Intro to Economic Analysis: Microeconomics

EC 201 - Day 7 Slides

Connor Wiegand

Department of Economics - University of Oregon

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Logistics

- Official homework 3 due this Saturday at 11:59pm, covering last week's material
- Next news assignments posted, due next Wednesday (October 27)
- Midterm November 3rd
  - Bring non-graphing, non-algebra calculator

Recall

- The price elasticity of demand is given by

$$\varepsilon_D = \left| \frac{\%\Delta Q_D}{\%\Delta P} \right|$$

and is interpreted as the % in quantity demanded for a good falls when price rises by 1%

- The income elasticity of demand is given by

$$\varepsilon_I = \frac{\%\Delta Q_D}{\%\Delta I}$$

and is interpreted as the % in quantity demanded for a good falls when income rises by 1%

Recall

- We define elastic/unit-elastic/inelastic as ε_D being above/at/below 1
- We define inferior/normal/superior as ε_I being below 0/above 0 and below 1/above 1
- We calculate percentage changes using the midpoint formula

$$\varepsilon_D = \left| \frac{\%\Delta Q_D}{\%\Delta P} \right| = \left| \frac{(Q_2 - Q_1) / [(Q_1 + Q_2)/2]}{(P_2 - P_1) / [(P_1 + P_2)/2]} \right|$$

Cross-Price Elasticity of Demand

- The other demand elasticity we will talk about is the **Cross-Price Elasticity of Demand** (CPED)[1]

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- The important part here is the order, as it is easy to get confused which good goes on the top versus which one goes on the bottom
- Here, Q_x is still taken to be the quantity demanded (Q_D) of x, but I have omitted D to avoid clutter[2]

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Interpretation of CPED

- The textbook defines CPED as the "measure of how much the quantity demanded of one good responds to a change in the price of another good, computed as the percentage change in quantity demanded of the first good divided by the percentage change in price of the second good"

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- In a similar style to the other elasticities, if the cross price elasticity of x with respect to y is given by ε_{xy}, then we say that if the price of y rises by 1%, then the quantity demanded for good x changes by ε_{xy}%

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  - positive
- Likewise, when y is a complement to x, we expect that an increase in the price of y leads to a decrease in the quantity demanded of x, so ε_{xy} should be negative

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    - Close example: any goods which are similar enough for you to only care about price: two brands of butter, triple sec, cheap coffee, etc.

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- Any interesting examples you can think of?

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- Calculate ε_{bc} and ε_{cb}. Are berries and cream substitutes, complements, or neither?

Solution 1

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- The goods are complements, note that they are asymmetric

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- Picking 2020 and 2021 will not give you an accurate measure of how time of year impacts gas, because COVID had such large impacts on everything
- In the same spirit, what would happen if the price of good x changed between the two data points you were using to calculate income elasticity?

Elasticity and Ceteris Paribus (cont.)

Price (dollars per unit)	Quantity demanded (units per day)	
	Income $2,000	Income $3,000
30	300	
40		250

I have two points with different Q_D and I. Can you calculate income elasticity using these two data points? What about PED?

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  - You can't know that a 1% increase in price decreases demand for Dr. Pepper by 0.82%, because, for all you know, most of the demand decrease you saw came from Mr. Pibb sales

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  - Likewise, the decrease in the demand for mushrooms could very well have been from the price increase (we actually know it is, because we found mushrooms to be a normal good earlier). Moreover, the income change increase could have stunted this observation about price elasticity

Exercise 2

- Consider the following table for beer and wine

Year	P_w/**bottle** ($)	P_b/**can** ($)	**Income** ($)	Q_D **of Wine** (cases/year)
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- Compute ε_{D_w}, ε_{I_w}, and ε_{wb}

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  - Only the price of beer changes[3], so we can calculate the cross-price elasticity of demand for wine with respect to beer:

$$\varepsilon_{wb} = \frac{(15k - 5k)/10k}{(1.4 - 1)/1.2} = 3$$

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  - Only the price of wine changes, so we can calculate the PED for wine:

$$\varepsilon_D = \frac{(15k - 5k)/10k}{(1.4 - 1)/1.2} = 3$$

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  - Therefore, demand for wine is elastic

Remark

- Using the same table as above,

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  - We can't compute them, not enough info

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- This is the tough task of many experimental and data-driven economists: finding data and using techniques such that you can isolate meaningful results that you are confident in

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- Note that the elasticity of supply will be very similar to the PED

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- Am I missing absolute values?

