

Introduction to Elasticity

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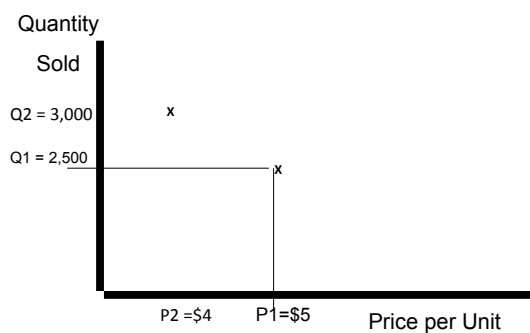
Three Classic Uses of the Elasticity Index

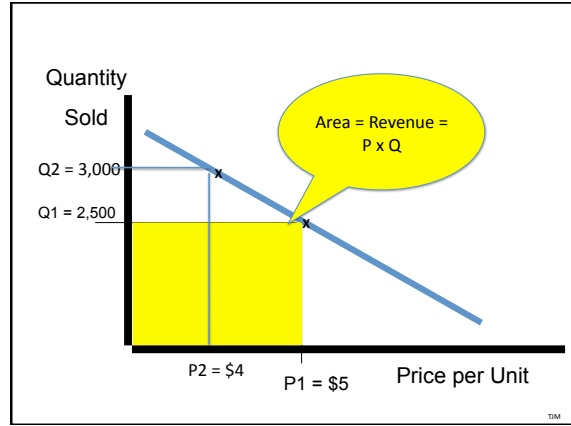
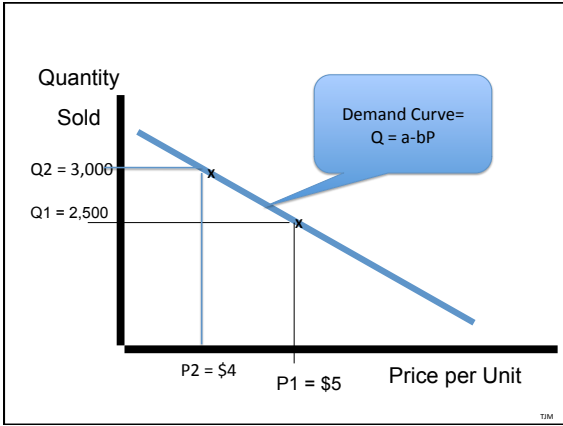
- 1) for comparing the sensitivity of changes in a variables across situations using different units of measure (e.g., apple and orange markets)
- 2) for estimating the consequences of making a change in one variable (price) on another variable (quantity sold)
- 3) for estimating the direction a variable (price) should be changed if an outcome (revenue) is to be maximized

- Most economists use the term elasticity to discuss the sensitivity of a change in one variable to a change in another variable.
- The most common usage of elasticity is price elasticity
- The price elasticity of the apple market in the USA is -1.6 and the price elasticity of the orange market in Spain is -2.5
- The orange market is more sensitivity to price changes than the apple market.

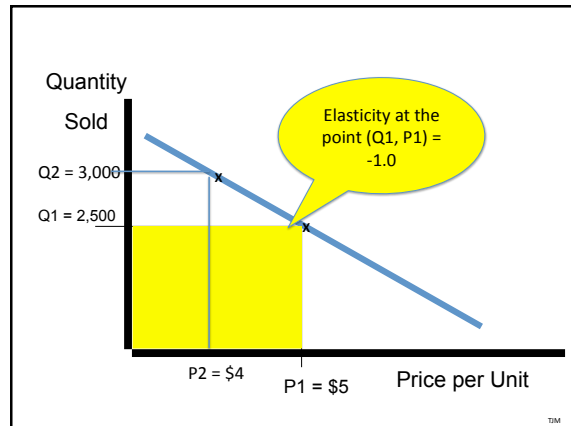
- The price elasticity of the apple market in the USA is -1.6 and the price elasticity of the orange market in Spain is -2.5
- Elasticity of -1.6 means that a 1% change in price will cause a 1.6% change in the quantity of apples that are sold
- Elasticity of -2.5 means that a 1% change in price will cause a 2.5% change in the quantity of oranges that are sold
- The two can be compared because elasticity is an index and an index is unit neutral.

