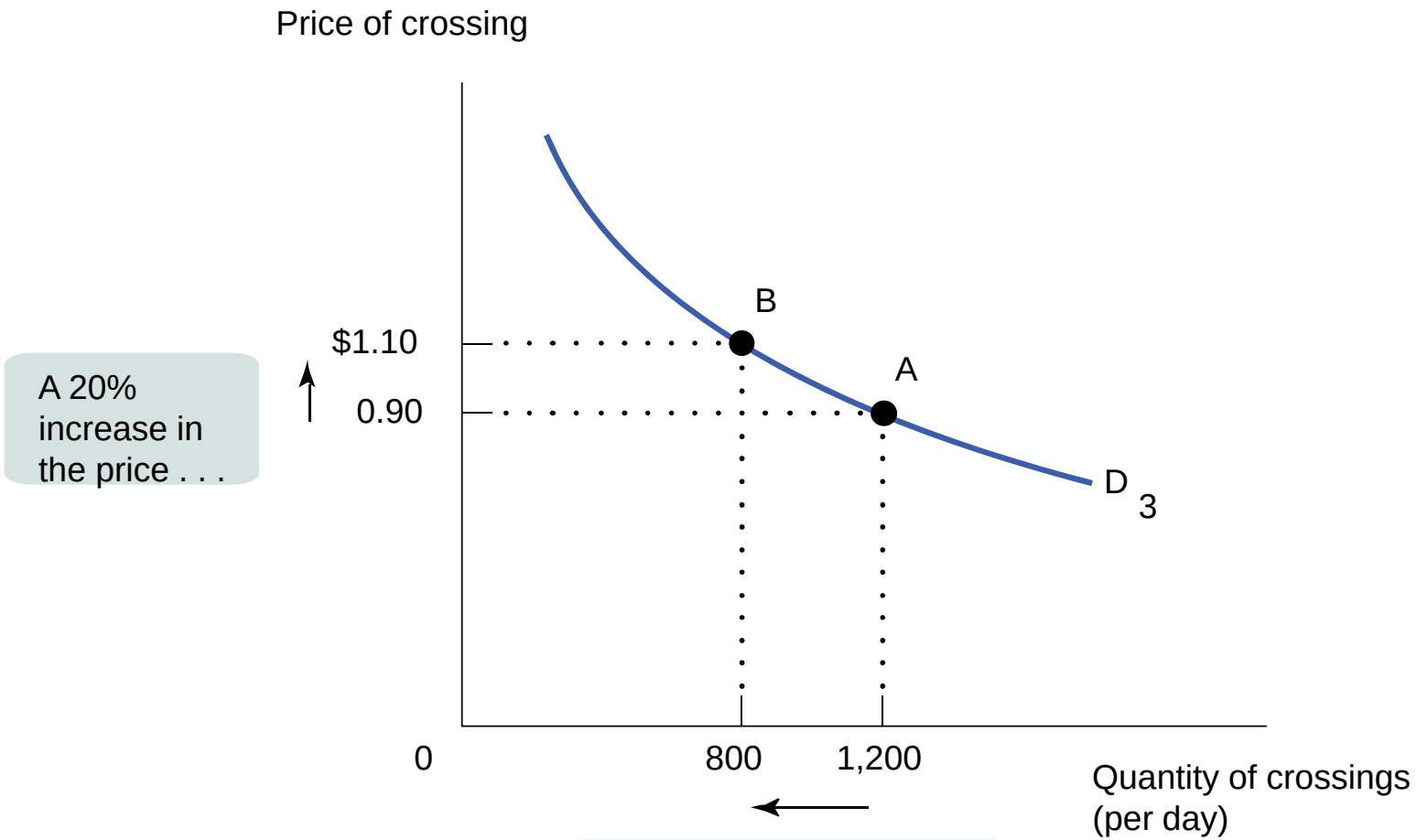
Elasticity : > 1



P falls by 10%

Q rises more than 10%

Elastic Demand: Price Elasticity of Demand = 2



"Perfectly elastic demand" (the other extreme)

$$\text{Price elasticity of demand} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{\text{any \%}}{0\%} = \text{infinity}$$

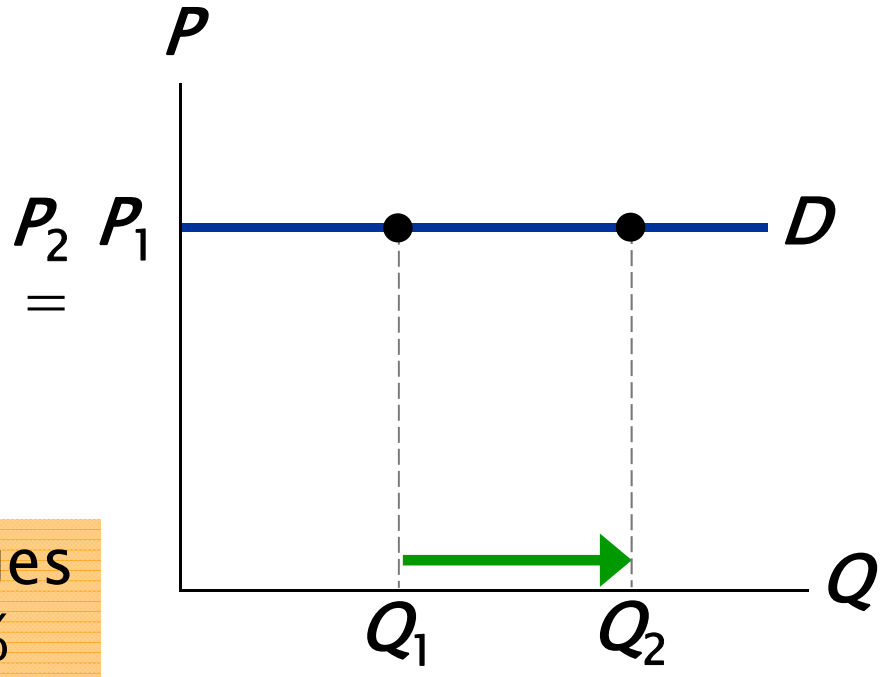
D curve:

horizontal

Consumers' price sensitivity:

extreme

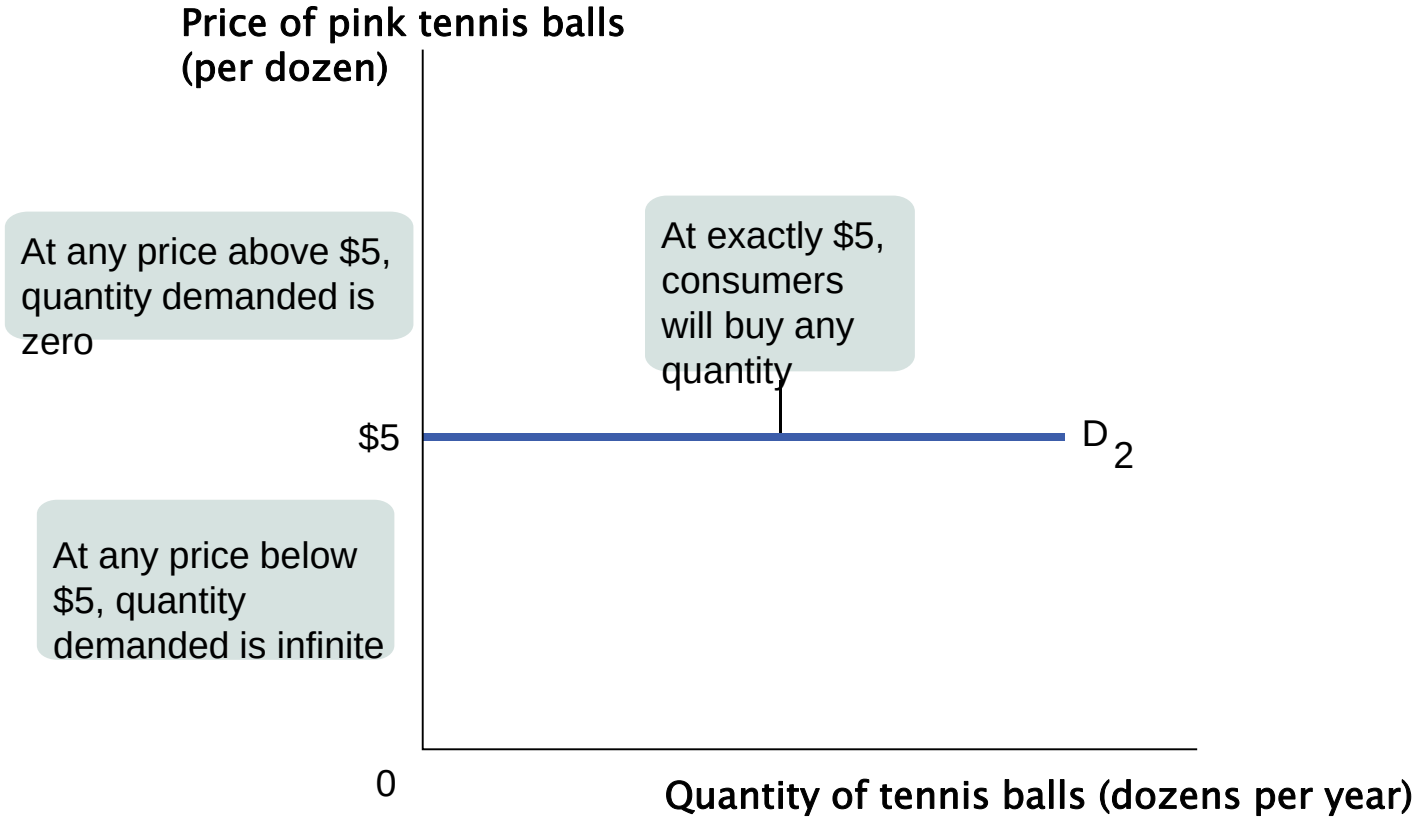
Elasticity : infinity



P changes by 0%

Q changes by any %

Price Elastic Demand: Price Elasticity of Demand = ∞



Some Estimated Price Elasticities of Demand

Good	Price elasticity
Inelastic demand	
Eggs	0.1
Beef	0.4
Stationery	0.5
Gasoline	0.5
Elastic demand	
Housing	1.2
Restaurant meals	2.3
Airline travel	
Foreign travel	4.1

Price elasticity of demand<1

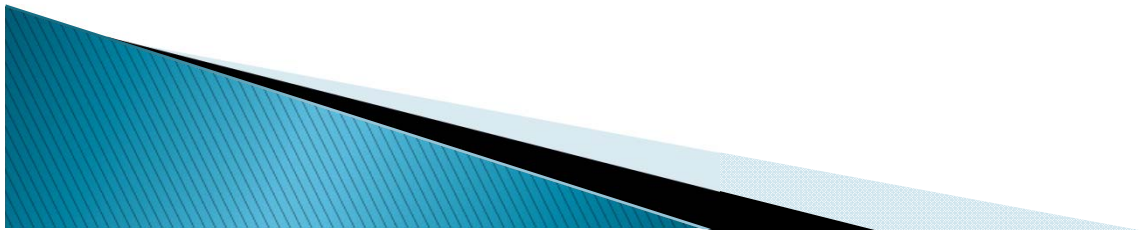
Price elasticity of demand>1

What determines price elasticity?