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- ε_S measures the sensitivity of producers to supply, given changes in price
  - Supply of a good is said to be *elastic* if the quantity supplied responds substantially to changes in the price
  - Supply is said to be inelastic if the quantity supplied responds only slightly to changes in the price
- Am I missing absolute values?
  - No, because the law of supply says that quantity supplied increases with price, so this object is already positive

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Determinants of PES

- While multiple things can affect supply elasticity, there are two key determinants

1. Availability of the product or of raw materials:
   - If there is a fixed availability of a product, then (reasonable) changes in price are unlikely to affect quantity supplied
     - Ex: You would have to increase the price of a Picasso painting significantly to get someone to sell
     - Ex: Gold is mined at around 2,500-3,000 tons/year. While an increase in price can induce owners and managers to try to work miners harder, it would take a significant price increase in gold to induce the mine owners to build new infrastructure to increase the rate of mining
2. Time Horizon:
   - Just like demand, supply is price-sensitive in the long run
   - Suppliers who already have product developed and ready to sell are often willing to make price corrections in the moment, but will likely change their production behavior in the long run

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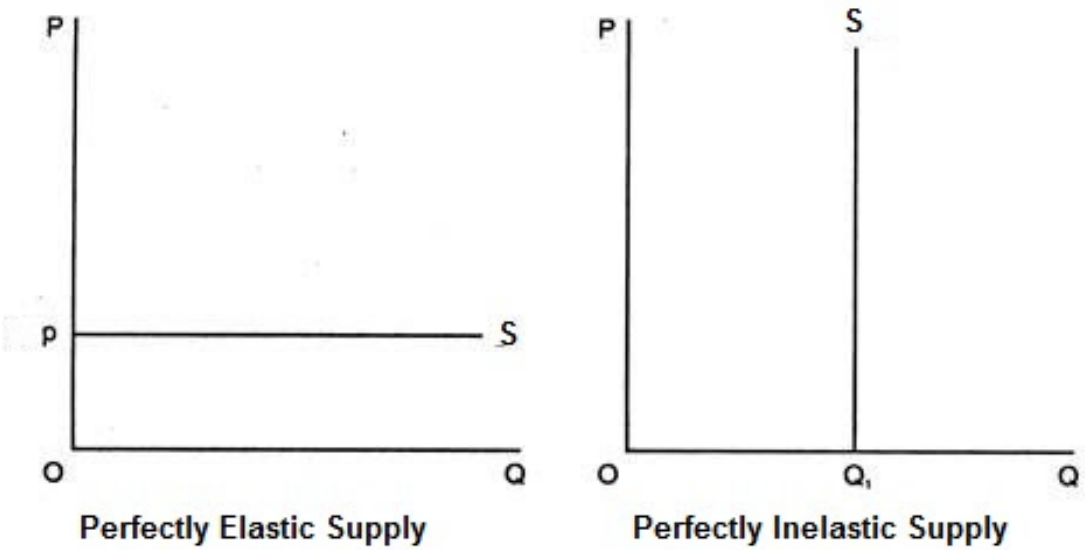
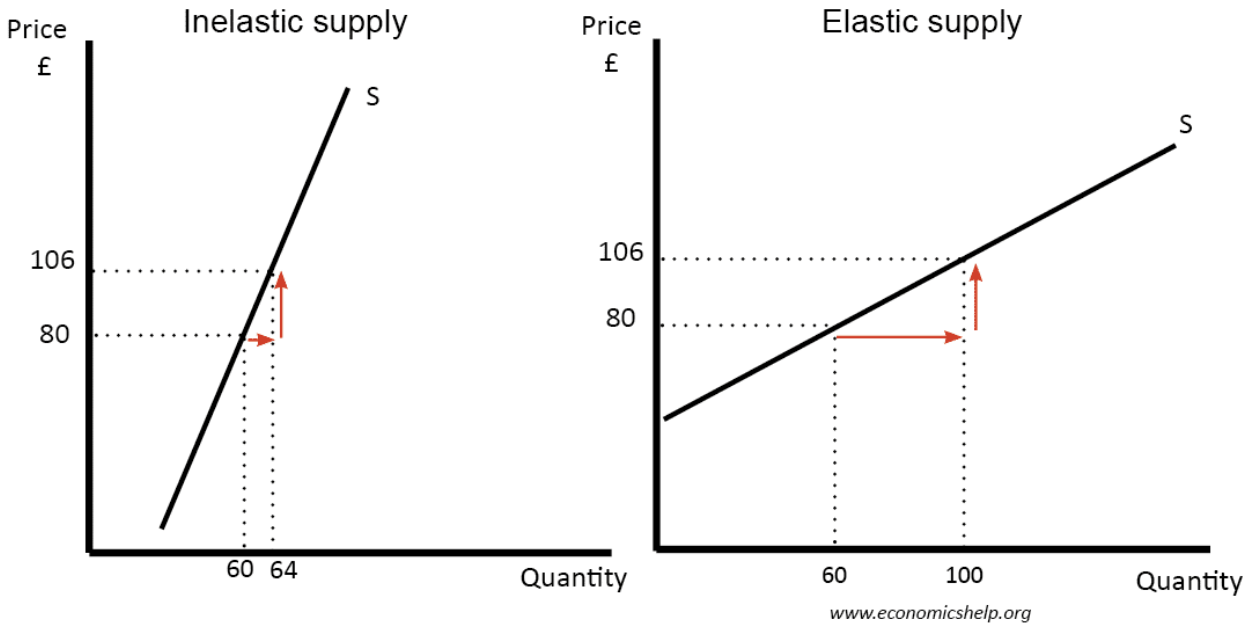
  - Related to availability and convertability, producers with straightforward production processes can start, stop, and change their supply levels easily, making them less sensitive to prices
    - Conversely, those with large, complicated processes are more price-sensitive