- Point Elasticity of Price is defined as
The ratio of the percentage change in quantity sold to the percentage change in price from one period to another
- Point Elasticity of Price = $\% \Delta Q / \% \Delta P$





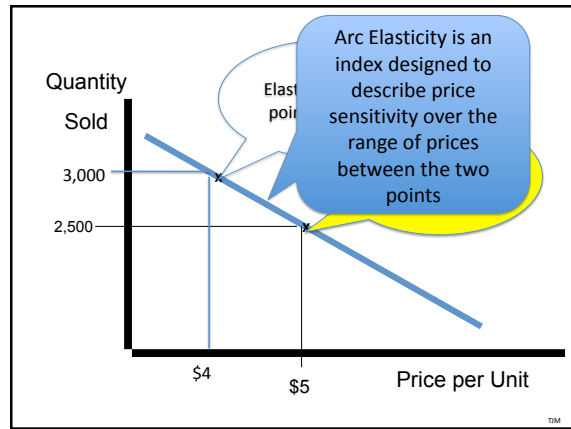
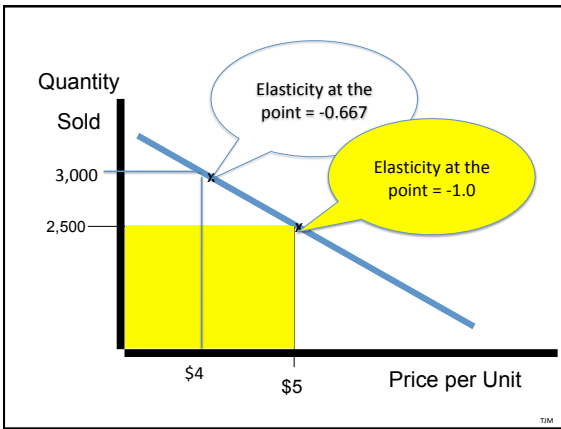
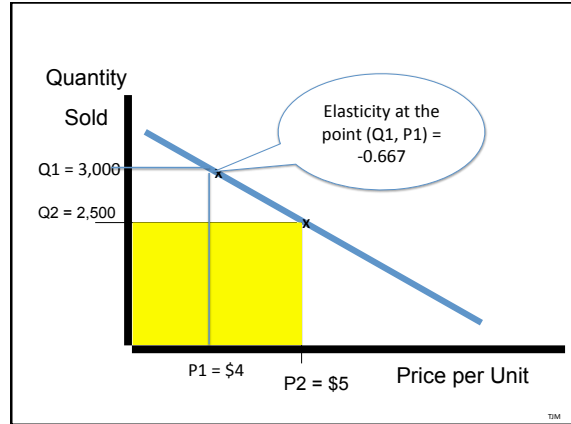
	Period 1	Period 2	Change = Δ	% change = %Δ
Quantity, Q	2,500	3,000	ΔQ= 500	%ΔQ = 500/2,500 = 0.20 = 20%
Price, P	\$5	\$4	ΔP = -\$1	%ΔP = -1/5 = -0.20 = -20%
Revenue	\$12,500	\$12,000	ΔR= -\$500	
Point Elasticity = %ΔQ/%ΔP = 20%/-20% = -1.0				



- The starting point provides the denominator for the two percentages
- $\% \Delta Q = (Q2 - Q1) / Q1$
- $\% \Delta Q = (3,000 - 2,500) / 2,500 = 20\%$
- $\% \Delta P = (P2 - P1) / P1$
- $\% \Delta P = (4 - 5) / 5 = -20\%$

- What Happens if we reverse the starting point?
- That is to say, change the denominator of the ratios