To learn the determinants of price elasticity,
we look at a series of examples.
Each compares two common goods.

In each example:

- Suppose the prices of both goods rise by 20%.
- The good for which Q^d falls the most (in percent) has the highest price elasticity of demand.
  Which good is it? Why?
- What lesson does the example teach us about the determinants of the price elasticity of demand?

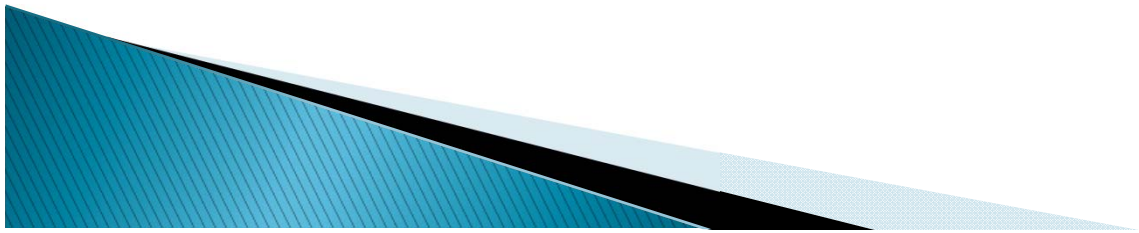


What Determines Elasticity of Demand?

Demand elasticity tends to be high when there are many close substitutes.

The availability of substitutes is determined by:

- how specifically the product is defined
- whether the good is a necessity or a luxury
- the length of the time interval (short run vs. long run)

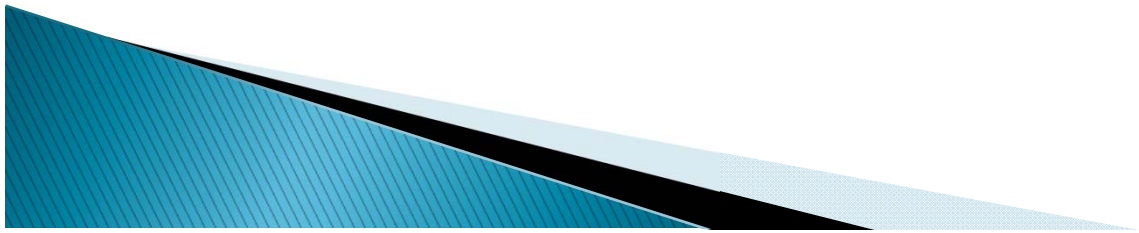


EXAMPLE 1:
Breakfast Cereal vs. Sunscreen

- The prices of both of these goods rise by 20%. For which good does Q^d drop the most? Why?
  - Breakfast cereal has close substitutes (*e.g.*, pancakes, Eggo waffles, leftover pizza), so buyers can easily switch if the price rises.
  - Sunscreen has no close substitutes, so consumers would probably not buy much less if its price rises.
- Lesson: ***Price elasticity is higher when close substitutes are available.***

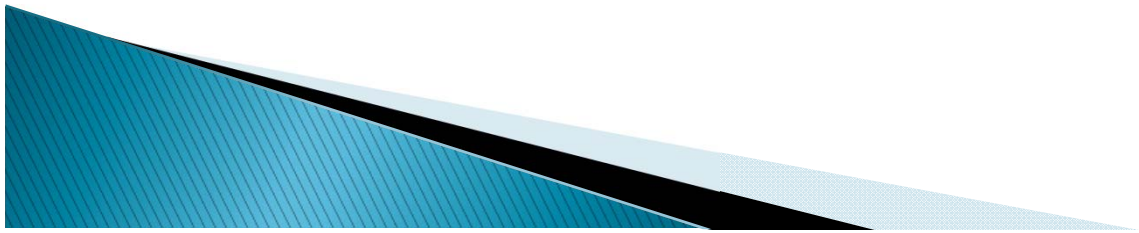
EXAMPLE 2:
"Blue Jeans" vs. "Clothing"

- The prices of both goods rise by 20%.
  For which good does Q^d drop the most? Why?
  - For a narrowly defined good such as blue jeans, there are many substitutes (khakis, shorts, Speedos).
  - There are fewer substitutes available for broadly defined goods.
    (There aren't too many substitutes for clothing, other than living in a nudist colony.)
- Lesson: ***Price elasticity is higher for narrowly defined goods than broadly defined ones.***



EXAMPLE 3:
Insulin vs. Caribbean Cruises

- The prices of both of these goods rise by 20%. For which good does Q^d drop the most? Why?
  - To millions of diabetics, insulin is a necessity. A rise in its price would cause little or no decrease in demand.
  - A cruise is a luxury. If the price rises, some people will forego it.
- Lesson: ***Price elasticity is higher for luxuries than for necessities.***



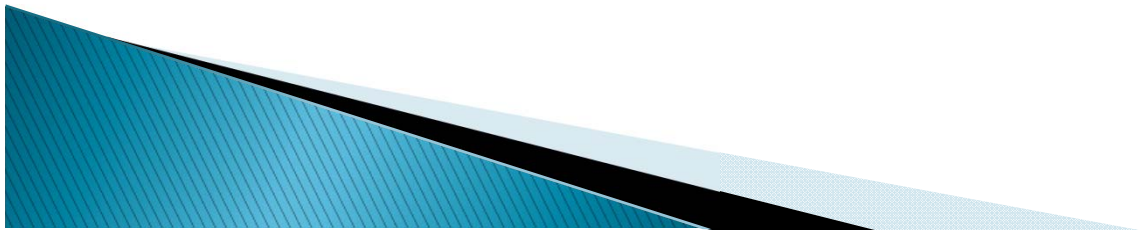
EXAMPLE 4:
Gasoline in the Short Run vs. Gasoline in the Long Run

- The price of gasoline rises 20%. Does Q^d drop more in the short run or the long run? Why?
  - There's not much people can do in the short run, other than ride the bus or carpool.
  - In the long run, people can buy smaller cars or live closer to where they work.
- Lesson: ***Price elasticity is higher in the long run than the short run.***

The Determinants of Price Elasticity: A Summary

The price elasticity of demand depends on:

- the extent to which close substitutes are available
- whether the good is a necessity or a luxury
- how broadly or narrowly the good is defined
- the time horizon—elasticity is higher in the long run than the short run

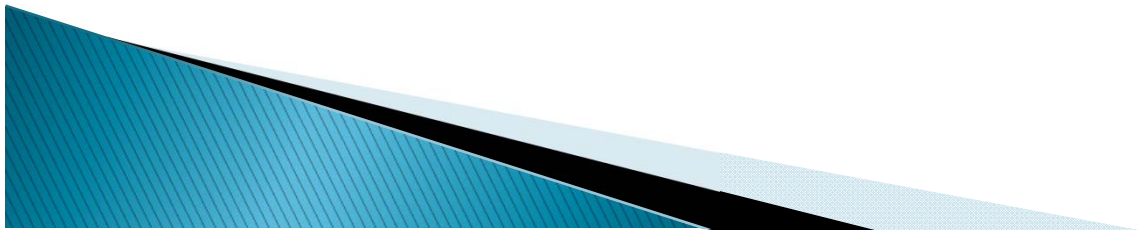


Why does it matter whether demand is unit-elastic, inelastic, or elastic?

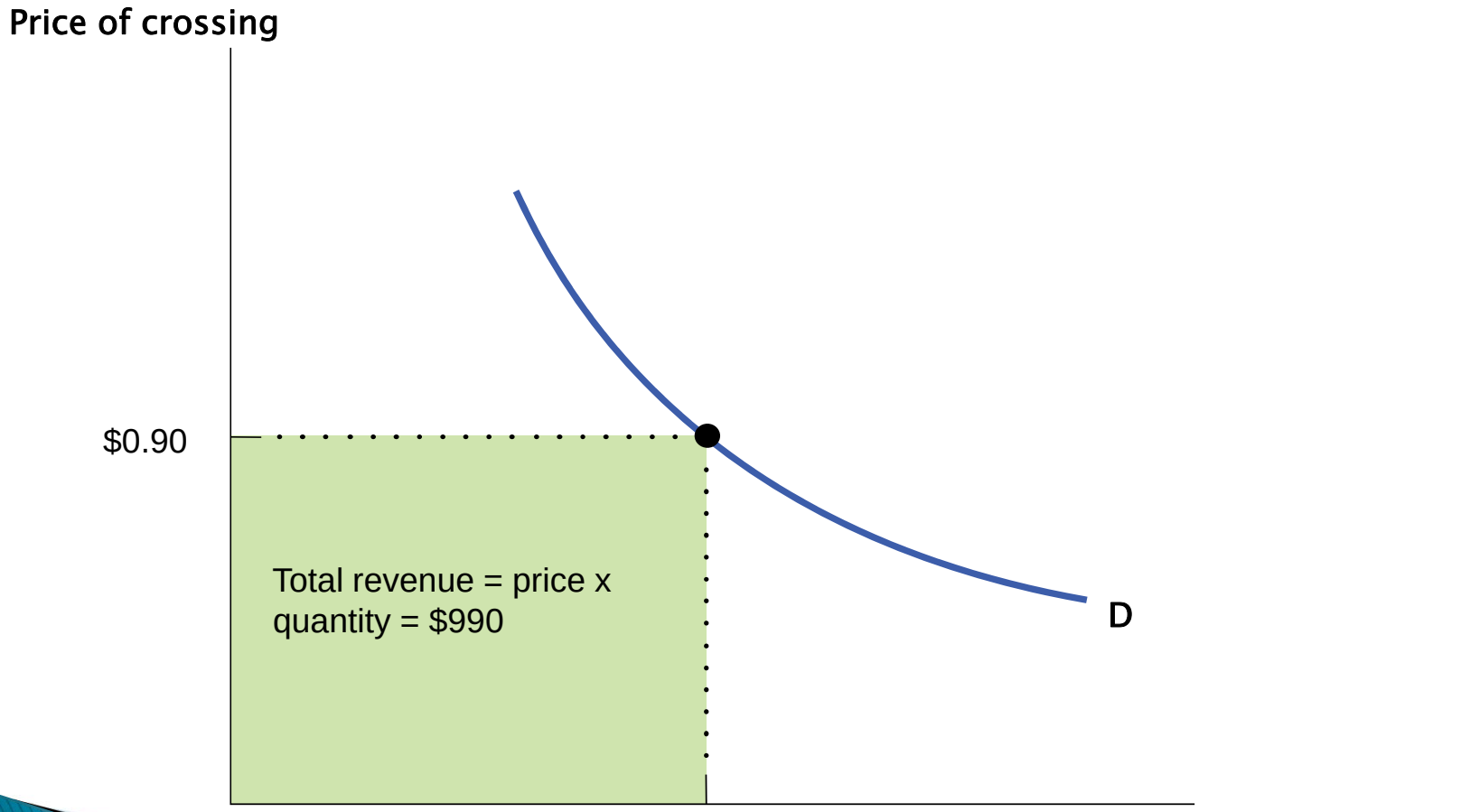
- Because this classification predicts how changes in the price of a good will affect the *total revenue* earned by producers from the sale of that good.