Graphical Interpretation of PES

- Same as before, inelastic looks like an "I", while elastic looks like an "E"



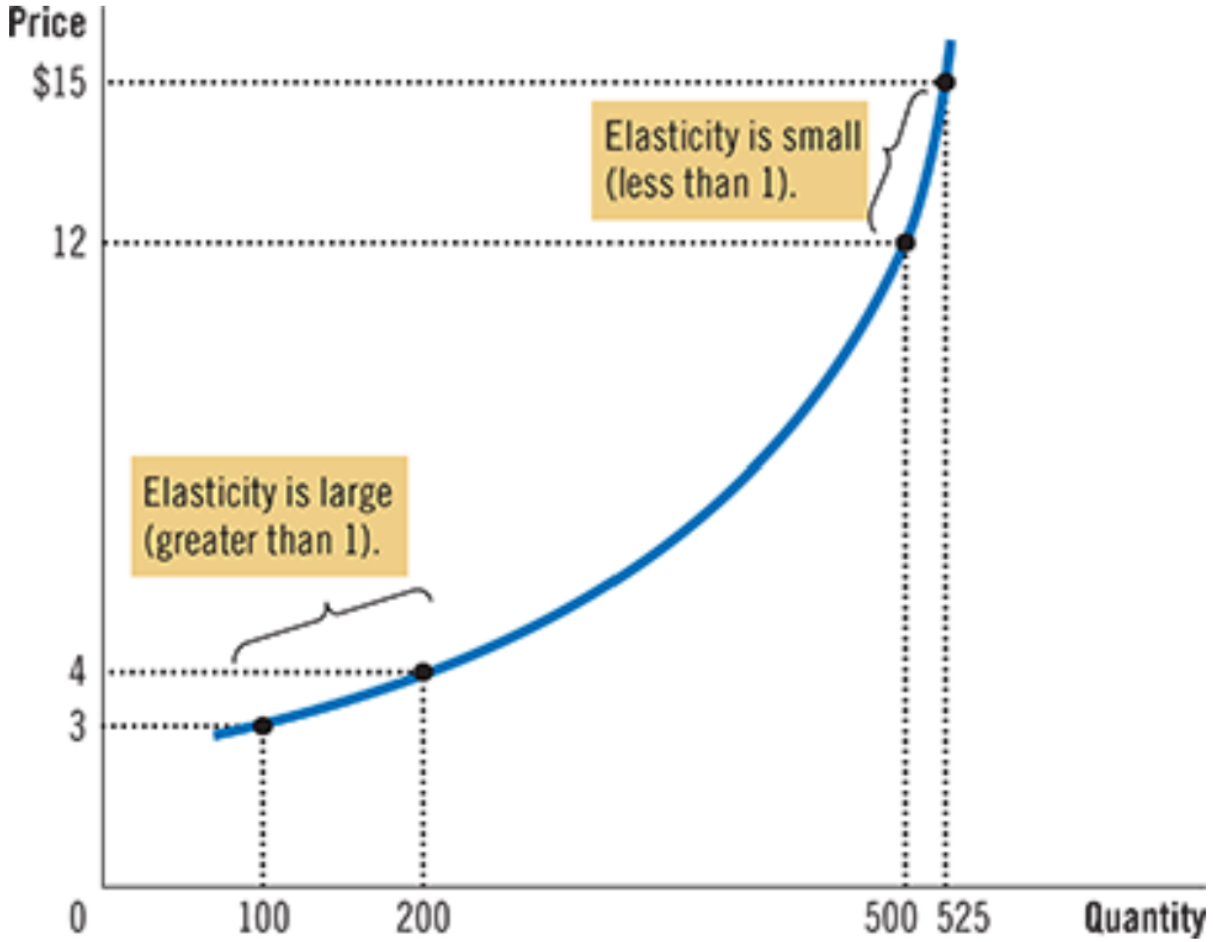
Graphical Interpretation of PES (cont.)