	Period 1	Period 2	Change = Δ	% change = %Δ
Quantity, Q	3,000	2,500	ΔQ= -500	%ΔQ = 500/3,000 = 0.1667 = 16.7%
Price, P	\$4	\$5	ΔP= \$1	%ΔP = 1/4 = 0.25 = 25%
Revenue	\$12,500	\$12,000	ΔR= -\$500	
Point Elasticity = %ΔQ/%ΔP = -16.7%/25% = -0.667				

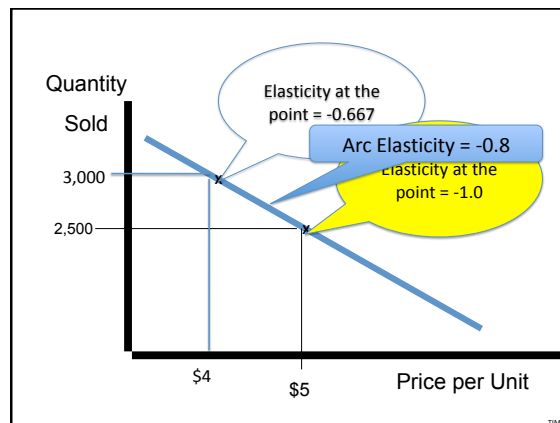


Big Difference in Elasticity measures

- Use the Point Elasticity **ONLY** when the changes in the two variables are very small
- Use Arc Elasticity when the changes in the two variables are large
- Calculus is based on using infinitesimally small changes

- There are many different ways to calculate elasticity. They all depend on what value is used as the denominator in the percentage changes
- Arc elasticity for marketing managers is calculated by using the **minimum of the two choices for the denominator for the % changes**

	Period 1	Period 2	Change	%Δ based on minimums
Quantity, Q	3,000	2,500	ΔQ= -500	$\% \Delta Q_{\min} = 500/2,500 = 0.20 = 20\%$
Price, P	\$4	\$5	ΔP = \$1	$\% \Delta P_{\min} = -\$1/4 = -0.25 = 25\%$
Revenue	\$12,000	\$12,500	ΔR= \$500	
Arc Price Elasticity = $\% \Delta Q_{\min} / \% \Delta P_{\min}$				
Arc price Elasticity = 20%/25% = -0.8				



With the Arc Elasticity the starting point is irrelevant

- There is no such thing as an ideal measure of arc elasticity
- Many Economists like to use the averages of the two points to have an average denominator
- Marketing managers like using the minimum values for denominators because it is consistent with Impact Analysis

Three Classic Uses of the Elasticity Index

- 1) for comparing the sensitivity of changes in a variables across situations using different units of measure (e.g., apple and orange markets)
- 2) for estimating the consequences of making a change in one variable (price) on another variable (quantity)
- 3) for estimating the direction a variable (price) should be changed if an outcome (revenue) is to be maximized

Exam Question #1

- If the car market has a price elasticity of -2.5 and the housing market has a price elasticity of -1.7, then which one is more sensitive to a price change?
- A) the car market
- B) the housing market
- C) not enough information to know?

Exam Question #1

- If the car market has a price elasticity of -2.5 and the housing market has a price elasticity of -1.7, then which one is more sensitive to a price change?
- A) **the car market is correct**
- B) the housing market
- C) not enough information to know?

Three Classic Uses of the Elasticity Index

- 2) for estimating the consequences of making a change in one variable (price) on another variable (quantity)

Exam Question #2

- If the price elasticity in your market is -2.5 and you decrease your price by 2%, then you can expect your sales volume to increase by 5%. True or False?
- True
- False

Exam Question #2

- If the price elasticity in your market is -2.5 and you increase your price by 2%, then you can expect your sales volume to increase by 5%. True or False?
- **True is correct**
- False
- $\% \Delta Q = \text{Elasticity of Price} \times \% \Delta P$
- $\% \Delta Q = -2.5 \times -2\% = 5\%$