- The **total revenue** is defined as the total value of sales of a good or service, i.e.

- Total Revenue $=$ Price $\times$ Quantity Sold

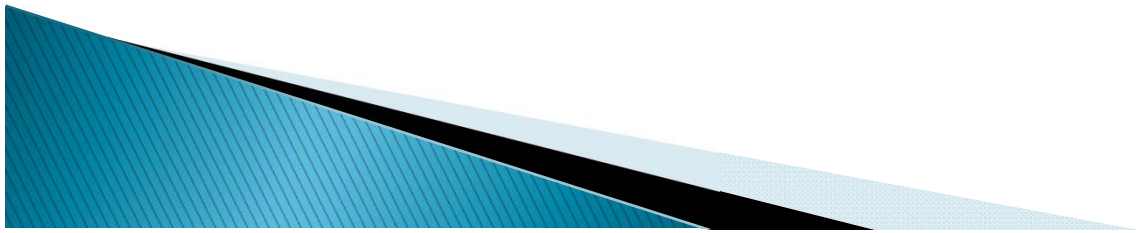


Total Revenue by Area

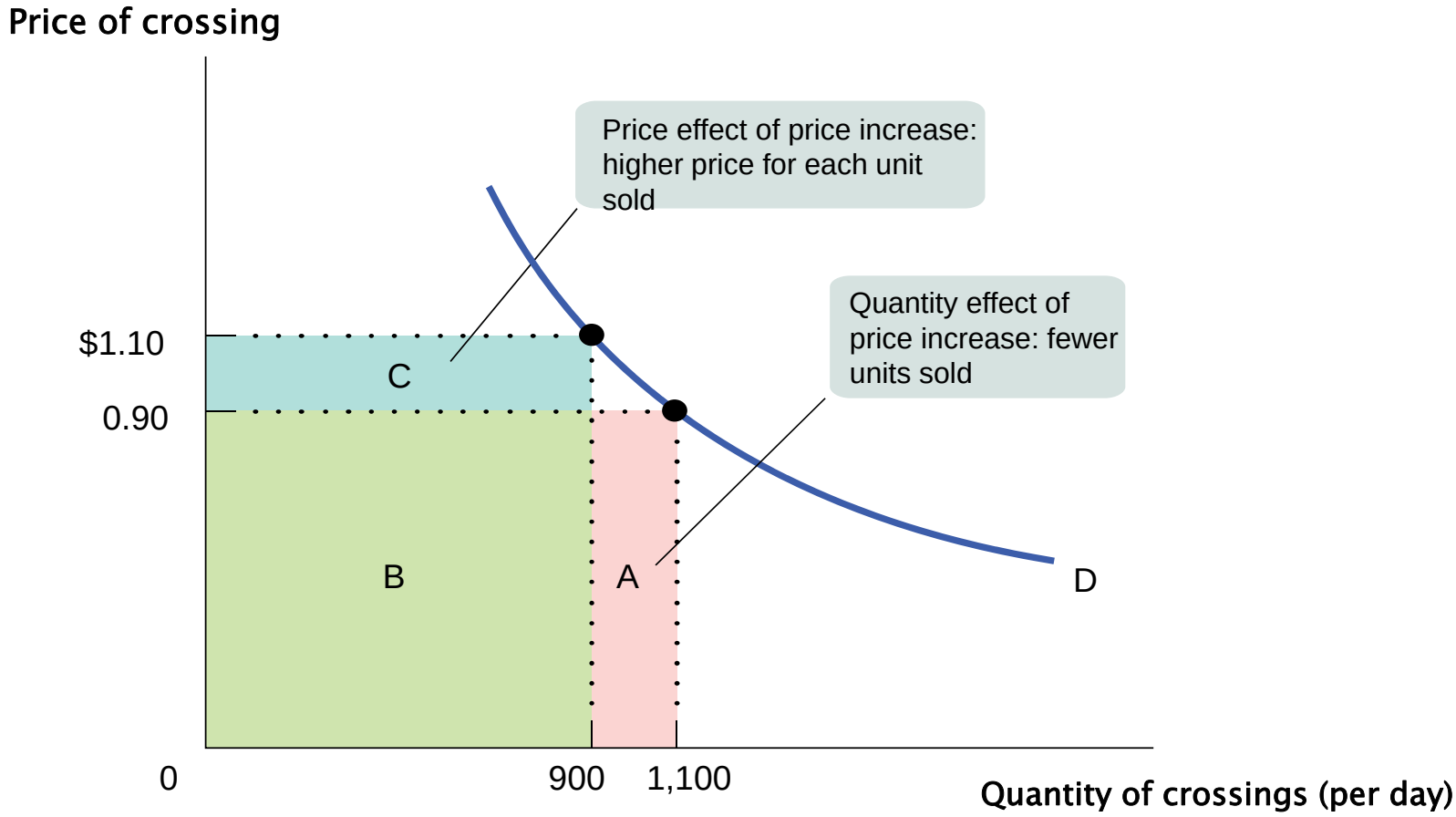


Elasticity and Total Revenue

- When a seller raises the price of a good, there are two countervailing effects in action (except in the rare case of a good with perfectly elastic or perfectly inelastic demand):
  - ***A price effect:*** After a price increase, each unit sold sells at a higher price, which tends to raise revenue.
  - ***A quantity effect:*** After a price increase, fewer units are sold, which tends to lower revenue.



Effect of a Price Increase on Total Revenue

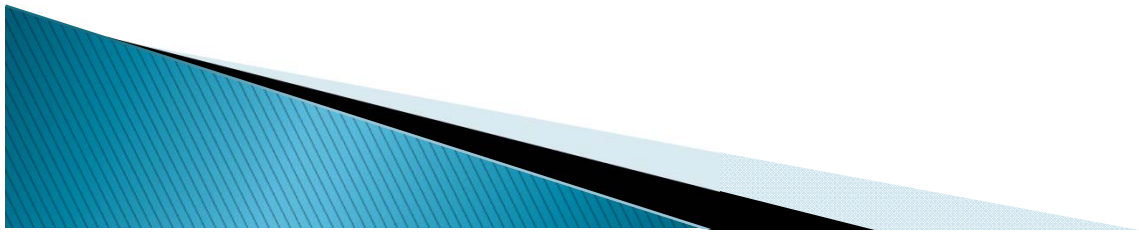


Price Elasticity and Total Revenue

- Continuing our scenario, if you raise your price from $200 to $250, would your revenue rise or fall?

$$\text{Revenue} = P \times Q$$

- A price increase has two effects on revenue:
  - Higher *P* means more revenue on each unit you sell.
  - But you sell fewer units (lower *Q*), due to law of demand.
- Which of these two effects is bigger? It depends on the price elasticity of demand.

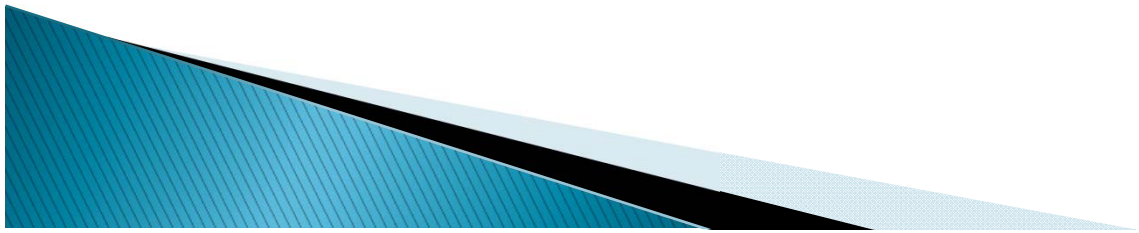


Elasticity and Total Revenue

- If demand for a good is ***elastic*** (the price elasticity of demand is greater than 1), an increase in price reduces total revenue. In this case, the quantity effect is stronger than the price effect.

- If demand for a good is ***inelastic*** (the price elasticity of demand is less than 1), a higher price increases total revenue. In this case, the price effect is stronger than the quantity effect.

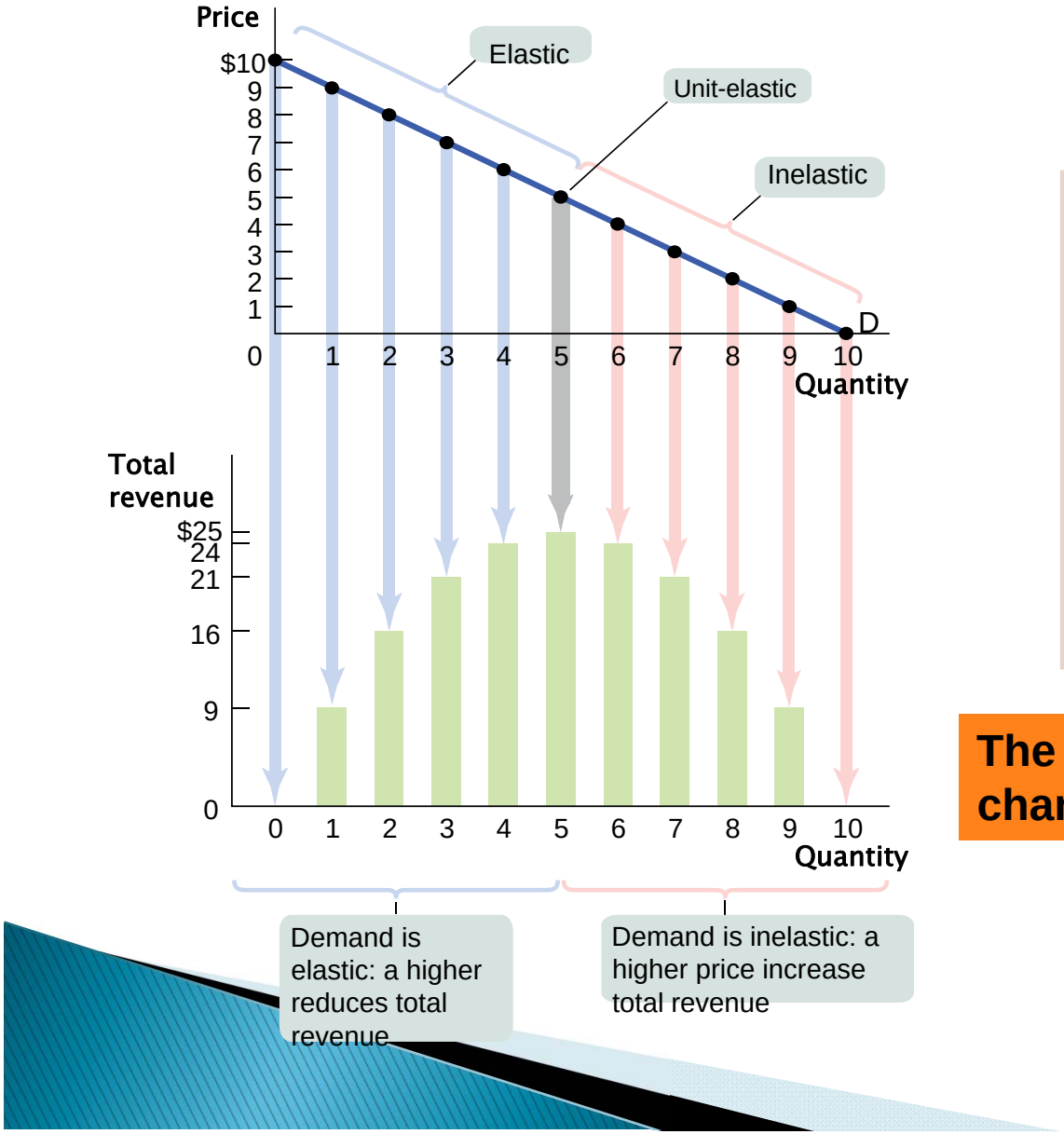
- If demand for a good is ***unit-elastic*** (the price elasticity of demand is 1), an increase in price does not change total revenue. In this case, the sales effect and the price effect exactly offset each other.



