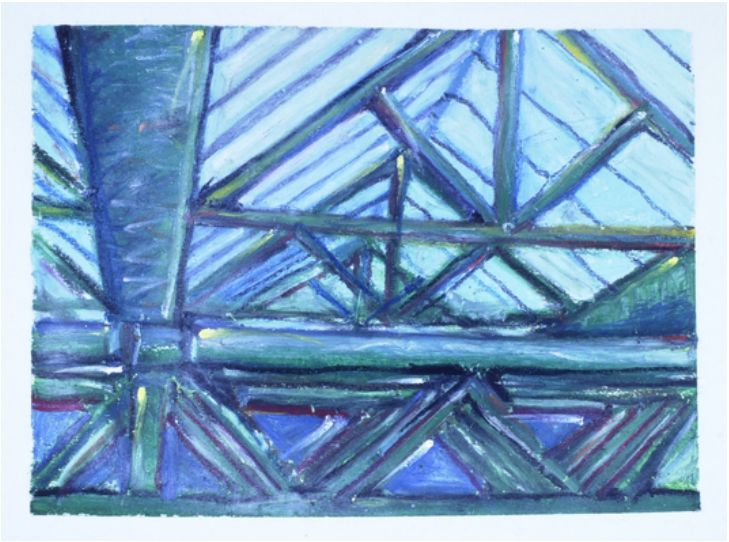


Elasticity

Fei DING
HKUST ECON

Announcements

- Assigned reading:
  - Textbook, Chapter 4, 5
- Problem sets
  - PS2 – Ch3: 7-9, 14, 20-23, 26-27
  - PS3 – Ch4: 5, 9, 12-15, 17-19, 26
- Due dates and quiz 1 time will be announced soon. Please be prepared.

Price Elasticity of Demand

- When the price of banana increases, will your total spending (expenditure) on bananas increase, decrease, or remain the same?
  - Spending = P ↑ x Q ↓
  - Depends on the relative magnitude of change.
- Price elasticity of demand: a unit-free measure of responsiveness of the quantity demanded to a change in price, holding all else constant.

Slope vs. Elasticity of Demand

The responsiveness of Q to a change in P:

- If the demand curve is steep, the price changes by a lot per extra unit demanded. If the demand curve is almost flat, the price barely changes.
- But the slope of a demand curve depends on the units in which we measure the price and the quantity.
  - Can choose these units to make the demand curve steep or flat.
  - Hard to compare across goods (example: soda vs. airplane).
- Elasticity is *independent* of units of measurement so it is easier to compare.

