

Chapter 6: Real world estimates of elasticities (*responsiveness*)

Interpretation: For each 1% change in **cause** there will be a (**elasticity**) % change in **effect**

- $\frac{\% \Delta B}{\% \Delta A}$, called the "**A elasticity of B**" **The first word goes on the bottom, and is the *cause*
- **Price Elasticity of Demand** = $\frac{\% \Delta Q_d}{\% \Delta P} = -2.0 \text{ for electricity} = \frac{-2.0}{+1\%} = \frac{-2.0}{+10\%} = \frac{-2.0}{-10\%} = \frac{-2.0}{+5\%} = \frac{-2.0}{+8\%}$

Price elasticity of demand: (*Always negative*, but we drop the - sign *only for these* since always negative or 0

Salt, Insulin: 0 So if Price goes up 1%, Q_d goes down by _____

Eggs: 0.1 So if Price goes up 1%, Q_d goes down by _____

Gasoline: 0.15-0.20 in the short run, 0.30 in the long run

Unskilled workers: 0.22

Timber (wood) 0.35

Industrial chemicals: 0.4

Cigarettes: Adults: 0.4 in short run, .75 in long run. Teens: 0.8 in short run

Shoes: 0.9 So if Price goes up **10%**, Q_d goes down by _____

Domestic Travel: 1.2, Airline Travel 2.4, Foreign Travel 4.0

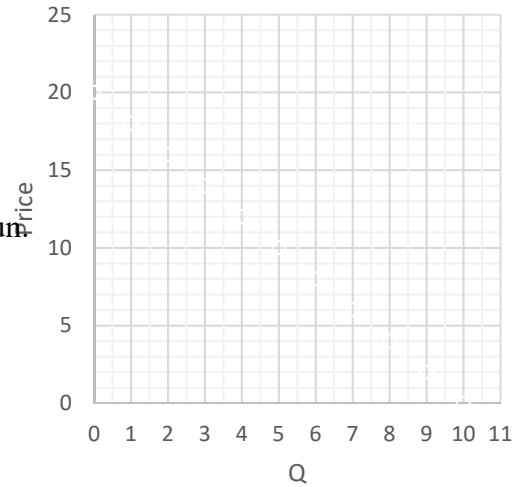
Personalized license plates: 1.35

Eating out: 1.6

Electricity: Close to 2.0 in the long run. Book says 0.13 (short run),

Jewelry: 2.6

Fancy silverware and china: 8.8 So if Price goes up 1%, Q_d goes down by _____



Income Elasticities of Demand: Can be + or -

For environmental protection: 1.44

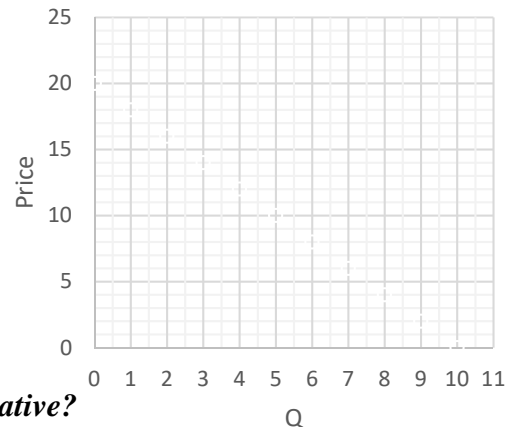
Personalized license plates: 0.57

In Japan: For Beef: 1.93 For Rice: -0.73

Charitable contributions: 1.0

Cars: 1.2 So if Income goes up by 10%, Q_d goes up by _____

Air Travel: 6.0 So if income goes down by 5%, Q_d drops by _____



Price elasticity of supply:

Houses: Around 6! So if price goes down by 10%, Q_s drops by _____

Medical specialists: 0.00 on average, some slightly negative!

What will happen when demand for medical specialists increases if negative?

Cross (or cross-price) elasticities of demand (can be + or -) (remember: q of second item/price of first item) :

In Japan: $e_{\text{noodles-fish}} = -0.02$

In a study on heroin addicts: $e_{\text{heroin-valium}} = 1$

$e_{\text{heroin-marijuana}} = 0.8$

$e_{\text{heroin-alcohol}} = 0.7$

They also found that the income elasticity = 1 and the price elasticity of demand = 1 (really -1)

Information on Alcohol:

Travel Cost Elasticity of Demand = -0.12

Beer: **price elasticity of demand:** 0.5 **Income elasticity of demand** 0.43

Liquor: **price elasticity of demand:** 1.5 **Income elasticity of demand** 0.80 (though in NC I estimate it is 0.40)

Wine: **price elasticity of demand:** 2.0 **Income elasticity of demand** 1.2

Cross price elasticities of demand:

Beer-liquor: 0.08

Beer-wine: 0.05

Wine-liquor: 0.6

Liquor-wine: 0.7

Remember: Elasticity measures how a change in “A” causes “B” to change

- “A” is the CAUSE, “B” is the EFFECT
- Formula is $\frac{\% \Delta B}{\% \Delta A}$, called the “A elasticity of B”
- If the top of the formula is larger than the bottom, the relationship is “elastic”
- If the top is smaller than the bottom, inelastic. If equal, “unitary elastic”.
- The PRICE elasticity of DEMAND measures how much Quantity Demanded responds to a Price change. It is always negative, so sometimes we ignore the (-) for price elasticity of demand only!

