

# Elements of Microeconomics

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## Chapter 5

# Notes on Homework 1

- You need to **explain** your answers. Stating the principle your are asked to use is not an explanation.
- Please submit correctly, you will lose points in the future for incorrect submissions.

# Elasticity

- Elasticity is an important concept when talking about consumer choice and policy decisions.
- Computationally it is not very difficult so focus on the intuition.
- There are many elasticities, the primary focus of this course will be on **price elasticity of demand** and the **price elasticity of supply**.

# Price Elasticity of Demand

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- **Price Elasticity of Demand (PED)**: a measure of how much the quantity demanded of a good responds to a change in the price of that good, computed as the percentage change in quantity demanded divided by the percentage change in price.
- Notice here that we are dealing with percent changes. The implications of this will be revealed in the calculation methods.

# Determinants of PED

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- ① Availability of close substitutes
- ② Necessities vs. Luxuries
- ③ Definition of the market
  - ▶ Remember this from last chapter.
- ④ Time horizon
  - ▶ Remember our principle that rational people think on the margin as well as time horizons. Both of these affect your demand for goods at a given time. This will be relevant in certain policy discussions as you will see.

# Computation of PED

- There are a few methods that one can use to calculate PED. Use whichever one you like and feel most comfortable with.

## PED Intuition

Remember that fundamentally:

$$PED = \frac{\% \Delta Q_d}{\% \Delta P}$$

Which is indicating a consumer's sensitivity to price changes.

# Methods Of Computation: Midpoint

- **midpoint method:** This method avoids issues of picking the wrong "direction" when calculating PED. However, there are more opportunities to make arithmetic mistakes.

## Midpoint Calculation

$$PED = \frac{\frac{(Q_2 - Q_1)}{(Q_2 + Q_1)}}{\frac{(P_2 - P_1)}{(P_2 + P_1)}}$$

# Methods of Computation: Point Elasticity Method

- This method is sometimes referred to as the *point-slope formula*. Regardless of name it offers another method to compute PED.
- This method some find easier than the midpoint and others find the midpoint to be easier. At the end of the day pick whichever one makes the most sense to you.

# Constructing the Point Method

Remember the intuition behind PED.

$$\textcircled{1} \text{ PED} = \frac{\% \Delta Q_d}{\% \Delta P}$$

$$\textcircled{2} \text{ PED} = \frac{\frac{\Delta Q_d}{Q_d}}{\frac{\Delta P}{P}}$$

$$\textcircled{3} \text{ PED} = \frac{\Delta Q_d}{\Delta P} * \frac{P}{Q_d}$$

$$\textcircled{4} \text{ PED} = b * \frac{P}{Q_d}$$

*Note:  $b$  is the slope of the demand curve when in the form  $Q_d = a - bP$ . If you are given the inverse demand curve (i.e. in  $y = mx + b$ ) the  $b$  in point slope is  $\frac{1}{m}$ .*

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- 2 **Cross Price Elasticity of Demand:** a measure of how much the quantity demanded of one good responds to a change in the price of another good. The sign of CPED matters, why?



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### Cross Price Elasticity of Demand

$$CPED = \frac{\% \Delta Q_{d \text{ good1}}}{\% \Delta P_{\text{good2}}}$$

# Signs of Demand Elasticities

Elasticity	Positive	Negative
CPED	substitutes	complements
IED	normal	inferior

# Price Elasticity of Supply

- **Price Elasticity of Supply:** a measure of how much the quantity supplied of a good responds to a change in the price of that good.

## Cross Price Elasticity of Demand

$$PES = \frac{\% \Delta Q_s}{\% \Delta P}$$

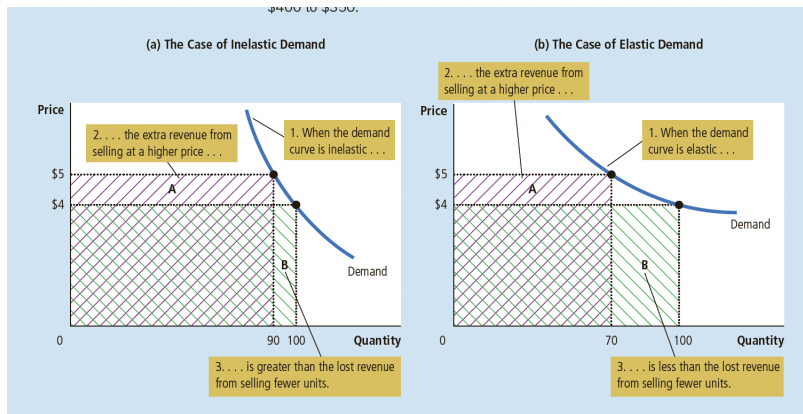
- Intuitively this is a measure of how sensitive suppliers are to changes in price.
- Computations are similar to that of PED.

## Graphically: What Does All of This Mean?

- This is where some of the intuition comes into play.
- What do the following graphs look like?
  - ①  $PED = 0$
  - ②  $PED = \infty$
  - ③  $PED = 1$  (unit elastic)
  - ④  $PED > 1$
- More importantly what do they *mean*?
- If demand is linear, what is happening with consumer PED along the curve? Why?

# Effect on Revenue

- Some of you wrote about loss of profits/revenue on Assignment 1. Without elasticities it is hard to predict the changes in such things.
- However, now you'll be able to judge these scenarios with what you have learned in Chapter 5.



### Question 1

The price of apples goes from \$1 per lb to \$1.50 per lb. As a result  $Q_d$  of oranges rises from 8,000 a week to 9,500.

- What is the cross-price elasticity of demand?
- What does that tell us about apples and oranges?

### Question 2

A price change causes the quantity demanded of a good to decrease by 20%, while the total revenue of that good increases by 10%. The demand curve is elastic in this region. TRUE or FALSE, why?

### Question 3

Consider the market for James Wilson (no relation to House) globes. The demand for the globes is described by the equation  $Q_d = 20 - 5P$ .

- Find PED when the  $P = 2.5$  using the midpoint method.
- Find PED when  $P = 2$  using any method.