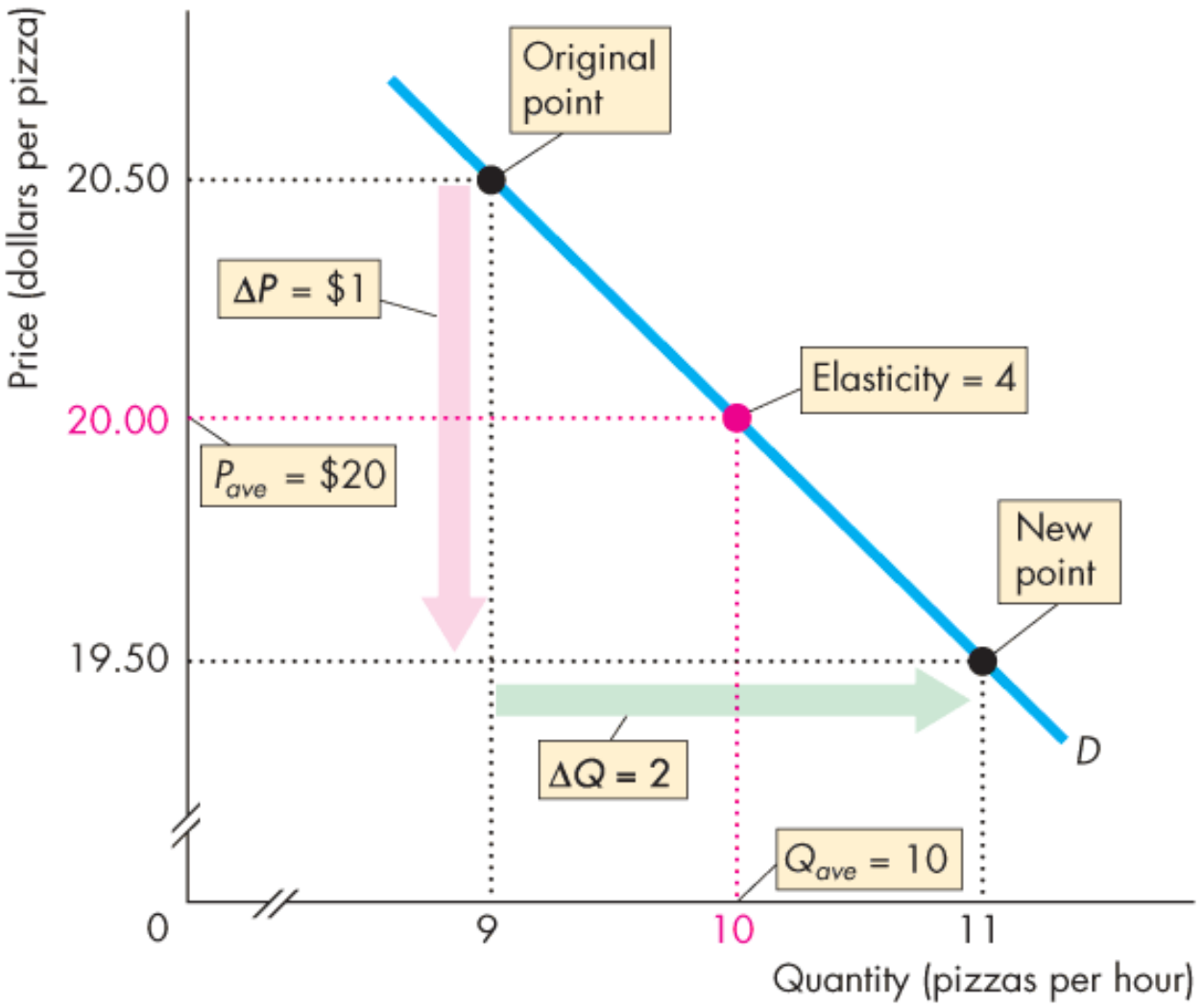
Price Elasticity of Demand

To calculate the price elasticity of demand:

We express the change in price as a percentage of the *average price*—the average of the initial and new price, …

and we express the change in the quantity demanded as a percentage of the *average quantity* demanded—the average of the initial and new quantity.

$$\epsilon = \frac{\%\ change\ in\ quantity\ demanded}{\%\ change\ in\ price} = \frac{\Delta Q/\bar{Q}}{\Delta P/\bar{P}}$$



Price Elasticity of Demand

% change in quantity demanded, $\%\Delta Q$, is calculated as $\Delta Q/Q_{ave}$ x 100, which is

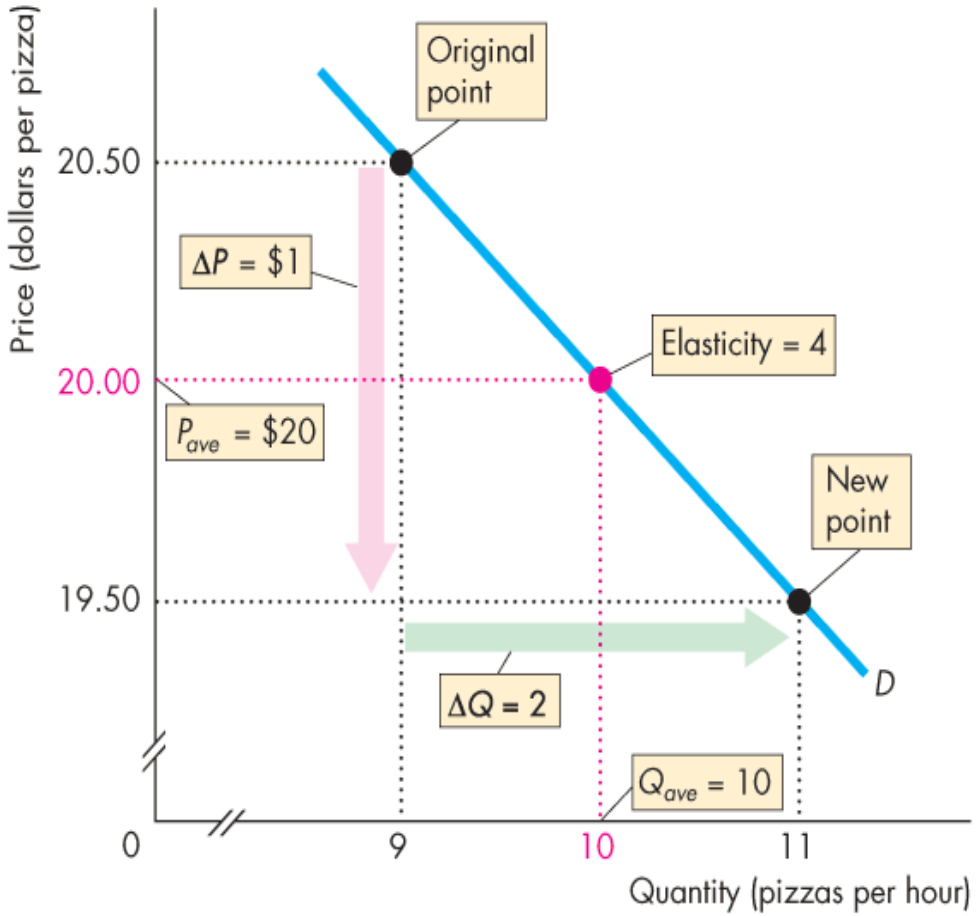
(2/10) x 100 = 20%.