Price Elasticity of Demand and Total Revenue

	Price of crossing = $0.90	Price of crossing = $1.10
Unit-elastic demand (price elasticity of demand = 1)		
Quantity demanded	1,100	900
Total revenue	$990	$990
Inelastic demand (price elasticity of demand = 0.5)		
Quantity demanded	1,050	950
Total revenue	$945	$1,045
Elastic demand (price elasticity of demand = 2)		
Quantity demanded	1,200	800
Total revenue	$1,080	$880

Demand Schedule and Total Revenue

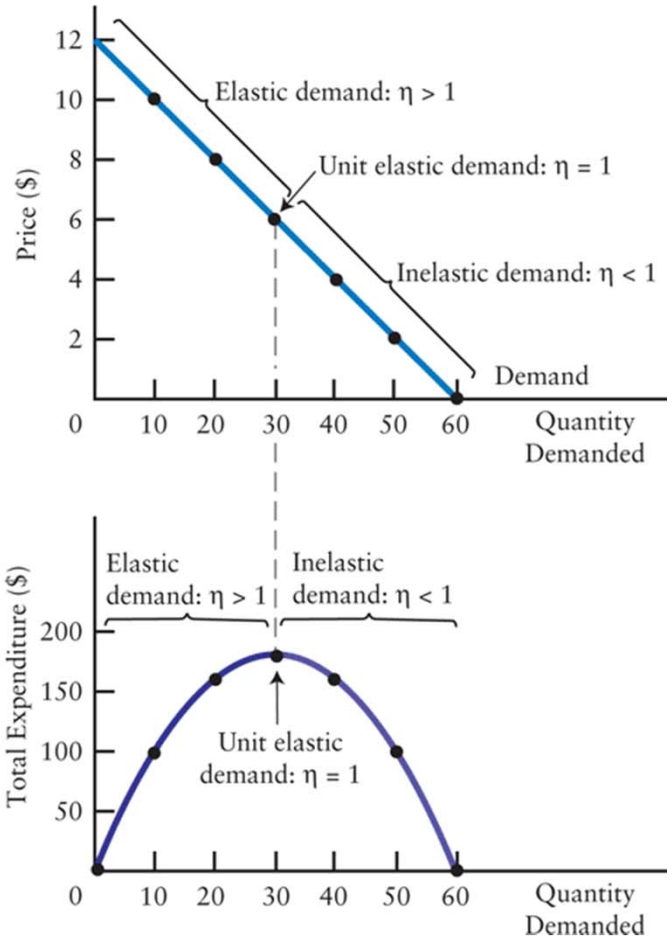


Demand Schedule and Total Revenue for a Linear Demand Curve		
Price	**Quantity demanded**	**Total Revenue**
$0	10	$0
1	9	9
2	8	16
3	7	21
4	6	24
5	5	25
6	4	24
7	3	21
8	2	16
9	1	9
10	0	0

The price elasticity of demand changes along the demand curve

Total Expenditure and Quantity Demanded

Price ($)	Quantity Demanded	Expenditure ($)
12	0	0
10	10	100
8	20	160
6	30	180
4	40	160
2	50	100
0	60	0



Price Elasticity and Total Revenue

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in } Q}{\text{Percentage change in } P}$$

$$\text{Revenue} = P \times Q$$

- If demand is elastic, then

  price elasticity of demand $>$ 1

  % change in Q $>$ % change in P

- The fall in revenue from lower Q is greater than the increase in revenue from higher P, so revenue falls.

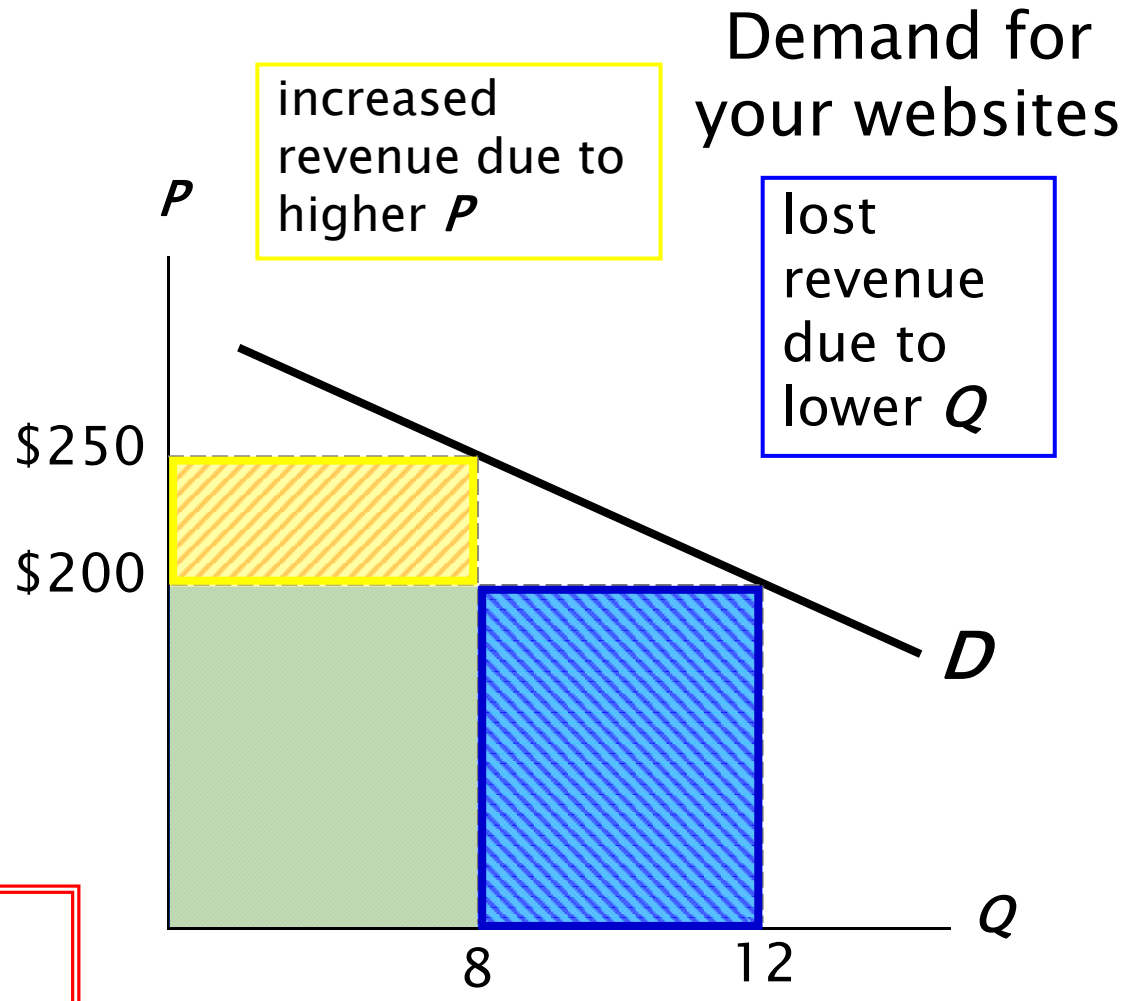
Price Elasticity and Total Revenue

Elastic demand
(elasticity = 1.8)

If P = \$200,
Q = 12 and
revenue = \$2400.

If P = \$250,
Q = 8 and
revenue = \$2000.

When D is elastic,
a price increase
causes revenue to fall.



Price Elasticity and Total Revenue

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in } Q}{\text{Percentage change in } P}$$

$$\text{Revenue} = P \times Q$$

- If demand is inelastic, then

  price elasticity of demand < 1

  % change in $Q <$ % change in P

- The fall in revenue from lower Q is smaller than the increase in revenue from higher P, so revenue rises.
- In our example, suppose that Q only falls to 10 (instead of 8) when you raise your price to \$250.

Price Elasticity and Total Revenue

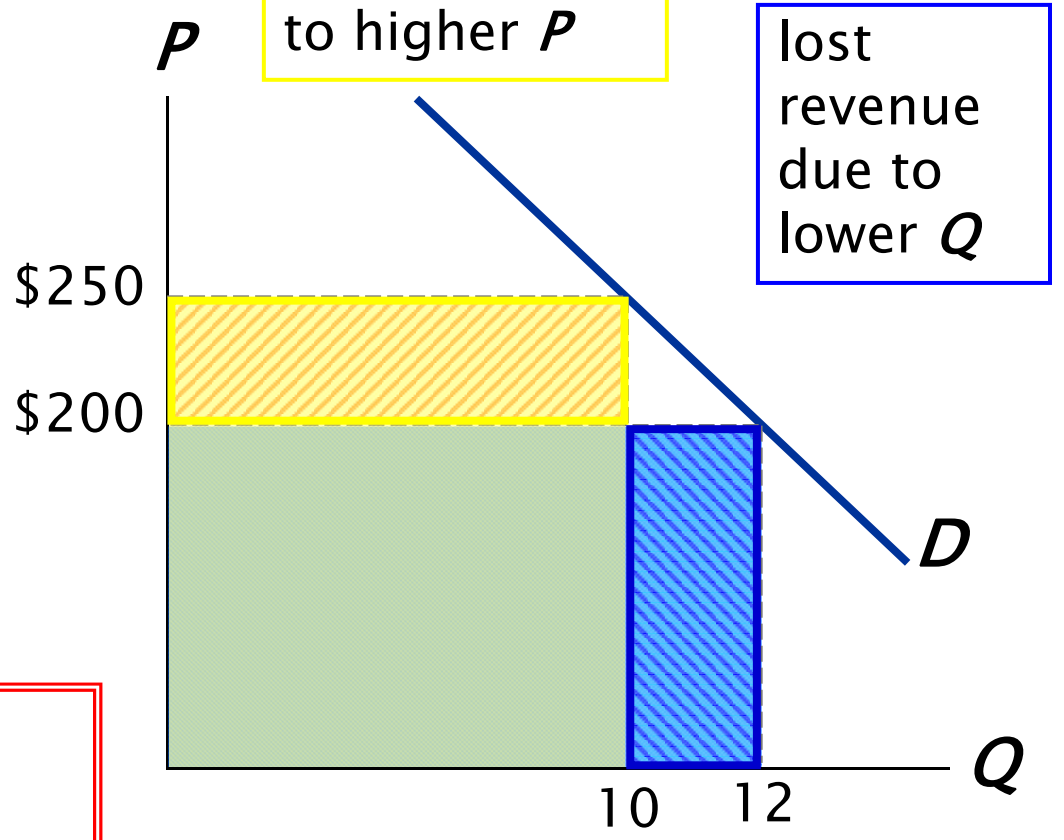
Now, demand is inelastic:
elasticity = 0.82

If P = \$200,
Q = 12 and
revenue = \$2400.