Just as before, the rule of thumb and common phrasing is that flatter curves are generally more elastic, and steep curves are generally more inelastic. However, again, this is not technically correct, as supply curves can vary in elasticity based on different factors[4]

[4] If you want to know more about this, talk to me.

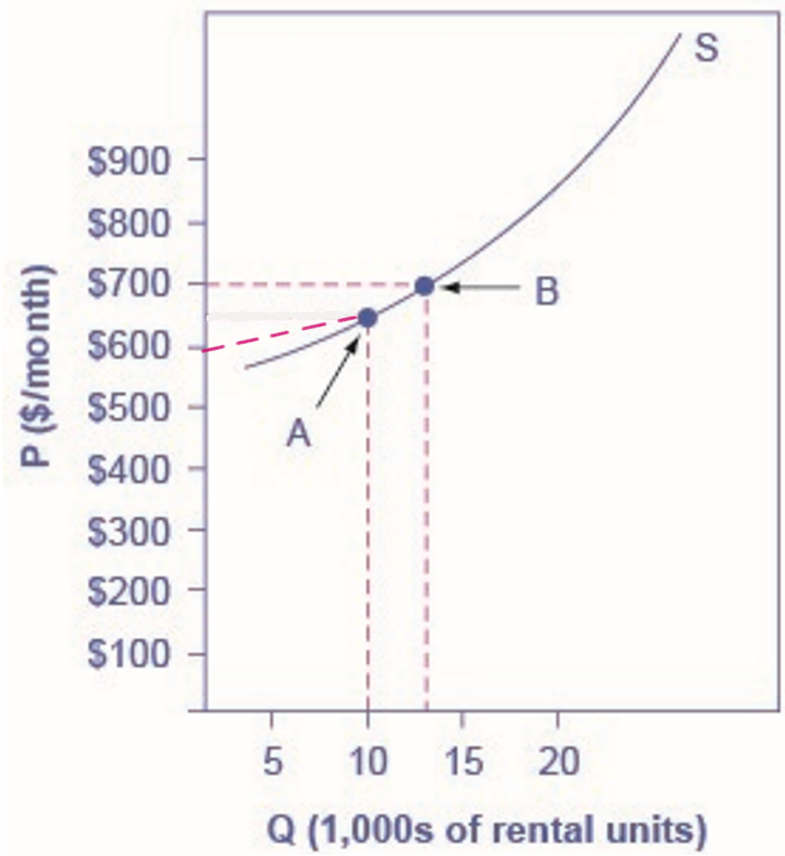
Graphical Interpretation of PES (cont.)