% change in price, $\%\Delta P$, is calculated as $\Delta P/P_{ave}$ x 100, which is

($1/$20) x 100 = 5%.

The price elasticity of demand is

$\%\Delta Q$ / $\%\Delta P$ = 20% / 5% = 4.



Price Elasticity of Demand

Average Price and Quantity

By using the *average price* and *average quantity*, we get the same elasticity value regardless of whether the price rises or falls.

Minus Sign and Elasticity

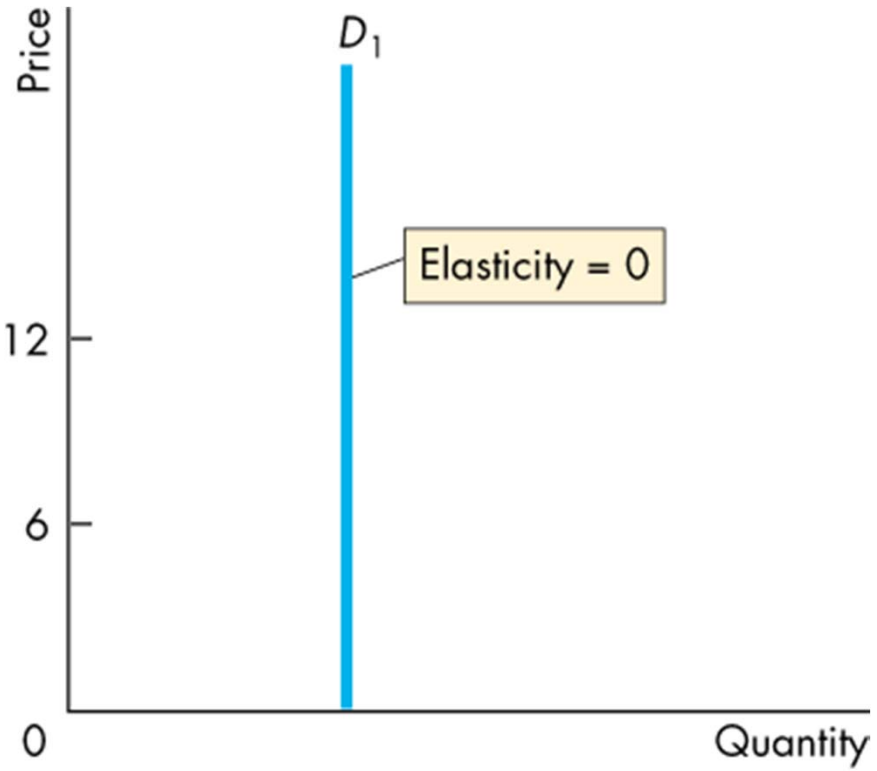
The formula yields a negative value, because price and quantity move in opposite directions.

But it is the *magnitude*, or absolute value, that reveals how responsive the quantity change has been to a price change.

Inelastic vs. Elastic Demand

Demand can be inelastic, unit elastic, or elastic, and can range from zero to infinity.

If the quantity demanded doesn't change when the price changes, the price elasticity of demand is zero and the good has a **perfectly inelastic demand**.



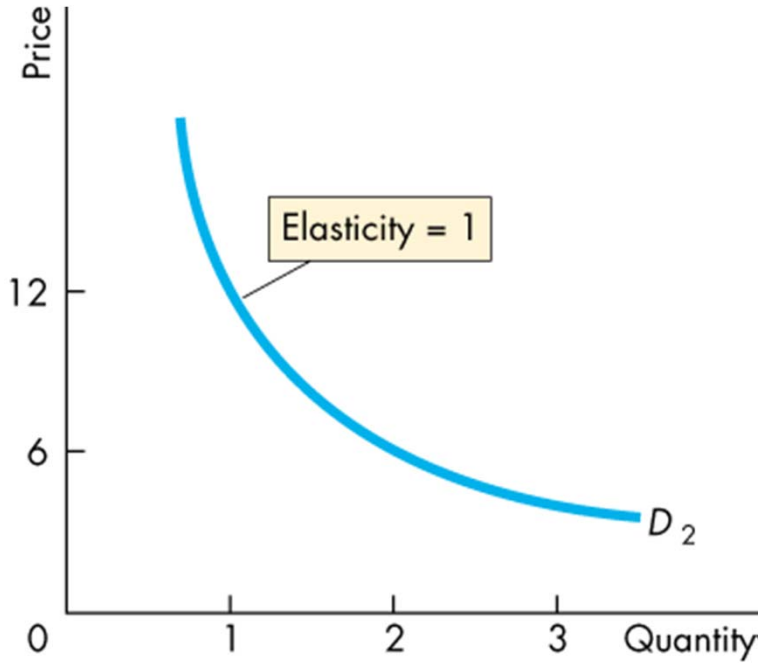
(a) Perfectly inelastic demand

Price Elasticity of Demand

If the percentage change in the quantity demanded equals the percentage change in price, …

the price elasticity of demand equals 1 and the good has **unit elastic demand**.