A. Simple Way To Calculate: Price Elasticity of Demand: $\epsilon_d = \frac{\% \Delta Q_d}{\% \Delta P}$

1) We see price increase by 5%, and Q decrease by 10% _____

“Arc elasticity” 2) We see price decrease by 12% and Q increase by 3.4% _____

3) We see price increase by 8.1% and Q decrease by 8.1% _____

The Price elasticity of Supply:

The Income elasticity of Demand:

The Cross-Price elasticity of Demand:

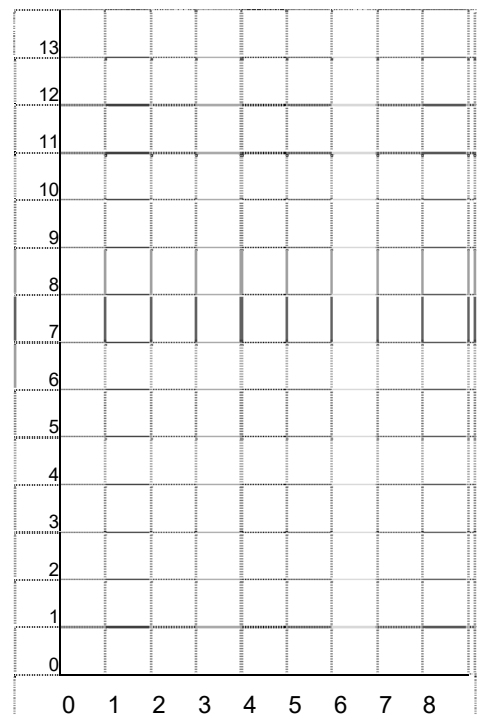
B. When given Raw Data: $\epsilon_d = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{\frac{\Delta Q_d}{\text{avg. } Q} * 100}{\frac{\Delta P}{\text{avg. } P} * 100} = \frac{\frac{\Delta Q}{\text{avg. } Q}}{\frac{\Delta P}{\text{avg. } P}}$ 1) If $P_1 = \$10, Q_1 = 100, P_2 = \$15, Q_2 = 80$

“% Change using the Midpoint formula”

2) Suppose we have a demand line $P = 12 - 2Q$. Graph it →

- a. Calculate the elasticity when Q goes from 0 to 1.
- b. Calculate the elasticity when Q goes from 1 to 2.
- c. Calculate the elasticity when Q goes from 2 to 3.
- d. Calculate the elasticity when Q goes from 3 to 4.
- e. Calculate the elasticity when Q goes from 4 to 5.
- f. Calculate the elasticity when Q goes from 5 to 6.

Now, calculate the total revenue for each price, quantity combination. What lessons have we learned?



Chapter 6 Practice Questions on Elasticity:

1. (Simple) The price elasticity of demand for milk to drink has been estimated as .3 (actually -0.3). This means that if price goes up by 1%, quantity demanded will _____.
 This also means that if price doubles, quantity demanded will _____.
 Or, if quantity suddenly doubled, we would expect price to _____.

2. (Midpoint formula) We see that as average incomes rise from \$30,000 to 40,000, we see per capita wine consumption increase from 2.42 to 3.42 bottles per month.

What elasticity can we calculate from this information? _____

Calculate it: _____ **Interpret what it means:** _____

3. Suppose that the demand curve is $P=100-2Q$.

What will happen to our sales revenue (Price *Quantity) if:

- We raise our price from \$90 to \$91?
- We raise our price from \$49 to \$51?
- We raise our price from \$15 to \$16?
- We **lower our price** from \$90 to \$89?
- So, what have we learned about the relationship between price elasticity of demand and what will happen to revenues when we raise or lower price?

4. The “cross price elasticity of wine and beer”, ϵ_{wb} would be $\frac{\% \Delta Q_{beer}}{\% \Delta P_{wine}}$. This has been found to be 0.05. The

“cross price elasticity of wine and liquor”, ϵ_{wl} would be $\frac{\% \Delta Q_{liquor}}{\% \Delta P_{wine}}$. This has been found to be 0.7 .

- Why are they positive? What would it mean if they were negative?
- What is the difference between the two cross price Elasticities? Why is one so much higher?

5. The price elasticity of supply for nursing care is approximately 0.1. What does this mean for the baby boomers who are retiring, and may cause the Demand for nursing care to increase?

6. The price elasticity of supply for doctors in some specialties is **negative**. Why?

7. **a.** Name a good that might have a price elasticity of demand close to zero.

b. Name a good that might have a price elasticity of supply close to zero.

c. Name a good that might have a price elasticity of demand close to infinity.

d. Name a good that might have a negative income elasticity of demand.

8. Why are elasticities in the long run “more elastic” than in the short run?

9. What factors determine whether a good’s price elasticity of demand is **more** or **less** elastic?

10. What is the “total revenue test” for price elasticity of demand?