Flatter portions of a curved supply curve tend to be more elastic, while steeper portions tend to be more elastic

Exercise 3

- In the following diagram, suppose the Q_s at B is 14, and P at A is \$600. Find ε_S



Remark about Scaling Units

- Recall this way of writing the elasticity of supply formula:

$$\varepsilon_S = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2}$$

- Now, multiplying Q_2 and Q_1 by 10 means we get

$$\begin{aligned}\frac{10Q_2 - 10Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{10Q_1 + 10Q_2} &= \frac{10\left(Q_2 - Q_1\right)}{P_2 - P_1} \cdot \frac{P_1 + P_2}{10\left(Q_1 + Q_2\right)} \\ &= \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1 + P_2}{Q_1 + Q_2} = \varepsilon_S\end{aligned}$$

- So the scale of units don't matter when we are doing elasticity change!

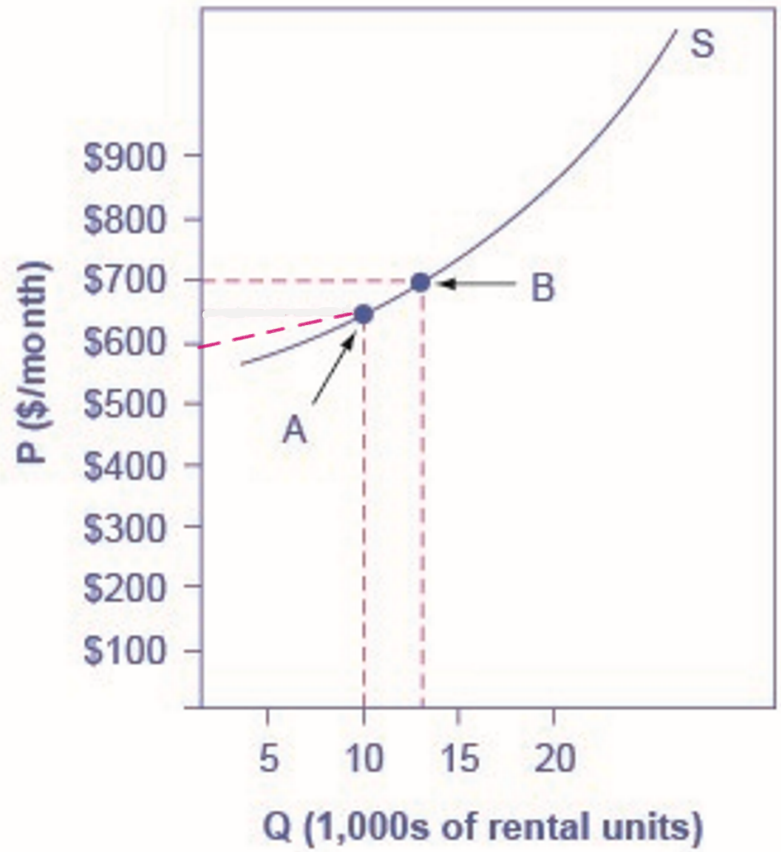
Solution 3

- Using the standard $\frac{\Delta Q / \left[(Q_1+Q_2)/2\right]}{\Delta P / \left[(P_1+P_2)/2\right]}$

$$\varepsilon_S = \frac{(14-10)/12}{(700-600)/650} = \frac{13}{6} = 2.1\bar{6}$$

Bonus exercise

- Suppose the following curve displays an elasticity of supply equal to 1.69, between points A and B. Find the equilibrium quantity after the movement to B. Continue to assume P at A is \$600.



Bonus Solution

$$\varepsilon_S = 1.69 = \frac{(Q_2 - 10)/(Q_2 + 10)}{100/1300}$$

$$\implies 0.13 = \frac{Q2 - 10}{Q_2 + 10}$$

$$\implies 0.13\,(Q_2 + 10) = Q2 - 10$$

$$\implies 11.3 = 0.87\,Q_2$$

$$\implies Q_2 = 12.98$$

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- Read 5-3 on your own