Figure 4.2(b) illustrates this case—a demand curve with ever declining slope.



(b) Unit elastic demand

Price Elasticity of Demand

If the percentage change in the quantity demanded is *smaller* than the percentage change in price,

- the price elasticity of demand is *less* than 1 and the good has **inelastic demand**.

If the percentage change in the quantity demanded is *greater* than the percentage change in price,

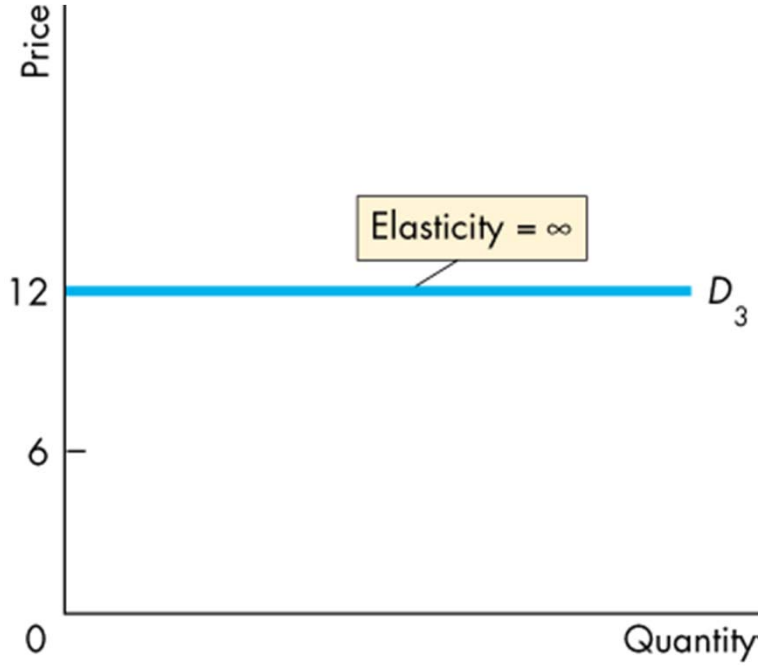
- the price elasticity of demand is *greater* than 1 and the good has **elastic demand**.

Price Elasticity of Demand

If the percentage change in the quantity demanded is infinitely large when the price barely changes, …

the price elasticity of demand is infinite and the good has a **perfectly elastic demand**.

Figure 4.2(c) illustrates the case of perfectly elastic demand—a horizontal demand curve.



(c) Perfectly elastic demand

Price Elasticity of Demand

The Factors That Influence the Elasticity of Demand

The elasticity of demand for a good depends on:

- The closeness of substitutes
- The proportion of income spent on the good
- The time elapsed since a price change

Price Elasticity of Demand

Closeness of Substitutes

The closer the substitutes for a good or service, the more elastic is the demand for the good or service.

Necessities, such as food or housing, generally have inelastic demand.

Luxuries, such as exotic vacations, generally have elastic demand.

Price Elasticity of Demand

Proportion of Income Spent on the Good

The greater the proportion of income consumers spend on a good, the larger is the elasticity of demand for that good.

Time Elapsed Since Price Change

The more time consumers have to adjust to a price change, or the longer that a good can be stored without losing its value, the more elastic is the demand for that good.

