

Elements of Microeconomics

AS.180.102 (03)

Chapter 5

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Announcements

Assignment 1 grades posted. Make sure to review what you got wrong and see me in office hours if you have any questions.

Outline

Elasticity captures an extremely intuitive concept: how do you change your behavior in response to changing prices?

Refresher:

When does a consumer buy more of a good?

Elasticity

- ① Good's price is lower (law of demand)
- ② Incomes are higher (for normal goods)
- ③ Price of substitutes is higher
- ④ Price of complements is lower

The *elasticities of demand* will tell us just how big the change in demand is for these cases.

Elasticity of Demand

A good may have *elastic* or *inelastic* demand.

What are some examples of inelastic goods? Elastic goods?

Specific example: buying a coffee. What factors will influence this product's elasticity of demand?

Elasticity of Demand

What factors will influence a good's elasticity?

- ➊ **Availability of close substitutes:** other kinds of drinks like sodas or juices.
- ➋ **Necessities vs. luxuries:** do you need it to be productive? Because it tastes good?
- ➌ **Market definition:** Are we considering the market for coffee? For all caffeinated beverages? For all drinks?
- ➍ **Time horizon:** In the short run, maybe I need a coffee to stay awake; in the long-run, maybe I break my crippling caffeine addiction.

Elasticity of Demand

We have a simple equation to find the price elasticity of demand:

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

Will this value be greater or less than 0? Why?

Elasticity of Demand: Refresher

If good A used to cost \$10, and now it costs \$14, what is the percentage change in its price?

$$\frac{\text{Change in price}}{\text{Original price}} * 100\% = \frac{\$14 - \$10}{\$10} * 100\% = 40\%$$

In our elasticity formula, we do not need to worry about multiplying by 100%.

Calculating Elasticity

Consider two points on a demand curve:

- Point A: $P_A = 12$ and $Q_A = 60$
- Point B: $P_B = 8$ and $Q_B = 80$

Take our formula and calculate the price elasticity of demand:

- 1 Moving from point A to point B

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- 2 Moving from point B to point A

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- ① Moving from point A to point B

$$P_e = \frac{1/3}{-1/3} = -1$$

- ② Moving from point B to point A

$$P_e = \frac{-1/4}{1/2} = -\frac{1}{2}$$

Calculating Elasticity

Two different values! What gives?

Related problem: you have \$100, and lose 10%. Tomorrow, you gain back 10%. How much do you have?

What can we do about this?

Midpoint Technique

Instead of taking the % change w.r.t. the original price, use an average of the two prices as your base:

Memento!

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

This is the formula to use!

Calculating Elasticity

Let's return to our example:

- $P_A = 12$ and $Q_A = 60$
 - $P_B = 8$ and $Q_B = 80$
- 1 What is the new base price?
 - 2 What is the new base quantity?
 - 3 What is the change for quantity?
 - 4 What is the change for price?

Calculating Elasticity

- $P_A = 12$ and $Q_A = 60$
- $P_B = 8$ and $Q_B = 80$
- ① What is the new base price? \$10
- ② What is the new base quantity? 70
- ③ What is the change for quantity? $\frac{2}{7}$
- ④ What is the change for price? $\frac{2}{5}$

Whether we consider moving from A to B or from B to A, we get

$$P_e = \frac{2/7}{2/5} = \frac{5}{7}.$$

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- Inelastic: price change of $X\%$ \implies demand change less than $X\%$
- Unit elastic: price change of $X\%$ \implies demand change of $X\%$
- Perfectly elastic: price change has no impact on demand
- Perfectly inelastic: small price change has enormous impact on demand

Total Revenue

How do we know how much is spent on a good at the market equilibrium?

Total revenue = equilibrium price \times equilibrium quantity

How does elasticity interact with revenue?

Elasticity

Suppose we have a linear demand curve:

- Quantity demanded is 0 when price is 10
 - Quantity demanded is 16 when price is 2
- 1 Calculate the formula for the demand curve (slope and intercept) and draw graphically.
 - 2 Is the elasticity constant? Why or why not?
 - 3 Pick a few example points, and use the midpoint formula to check the elasticity when:
 - 1 Price is close to 10
 - 2 Price is close to 0
 - 3 Price is around 5
 - 4 How will total revenue vary as price moves from 0 to 10?

Different Elasticities

We have focused on the *price elasticity of demand*, but there are others.

In general, we can find the *X elasticity of Y* as:

$$\text{X elasticity of Y} = \frac{\% \Delta \text{ in Y}}{\% \Delta \text{ in X}}$$

Some important elasticities:

- Income elasticity of demand
- Cross-price elasticity of demand

Different Elasticities

Income elasticity of demand:

- Positive for normal goods, negative for inferior goods
- income elasticity of demand = $\frac{\% \Delta \text{ in demand}}{\% \Delta \text{ in income}}$

Cross-price elasticity of demand:

- Positive for substitutes, negative for complements
- CP elasticity of demand = $\frac{\% \Delta \text{ in demand for good 1}}{\% \Delta \text{ in price of good 2}}$