Three Classic Uses of the Elasticity Index

- 3) for estimating the direction a variable (price) should be changed if an outcome (revenue) is to be maximized

Exam Question #3

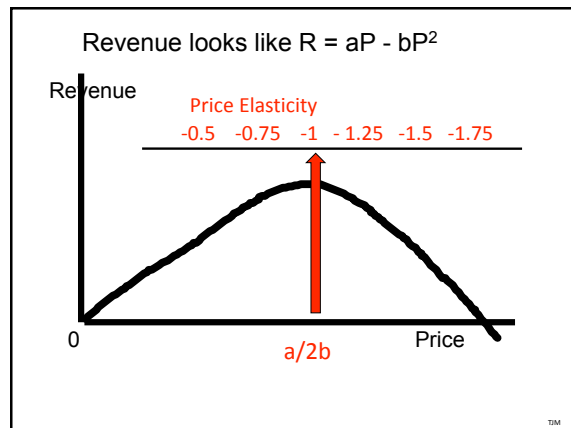
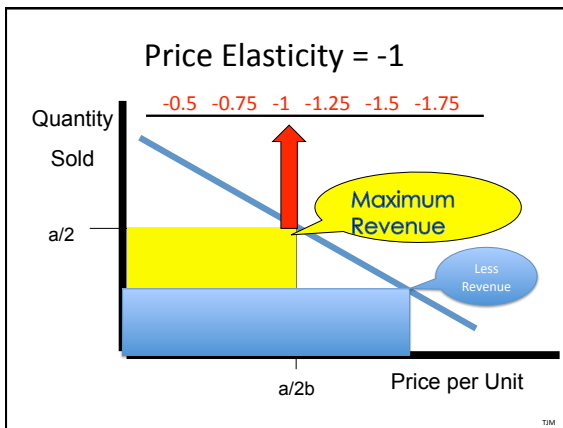
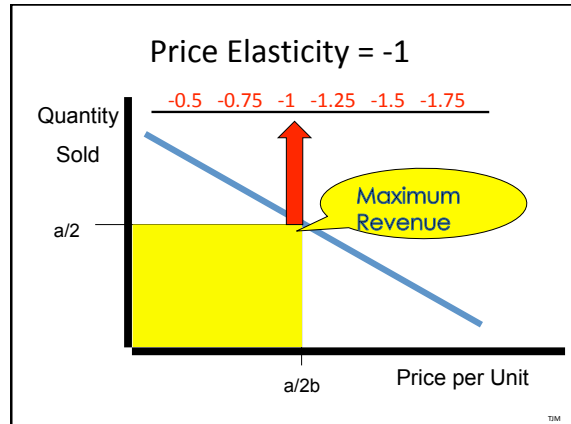
- If the price elasticity of your market is -2.75, then an increase in your selling price will decrease your revenue. True or false?
- A) True
- B) False

Remember the Definition

- The Elasticity of Price = $\% \Delta Q / \% \Delta P$
- Therefore
- $\% \Delta Q = (\% \Delta Q / \% \Delta P) \times \% \Delta P$
- $\% \Delta Q = (\text{Elasticity of Price}) \times \% \Delta P$

Exam Question #3

- If the price elasticity of your market is -2.75, then an increase in your selling price will decrease your revenue. True or false?
- A) **True is correct**
- B) False



- **Not all elasticities** have the property of indicating the direction a variable has to move for another to reach a maximum

Many Types of Elasticity

- Elasticity of Price
- Elasticity of Advertising
- Elasticity of Markup
- Elasticity of Return on Advertising
- Elasticity of Sales Calls
- Elasticity of Product Quality
- Elasticity of Retail Outlets
- Etc.

What did We Learn?

- Elasticity is an index and a unit-free ratio of a $\% \Delta y$ over a $\% \Delta x$
- It can be used to compare sensitivity of changes across different market situations
- It can be used to predict changes in variables due to changes in other variables
- Sometimes it indicates which way a variable must change to cause a maximum in another variable