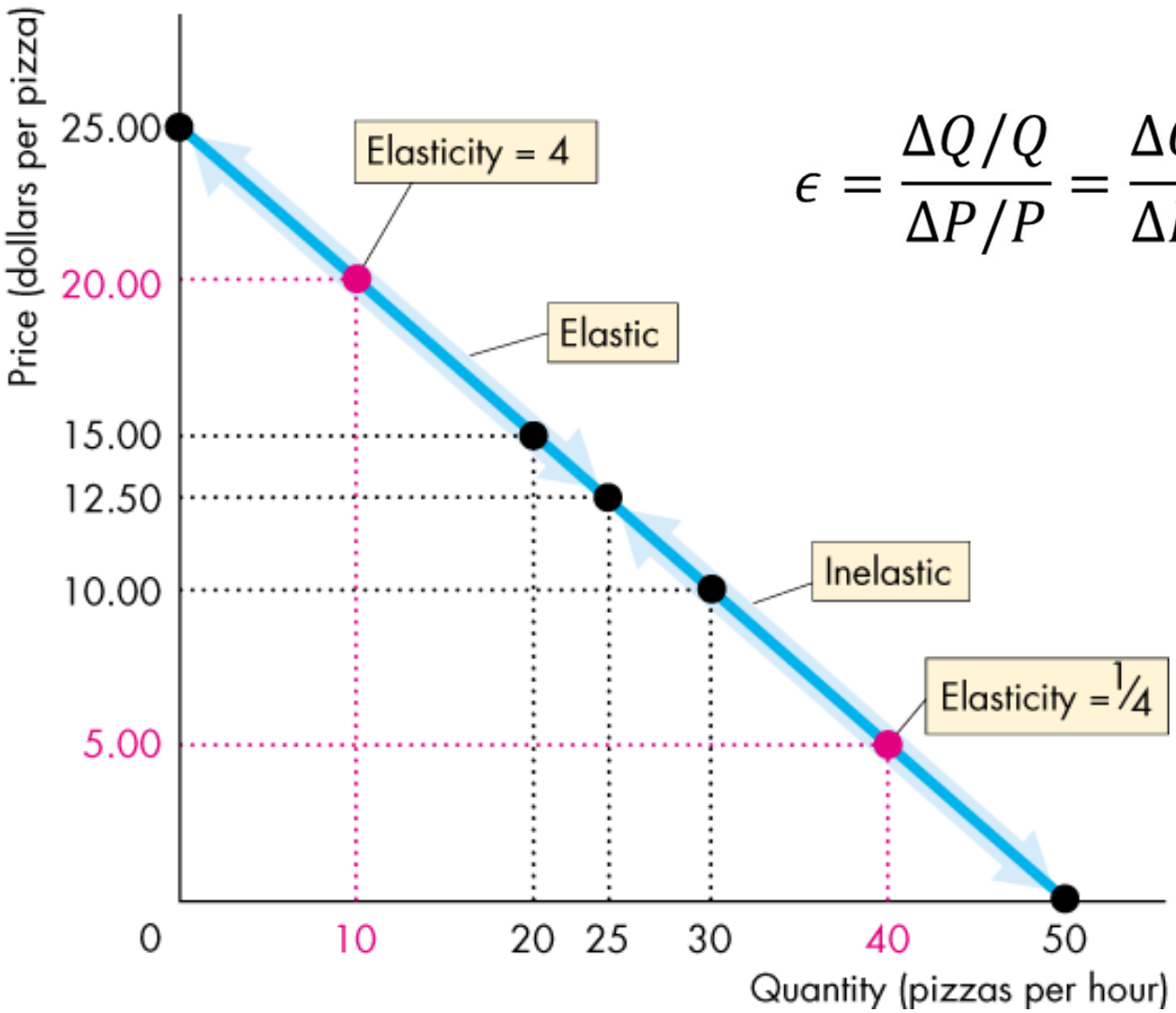
Price Elasticity of Demand

Which has a higher price elasticity of demand, blue jeans or clothing?

An oil price hike will result in a larger price elasticity of demand in the short-run or long run?