If P = \$250,
Q = 10 and
revenue = \$2500.

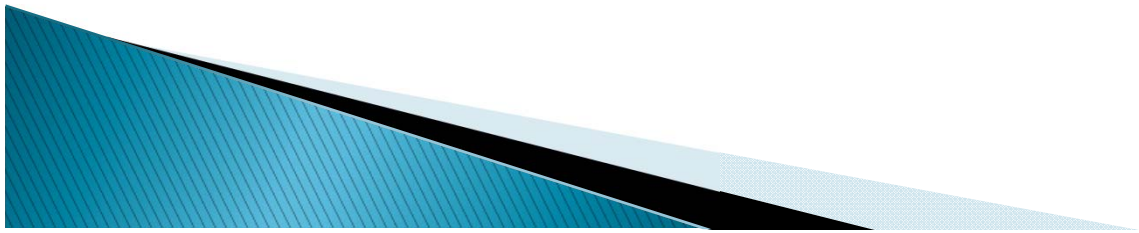
When D is inelastic,
a price increase
causes revenue to rise.

Demand for
your websites



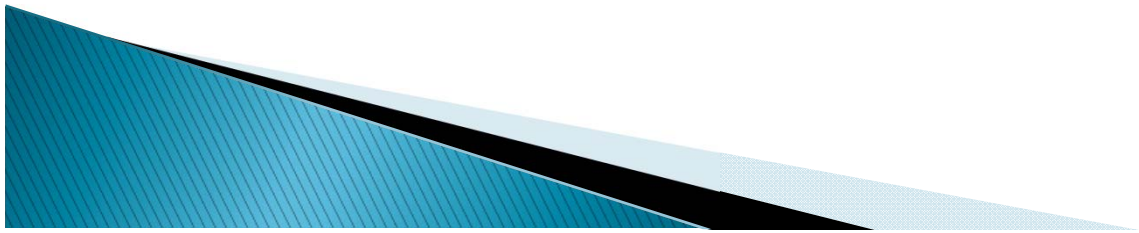
What Factors Determine the Price Elasticity of Demand?

- Whether Close Substitutes Are Available
- Whether the Good Is a Necessity or a Luxury
- Share of Income spent on the Good
- Time



APPLICATION: Does Drug Interdiction Increase or Decrease Drug-Related Crime?

- One side effect of illegal drug use is crime: Users often turn to crime to finance their habit.
- We examine two policies designed to reduce illegal drug use and see what effects they have on drug-related crime.
- For simplicity, we assume the total dollar value of drug-related crime equals total expenditure on drugs.
- Demand for illegal drugs is inelastic, due to addiction issues.

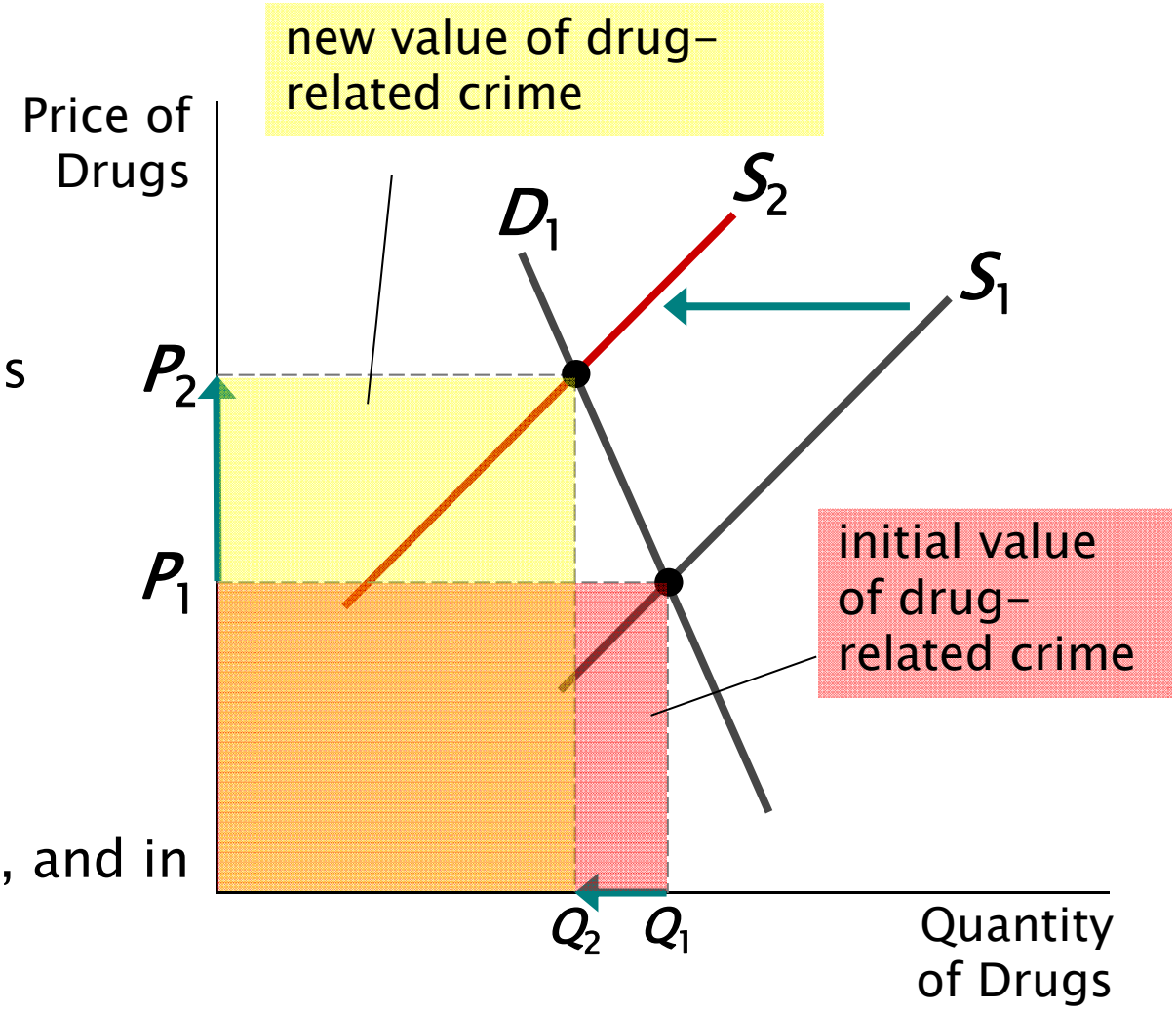


Policy 1: Interdiction

Interdiction reduces the supply of drugs.

Since demand for drugs is inelastic, *P* rises proportionally more than *Q* falls.

Result: an increase in total spending on drugs, and in drug-related crime

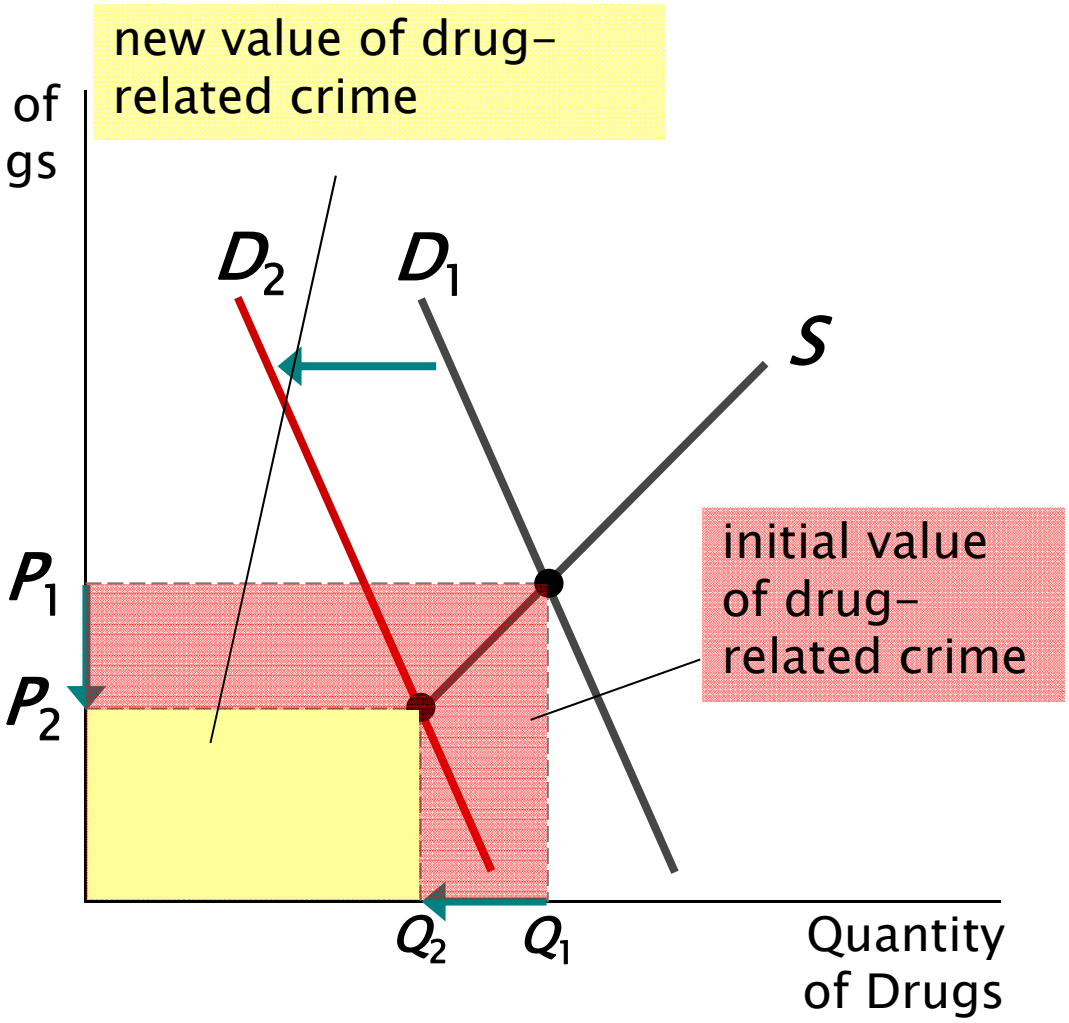


Policy 2: Education

Education reduces the demand for drugs.

P and *Q* fall.

Result:
A decrease in total spending on drugs, and in drug-related crime.



Other Demand Elasticities: Cross-Price Elasticity

- The **cross-price elasticity of demand** between two goods measures the effect of the change in one good's price on the quantity demanded of the other good. It is equal to the percent change in the quantity demanded of one good divided by the percent change in the other good's price.

