

Describing Demand and Supply Elasticities

Objective:

What is **Price Elasticity of Demand**, how it is calculated and its usefulness.

The relationship between slope, and elasticity.

What is **Income Elasticity of Demand**?

What is **Cross Price Elasticity of Demand**?

What is **Price Elasticity of Supply**?

- Price Elasticity measures the responsiveness of consumers to a change in the price of a product. It does so by comparing the percentage change in quantity demanded from a percentage change in price,

$$\varepsilon_D = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

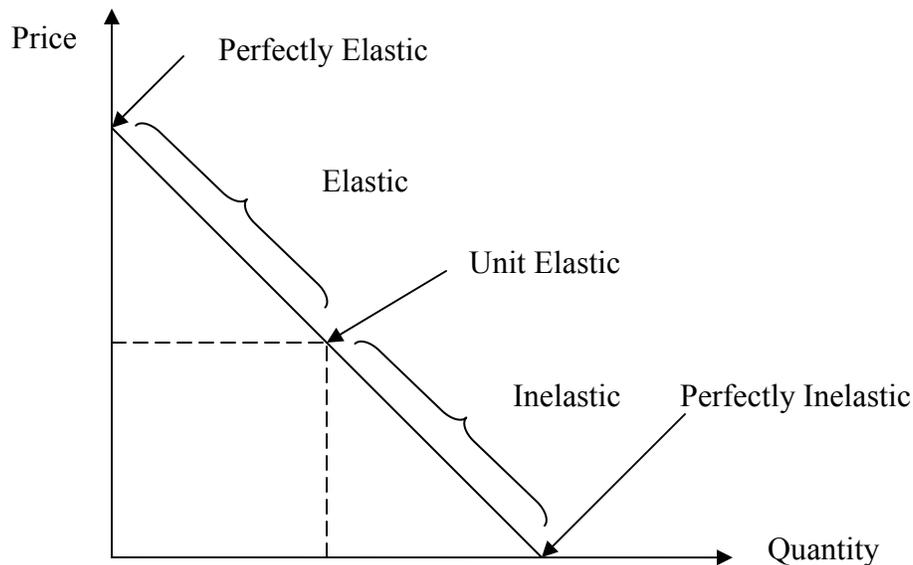
- Let us consider 2 points on a demand line/function, $(Q_A, P_A) = (2000, 10)$, and $(Q_B, P_B) = (1000, 15)$. Then the formulae is just,

$$\varepsilon_D = \frac{\left| \frac{Q_A - Q_B}{(Q_A + Q_B)/2} \right|}{\left| \frac{P_A - P_B}{(P_A + P_B)/2} \right|}$$

- Using the above numbers, the elasticity of the above product is

$$\varepsilon_D = \frac{\left| \frac{1000}{1500} \right|}{\left| \frac{-5}{12.5} \right|} = \left| \frac{2/3}{-2/5} \right| = |-5/3| = \frac{5}{3}. \text{ Why do we divide the numerator and denominator by the average quantity and price instead of one of the quantity and price?}$$

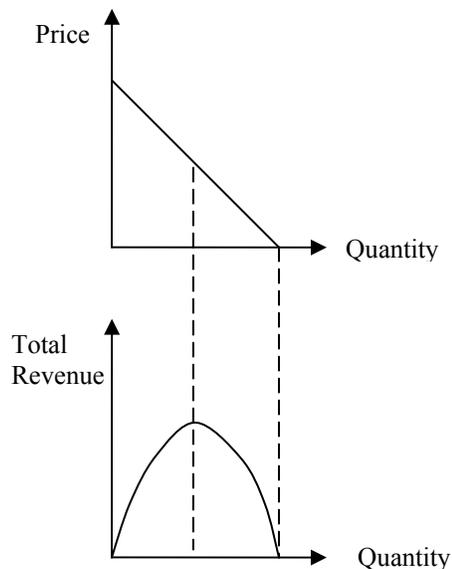
- If $\varepsilon_D > 1$ demand is said to be elastic. This is because for this to happen the numerator of ε_D has to be greater than the denominator. So let the denominator be 1%, then the numerator would have to change by more than 1%. Put another way, the percentage response in quantity demanded is greater than the percentage change in prices. If $\varepsilon_D < 1$ demand is said to be inelastic. Why?
- Notice the relationship between the elasticity and slope. Recall the slope of the demand curve is $\text{Slope}_D = \frac{P_A - P_B}{Q_A - Q_B}$. What is the relationship then?
- Why do we want to do this? This is because it is independent of any unit of measure, hence making comparisons between goods easier.
- How does perfect elasticity, and perfect inelasticity look like? What do they mean?
- It changes along a straight line.