Check online
https://en.wikipedia.org/wiki/Price_elasticity_of_demand

Elasticity along a Linear demand curve

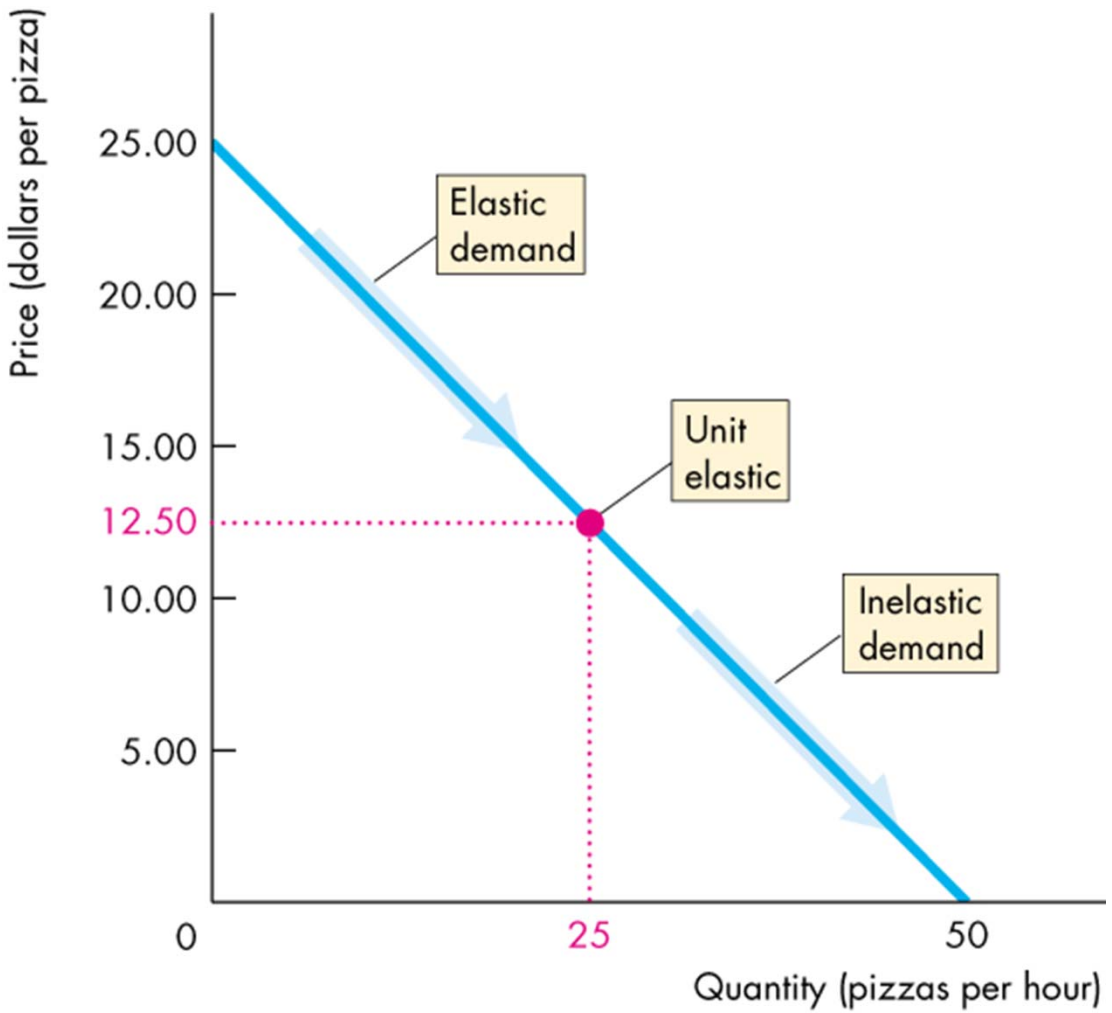


$$\epsilon = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P}\frac{P}{Q}$$

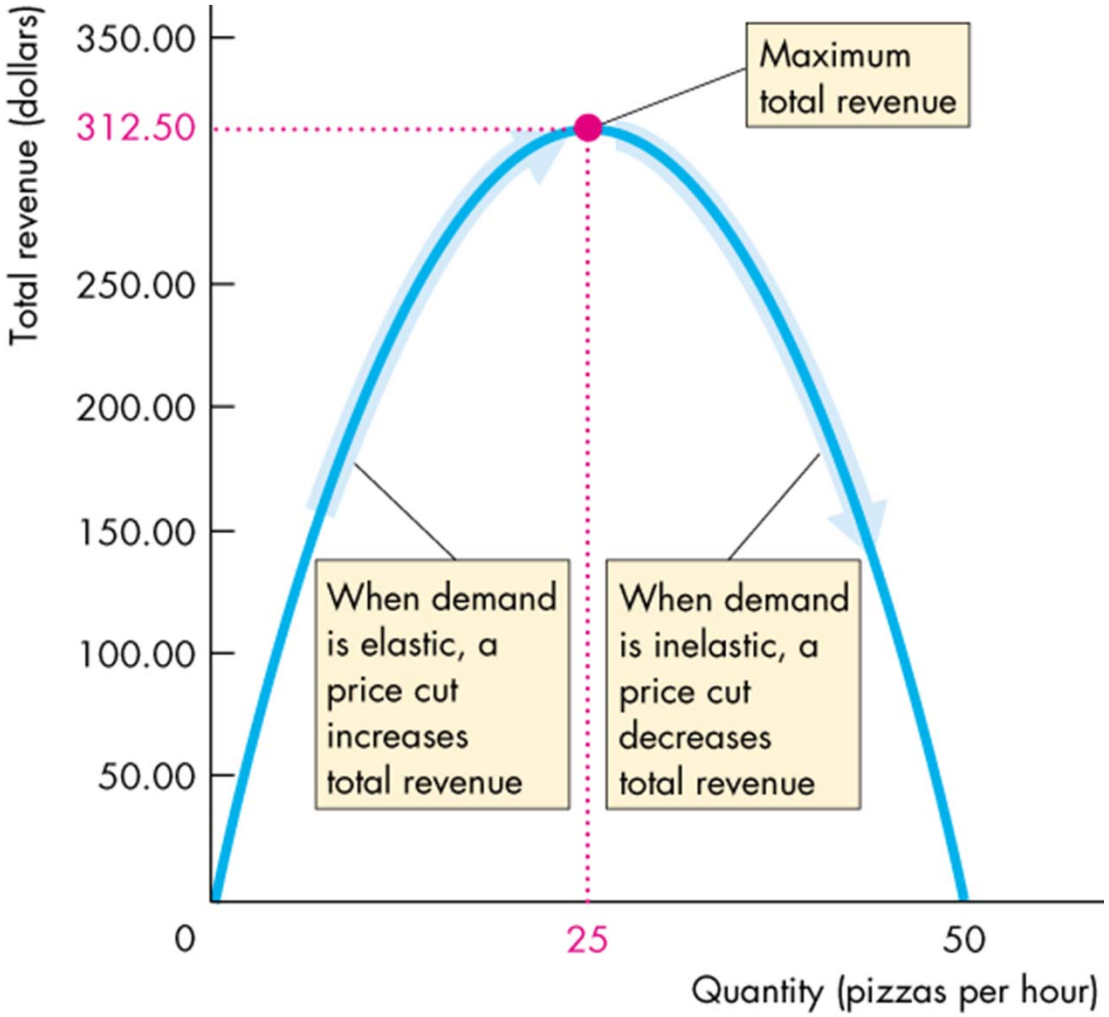
Total Revenue and Elasticity

The **total revenue test** is a method of estimating the price elasticity of demand by observing the change in total revenue that results from a price change (when all other influences on the quantity sold remain the same).

- If a price cut increases total revenue, demand is elastic.
- If a price cut decreases total revenue, demand is inelastic.
- If a price cut leaves total revenue unchanged, demand is unit elastic.



(a) Demand



(b) Total revenue

Expenditure and Elasticity

- If your demand is elastic, a 1 percent price cut increases the quantity you buy by more than 1 percent and your expenditure on the item *increases*.
- If your demand is inelastic, a 1 percent price cut increases the quantity you buy by less than 1 percent and your expenditure on the item *decreases*.
- If your demand is unit elastic, a 1 percent price cut increases the quantity you buy by 1 percent and your expenditure on the item *does not change*.

More Elasticities of Demand

Income Elasticity of Demand

The **income elasticity of demand** measures how the quantity demanded of a good responds to a change in income, other things remaining the same.

The formula for calculating the income elasticity of demand is

$$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

More Elasticities of Demand

If the income elasticity of demand is greater than 1, demand is *income elastic* and the good is a *normal good*.

If the income elasticity of demand is greater than zero but less than 1, demand is *income inelastic* and the good is a *normal good*.

If the income elasticity of demand is less than zero (negative) the good is an *inferior good*.

To Love, Honor, and Save Money

In a survey of caterers and event planners, nearly half of them said that they were seeing declines in wedding spending in response to the economic slowdown; 12% even reported wedding cancellations because of financial concerns.

Source: *Time*, June 2, 2008

- Based upon this news clip, are wedding events a normal good or inferior good? Explain.