The Cross-Price Elasticity of Demand Between Goods A and B:

$$= \frac{\%\text{ change in quantity of A demanded}}{\%\text{ change in price of B}}$$

$$\eta_{XY} = \frac{\textit{percentage change in quantity demanded of good } X}{\textit{percentage change in price of good } Y}$$

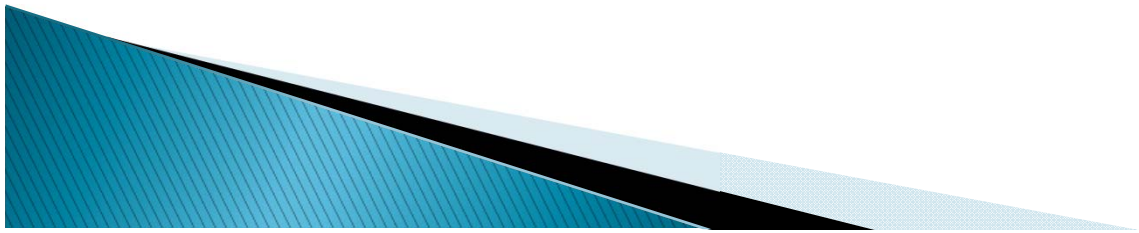
If $\eta_{XY} > 0$, then *X* and *Y* are substitutes.

If $\eta_{XY} < 0$, then *X* and *Y* are complements.

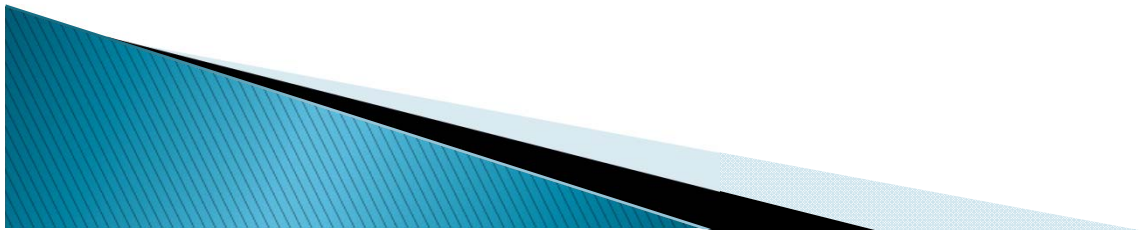
Cross-Price Elasticity

- Goods are **substitutes** when the *cross-price elasticity of demand* is positive.

- Goods are **complements** when the cross-price elasticity of demand is negative.



- For substitutes, cross-price elasticity > 0 (e.*g*., an increase in price of beef causes an increase in demand for chicken)
- For complements, cross-price elasticity < 0 (*e.g*., an increase in price of computers causes decrease in demand for software)



The Income Elasticity of Demand

- The **income elasticity of demand** is the percent change in the quantity of a good demanded when a consumer's income changes divided by the percent change in the consumer's income.

$$\text{Income elasticity of demand} = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

Income Elasticity of Demand

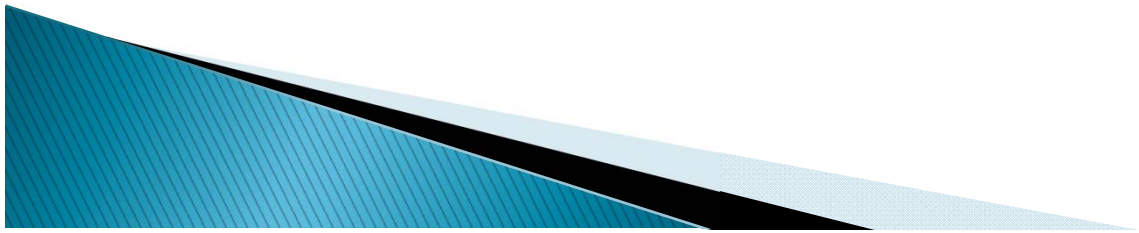
$$\eta_Y = \frac{\textit{percentage change in quantity demanded}}{\textit{percentage change in income}}$$

If $\eta_Y > 0$, the good is said to be normal.

If $\eta_Y < 0$, the good is said to be inferior.

Normal Goods and Inferior Goods

- When the income elasticity of demand is positive, the good is a ***normal good*** - that is, the quantity demanded at any given price increases as income increases.
- When the income elasticity of demand is negative, the good is an ***inferior good*** - that is, the quantity demanded at any given price decreases as income increases.



Measuring the Price Elasticity of Supply

- The **price elasticity of supply** is a measure of the responsiveness of the quantity of a good supplied to the price of that good. It is the ratio of the percent change in the quantity supplied to the percent change in the price as we move along the supply curve.

$$\text{Price elasticity of supply} = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$

Price Elasticity of Supply

Price elasticity of supply measures the responsiveness of the quantity supplied to a change in the product's own price.

It is denoted by η_s and is defined as:

$$\eta_S = \frac{\textit{percentage change in quantity supplied}}{\textit{percentage change in price}}$$

$$\eta_S = \frac{\Delta Q^S / \bar{Q}^S}{\Delta p / \bar{p}}$$

Price Elasticity of Supply

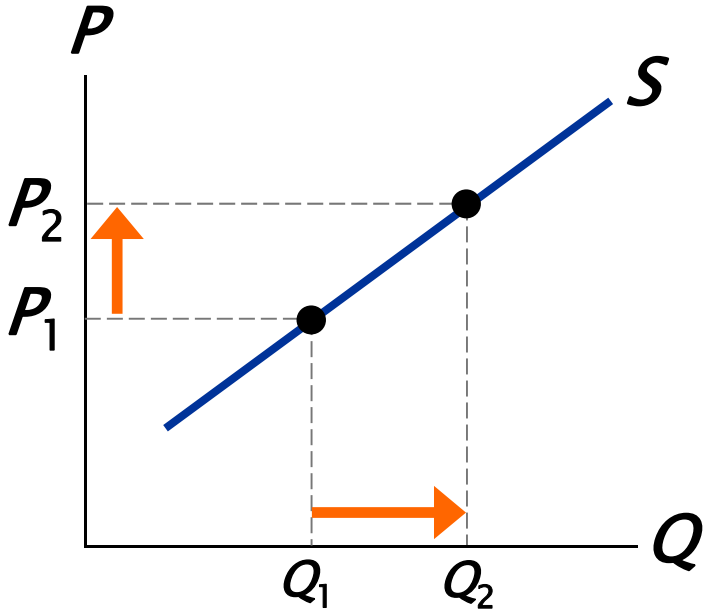
$$\text{Price elasticity of supply} = \frac{\text{Percentage change in } Q^S}{\text{Percentage change in } P}$$

Example:

Price elasticity of supply equals

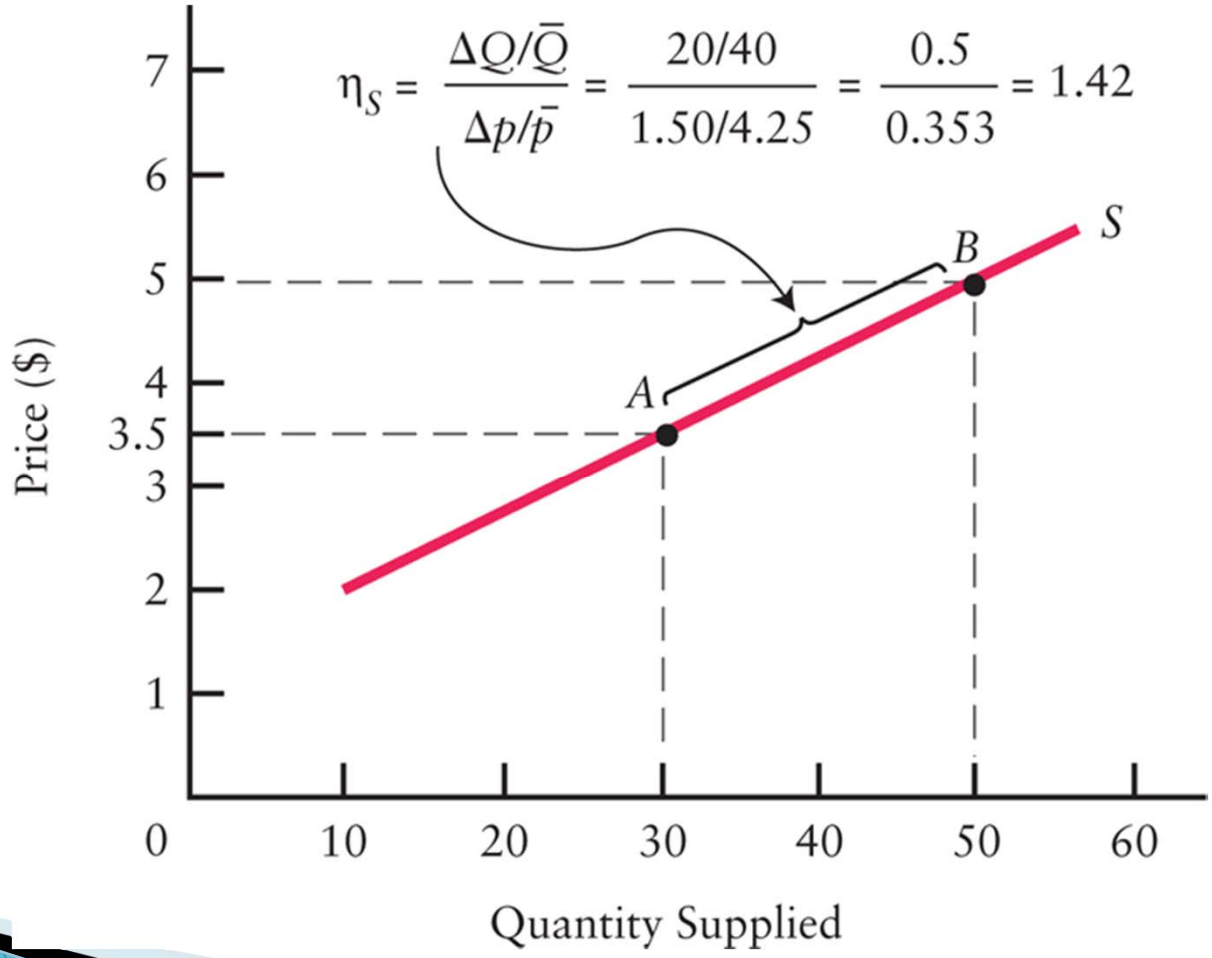
$$\frac{16\%}{8\%} = 2.0$$

P rises by 8%

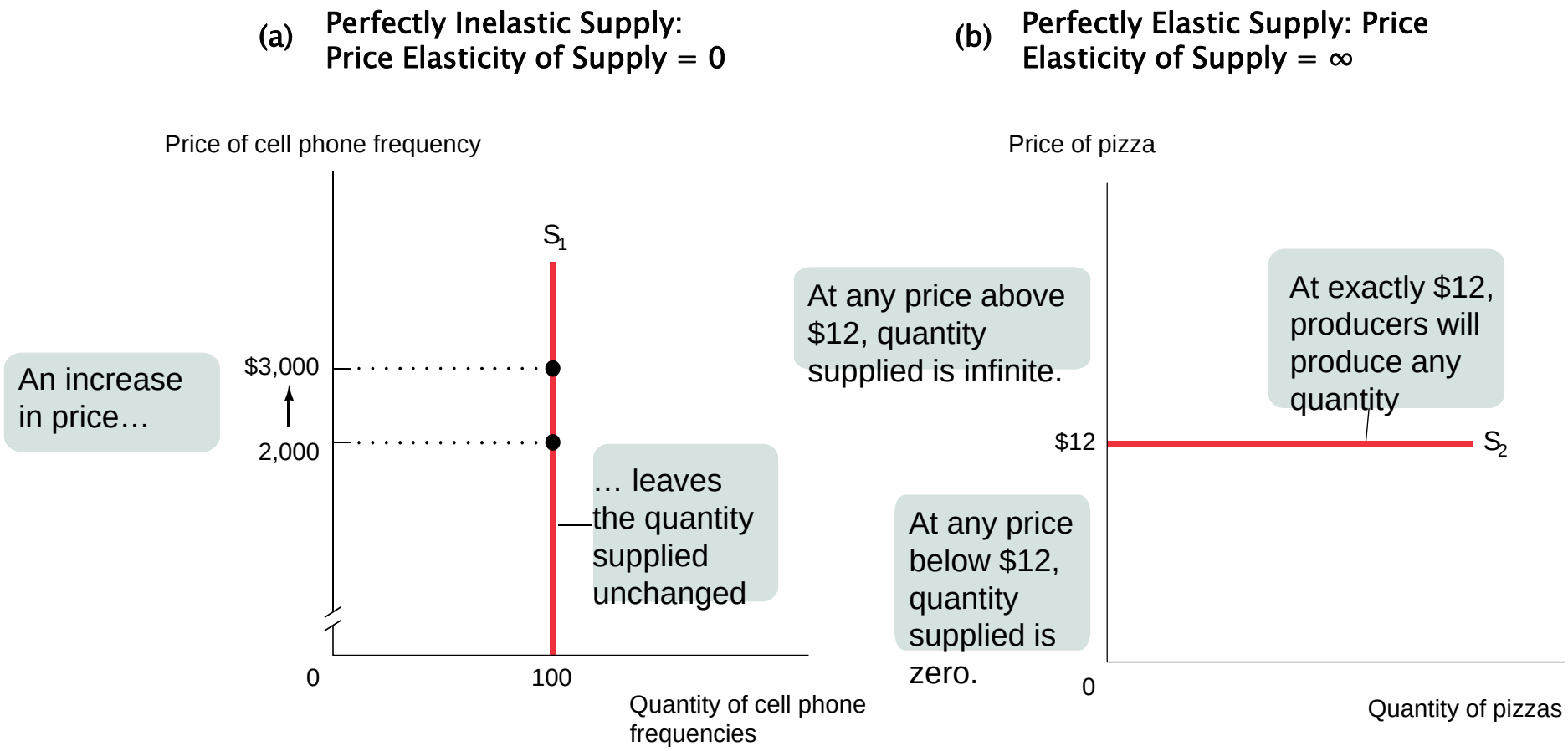


Q rises by 16%

Computing Price Elasticity of Supply

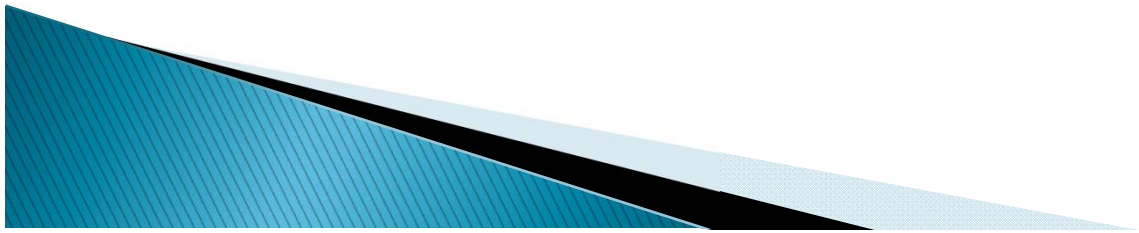


Two Extreme Cases of Price Elasticity of Supply



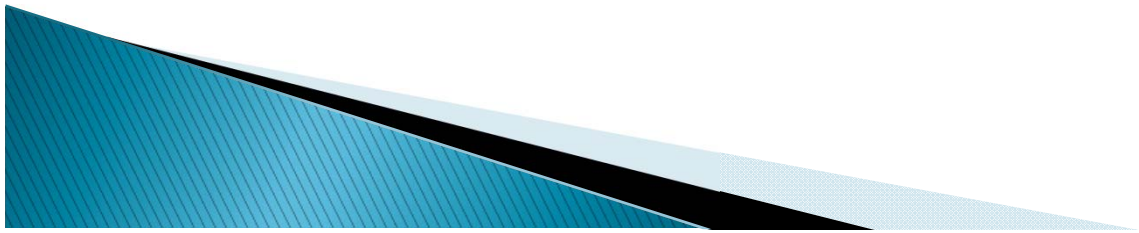
Two Extreme Cases of Price Elasticity of Supply

- There is **perfectly inelastic supply** when the price elasticity of supply is zero, so that changes in the price of the good have no effect on the quantity supplied. A perfectly inelastic supply curve is a vertical line.
- There is **perfectly elastic supply** when even a tiny increase or reduction in the price will lead to very large changes in the quantity supplied, so that the price elasticity of supply is infinite. A perfectly elastic supply curve is a horizontal line.



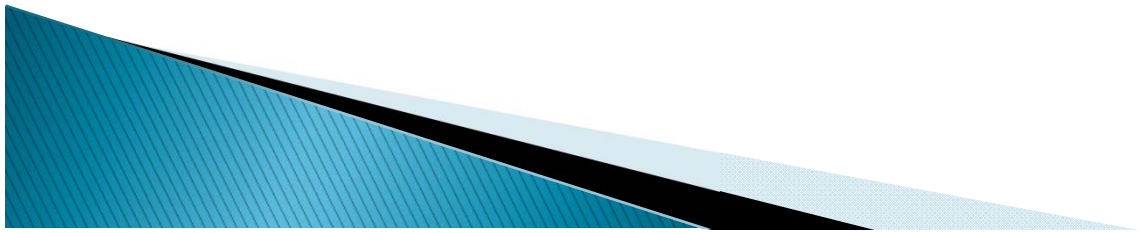
What Factors Determine the Price Elasticity of Supply?

- **The Availability of Inputs:** The price elasticity of supply tends to be large when inputs are readily available and can be shifted into and out of production at a relatively low cost. It tends to be small when inputs are difficult to obtain.
- **Time:** The price elasticity of supply tends to grow larger as producers have more time to respond to a price change. This means that the long-run price elasticity of supply is often higher than the short-run elasticity.



The Variety of Supply Curves

- The slope of the supply curve is closely related to price elasticity of supply.
- Rule of thumb:
  The flatter the curve, the bigger the elasticity.
  The steeper the curve, the smaller the elasticity.
- Five different classifications…



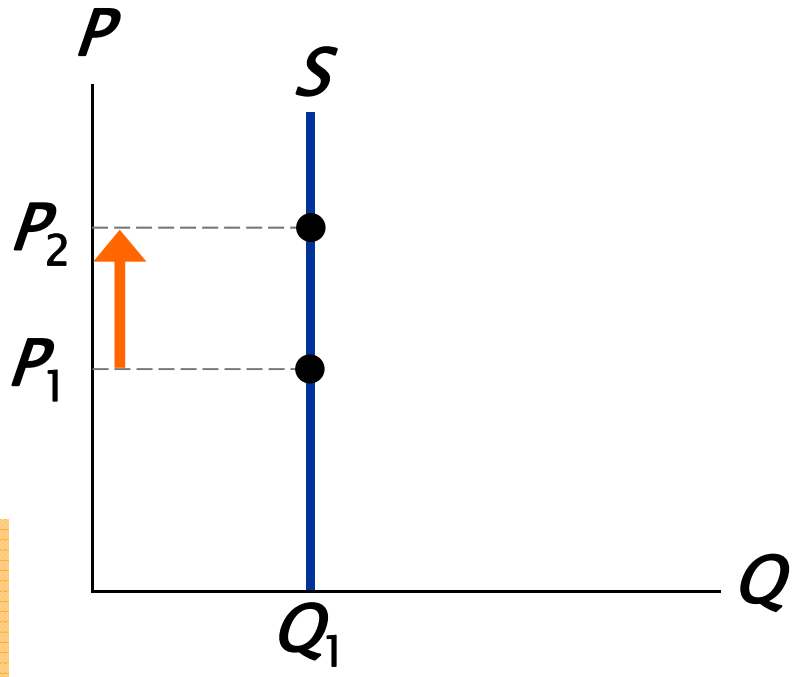
"Perfectly inelastic" (one extreme)

$$\text{Price elasticity of supply} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{0\%}{10\%} = 0$$

S curve:
vertical

Sellers' price sensitivity:
none

Elasticity : 0



P rises by 10%

Q changes by 0%

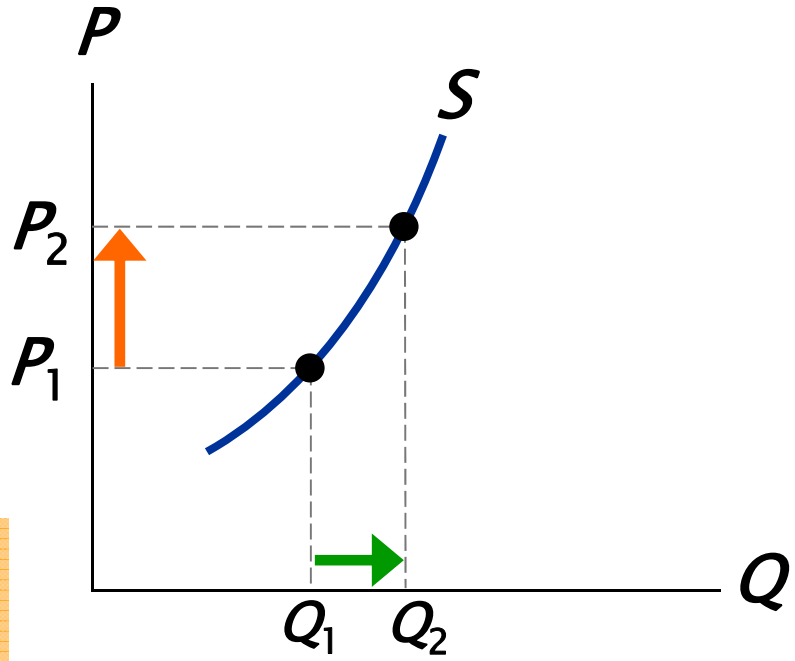
"Inelastic"

$$\text{Price elasticity of supply} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{< 10\%}{10\%} < 1$$

S curve:
relatively steep

Sellers' price sensitivity:
relatively low

Elasticity : < 1



P rises by 10%

Q rises less than 10%

"Unit elastic"

$$\text{Price elasticity of supply} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{10\%}{10\%} = 1$$

S curve:

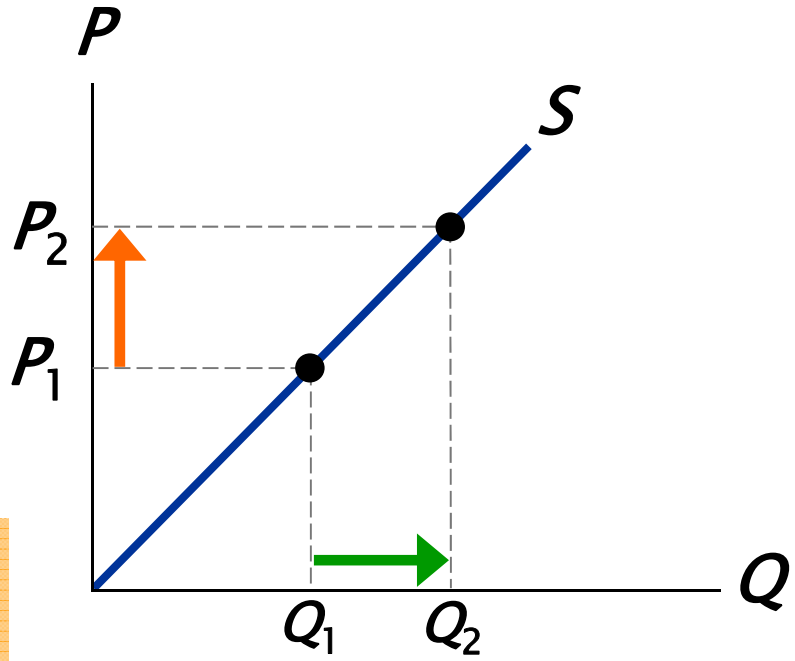
intermediate slope

Sellers' price sensitivity:

intermediate

Elasticity:

= 1



P rises by 10%

Q rises by 10%

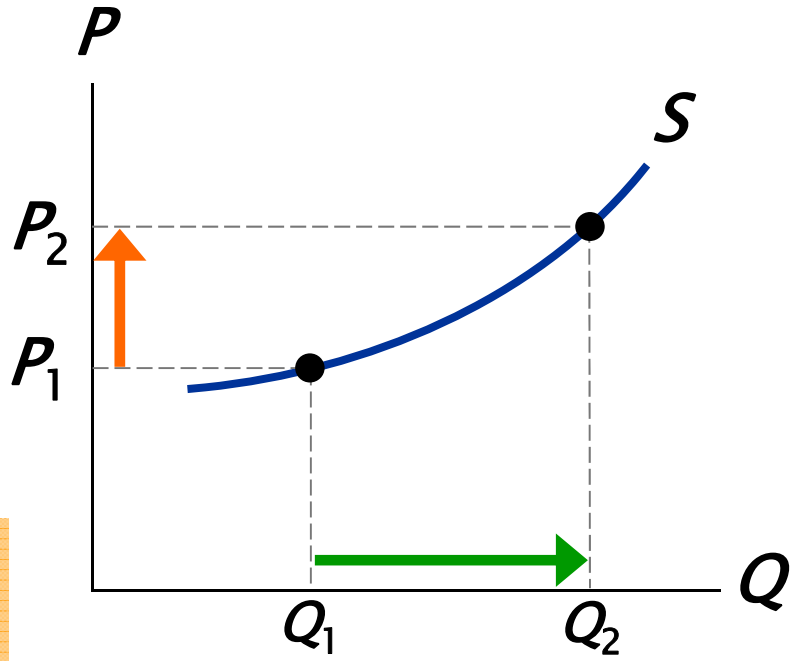
"Elastic"

$$\text{Price elasticity of supply} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{> 10\%}{10\%} > 1$$

S curve:
relatively flat

Sellers' price sensitivity:
relatively high

Elasticity : > 1



P rises by 10%

Q rises more than 10%

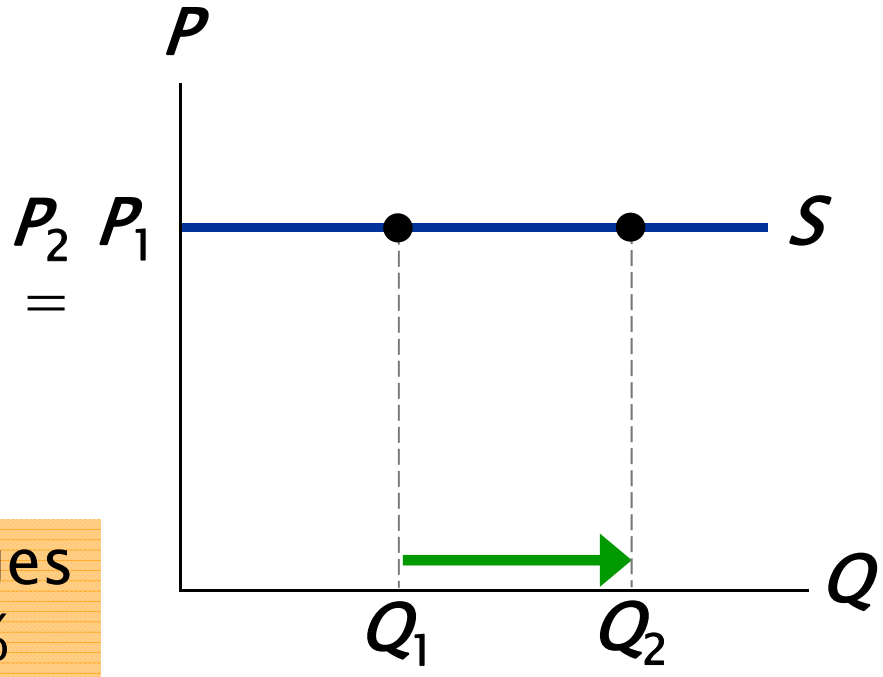
"Perfectly elastic" (the other extreme)

$$\text{Price elasticity of supply} = \frac{\%\text{ change in } Q}{\%\text{ change in } P} = \frac{\text{any }\%}{0\%} = \text{infinity}$$

S curve:
horizontal

Sellers' price sensitivity:
extreme

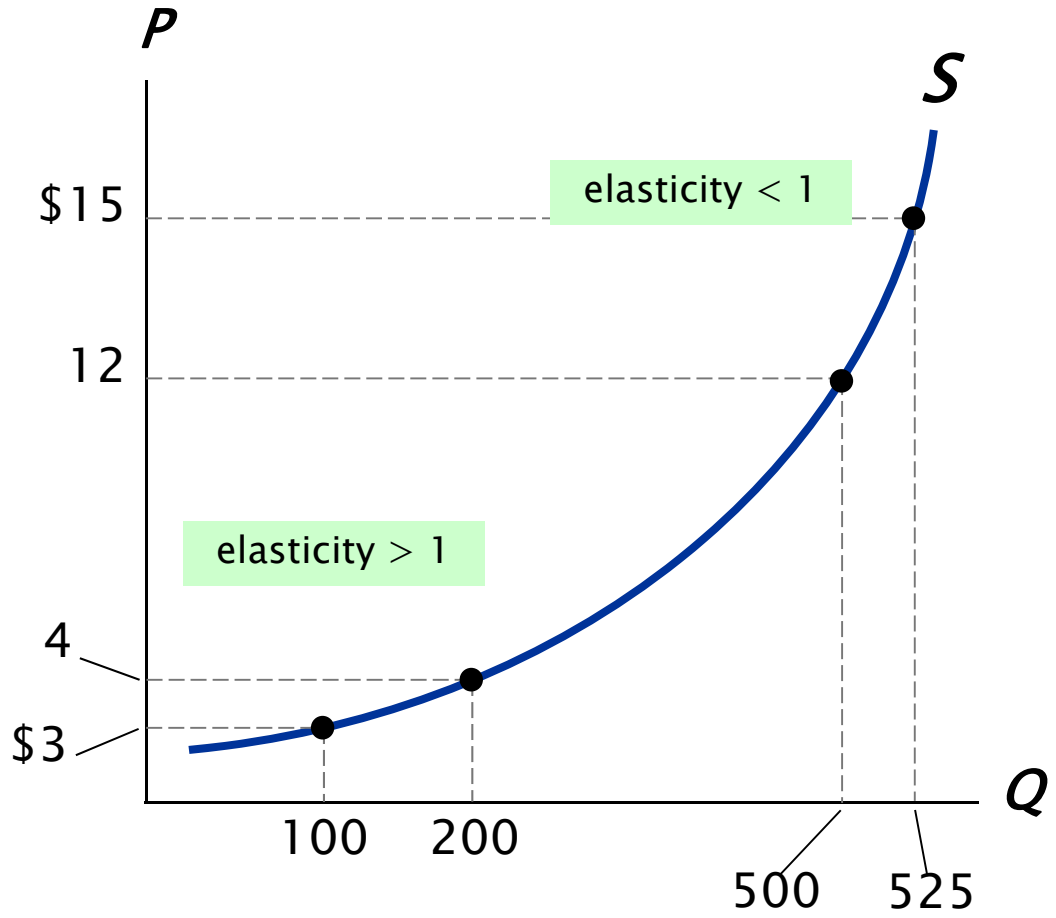
Elasticity : infinity



P changes by 0%

Q changes by any %

How the Price Elasticity of Supply Can Vary



Supply often becomes less elastic as *Q* rises, due to capacity limits.

An Elasticity Menagerie

Name	Possible values	Significance
Price elasticity of demand = $\frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$ (dropping the minus sign)		
Perfectly inelastic demand	0	Price has no effect on quantity demanded (vertical demand curve).
Inelastic demand	Between 0 and 1	A rise in price increases total revenue.
Unit-elastic demand	Exactly 1	Changes in price have no effect on total revenue.
Elastic demand	Greater than 1, less than ∞	A rise in price reduces total revenue.
Perfectly elastic demand	∞	A rise in price causes quantity demanded to fall to 0. A fall in price leads to an infinite quantity demanded (horizontal demand curve).

Cross-price elasticity of demand = $\frac{\text{\% change in quantity } \textit{of one good} \text{ demanded}}{\text{\% change in price } \textit{of another good}}$		
Complements	Negative	Quantity demanded of one good falls when the price of another rises.
Substitutes	Positive	Quantity demanded of one good rises when the price of another rises.
Income elasticity of demand = $\frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$		
Inferior good	Negative	Quantity demanded falls when income rises.
Normal good, income-inelastic	Positive, less than 1	Quantity demanded rises when income rises, but not as rapidly as income.
Normal good, income-elastic	Greater than 1	Quantity demanded rises when income rises, and more rapidly than income.
Price elasticity of supply = $\frac{\text{\% change in quantity supplied}}{\text{\% change in price}}$		
Perfectly inelastic supply	0	Price has no effect on quantity supplied (vertical supply curve).
	Greater than 0, less than ∞	Ordinary upward-sloping supply curve.
Perfectly elastic supply	∞	Any fall in price causes quantity supplied to fall to 0. Any rise in price elicits an infinite quantity supplied (horizontal supply curve).

Sources:

- Krugman, P. and Robin Wells (2008)
- Mankiw, N.G. (2012)
- Lipsey, Ragan, and Storer (2008)