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- The responsiveness of a good or product to changes in prices is dependent on the availability of substitute goods and the prices of these substitutes. Why? Well, the greater the number of substitutes, the more easily consumers can switch between these close substitutes, thus affecting how much quantity demanded changes when the price of the good under consideration changes. An example: Consider price of Breyers, Ben and Jerry, and Haagen Daz. If the price of say Ben and Jerry Ice Cream falls, because the brands are such close substitutes, you would imagine consumers of the other brands switching to Ben and Jerry Ice Cream, and the elasticity would be higher.
- But what affects the number of substitutes a product or good has?
 - **Time to Adjust:** More goods in the long than short run.
 - **Luxury versus Necessities:** Luxury goods generally has a lot of substitutes. Example: When you are in the market for luxury cars, you could choose between Aston Martins, Bentley, Cadillac, Lexus, etc. But necessities like diabetic ice cream has few substitutes.
 - **Narrow or Broad Definition:** Example, transportation, and mode of transport.
 - **Budget Proportion:** Example, your parent's house mortgage makes a large proportion of their income, than the cost of a new counter top. If interest rises to 10% from 4%, the cottage in the works may be shelved for a while. While the counter top project would still go on if Home Depot raises the prices of counter tops by 10%.
- Table 6.2 on page 143 of your text has some empirical elasticity.
- Price Elasticity of Demand and Total Revenue: The elasticity of a firm's product tells it how responsive changes in their prices would affect the demand for their good, and consequently the total revenue (TR) they receive. What is total revenue: $TR = P \times Q$. Example: Let the price elasticity of Rocky Mountain Bikes domestically be 3, which is elastic. It means a 1% increase in prices of their bikes

would reduce the demand for their bikes by 3%. Together, it would mean they would suffer a fall in total revenue (TR) if they raise their prices by 1%. However, if the elasticity is for worldwide demand for their bikes, and let it be 0.5%. Then a 1% increase in price would reduce quantity demanded worldwide by only 0.5%. Then the rise in price alone would allow them to raise their total revenue.

- **Practice Question:**
- Let the quantity demanded of Cervelo bikes be such at \$2000 a bike, the quantity demanded is 2million bikes. But at \$1500 a bike, the quantity demanded is 800,000 bikes. What is the price elasticity of demand? Let the current price of a Cervelo bike be \$2000. If they raise their price by \$300, what is the new revenue? Has it risen or fallen? What if they lowered their prices by \$300.
- Let Cervelo start a new line of bikes that compete with the larger bike firms such that at a price of \$300 a bike, the quantity demanded is 10 million, and at \$400 a bike, it is 9 million bikes. What is the price elasticity of demand for this low end bikes. Let the price the executives decided on be \$300. And a year later, these same executives suggest that if they raise their prices by \$50, their total revenue would increase, because their StFX Professor taught them price elasticity of demand. Do you think they are right? What happens if they lower their prices by \$25 from \$300?
- Diagrammatic representation of the relationship between elasticity of demand and total revenue.



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- Other Elasticities:
 - Income Elasticity of Demand
 - Tells us how demand responds to a change in consumers' income.
 - $$\eta = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Income}}$$

- Normal goods are goods whose consumption rises with an increase in income, and its income elasticity is $\eta > 0$.
 - Luxury goods are goods that has $\eta > 1$, i.e. their percentage increase in demand is greater than the percentage increase in consumers' income.
 - Inferior goods are goods whose consumption falls as consumers' income rises, and $\eta < 0$
 - The text has good examples of different goods with different elasticity magnitudes. See page 149, table 6.3/.
 - Cross Price Elasticity of Demand
 - It measures the responsiveness of consumption of one good, to a change in the price of another good.
 - $$\epsilon^{XY} = \frac{\text{Percentage Change in Quantity Demanded of Good X}}{\text{Percentage Change in Price of Good Y}}$$
 - Positive cross price elasticity means the goods in question are substitutes.
 - Negative cross price elasticity means the goods in question are complements.
 - If cross price elasticity is zero, it means the goods in question are unrelated.
 - Note that price of good say Y , and consumers' income are elements or variables that shift the demand curve on a diagram with price and quantity of a particular good, say X , where good X is a different good from Y .
- Price Elasticity of Supply
 - $$\epsilon^S = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price Charged}}$$
 - It measures the responsiveness of firm(s) supply to a change in the price of the good.
 - Determinants of Elasticity of Supply similar to demand above. But we typically focus on time because it seems to be the most important factor. Generally, the longer the time period, the greater the elasticity. Again this is because, the longer the time transpired, the greater the likelihood of better technology to reduce the cost of production and increase supply with little change in prices. Example: Computers of the 1980s and today. other substitutes, or more efficiently produced substitutes.
 - Economist distinguish between 3 time concepts:
 - Instantaneous Period: Elasticity is perfectly inelastic.
 - Short Run: Some substitution is possible in terms of elements/variables of in a production process, and so the supply is quite elastic.
 - Long Run: With time, easier to substitute elements/variables in production process, and supply curve becomes very elastic.
- Empirical Estimate of Elasticities.
- So how does this additional concept add to what we know from Demand and Supply?

ECON100 Elasticities