- Are wedding events more a necessity or a luxury? Would the income elasticity of demand be greater than 1, less than 1, or equal to 1? Explain.

To Love, Honor, and Save Money

Pampered Pets UK!

The economy has slowed down again but Britain's animal lovers have not stopped themselves from spending on gourmet pet food, spoiling their pets even though their budgets are tight. In fact, more than a third of pet owners claim that they would cut back on their own food purchases before that of their pets.

Source: *The Independent*, April 14, 2015

- What does this news clip imply about the income elasticity of demand for gourmet pet food?
- Would the income elasticity of demand be greater or less than 1? Explain.

Pampered Pets UK!

More Elasticities of Demand

Cross Elasticity of Demand

The **cross elasticity of demand** is a measure of the responsiveness of demand for a good to a change in the price of a *substitute* or a *complement*, other things remaining the same.

The formula for calculating the cross elasticity is:

$$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price of substitute or complement}}$$

More Elasticities of Demand

The cross elasticity of demand for

- a *substitute* is + or – or ??
- a *complement* is + or – or ???

Over 15 million households plan to ration energy use this winter to cope with soaring bills

The cost of energy is rising and British consumers are left to cope with a harsh winter. Seeing their energy bills rise, millions of households are planning to cut back as much as they can on their energy use despite the cold temperature, putting their health at risk. Many bill payers will cope by spending less on food so that they can afford to keep their homes warm. Household disposable income has been substantially affected by rising energy costs and prices are expected to keep increasing. Some estimate that the average UK home will spend £53 more on energy this year.

Source: *This is Money*, November 6, 2014

- List and explain the elasticities of demand that are implicitly referred to in the news clip.
- Why, according to the news clip, is the demand for energy inelastic?

Over 15 million households plan to ration energy use this winter to cope with soaring bills

Elasticity of Supply

When the demand for a good increases, its equilibrium price rises and the equilibrium quantity of the good increases.

But does the price rise by a large amount and the quantity increase by a little?

Or does the price barely rise and the quantity increase by a large amount?

The answer depends on the responsiveness of the quantity supplied of a good to a change in its price.

The answer depends on the *elasticity of supply* of the good.

Elasticity of Supply

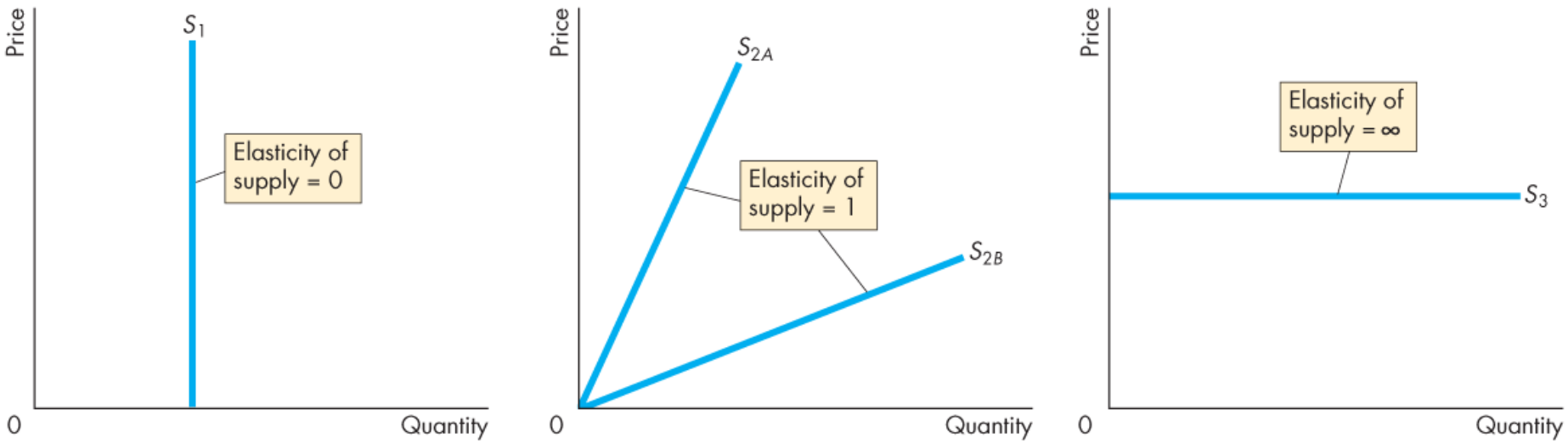
The **elasticity of supply** measures the responsiveness of the quantity supplied to a change in the price of a good, when all other influences on selling plans remain the same.

Calculating the Elasticity of Supply

The elasticity of supply is calculated by using the formula:

$$\frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

Elasticity of Supply



(a) Perfectly inelastic supply **(b) Unit elastic supply** **(c) Perfectly elastic supply**

Supply is *perfectly inelastic* if the supply curve is vertical and the elasticity of supply is 0.

Supply is *unit elastic* if the supply curve is linear and passes through the origin. (Note that slope is irrelevant.)

Supply is *perfectly elastic* if the supply curve is horizontal and the elasticity of supply is infinite.

Elasticity of Supply

The Factors That Influence the Elasticity of Supply

The elasticity of supply depends on

- Resource substitution possibilities
- Time frame for supply decision

Resource Substitution Possibilities

The easier it is to substitute among the resources used to produce a good or service, the greater is its elasticity of supply.

Elasticity of Supply

Time Frame for Supply Decision

The more time that passes after a price change, the greater is the elasticity of supply.

Momentary supply is perfectly inelastic. The quantity supplied immediately following a price change is constant.

Short-run supply is somewhat elastic.

Long-run supply is the most elastic.

Question

Does drug interdiction reduce drug-related crime?

- **Interdiction** is a military term for the act of delaying, disrupting, or destroying enemy forces or supplies en route to the battle area.
  - Example: increase the number of federal agents devoted to the war on drugs.
- How to measure the increase or decrease of "drug-related crime"?

Question

Does drug interdiction reduce drug-related crime?

- How to measure the increase or decrease of "drug-related crime"?
  - The total amount that drug users pay for drugs.
- Drug interdiction – What happens in the market for illegal drugs?
  - Would D or S or both change?
  - In which direction(s)?
  - What will be the new equilibrium P and Q?

Question

- Does drug interdiction increase or decrease drug-related crime?

Question

- Does drug education increase or decrease drug-related crime?

Question

Does drug interdiction reduce drug-related crime?

- How to measure the increase or decrease of "drug-related crime"?
  - The total amount that drug users pay for drugs.
- Drug interdiction: Long- vs. short-run effects

Thank you very much

End for today ☺

See you next time !