

2.6 Price elasticity of demand

Part 1 - PED is a measure of the responsiveness of consumers to a change in the price of a particular good. With data from a demand schedule, we can calculate the PED for a good between any two prices. For example, below is a table representing the demand for ski poles in Zurich during the month of December

Price (dollars)	Quantity Demanded
0	200
4	180
8	160
12	140
16	120
20	100
24	80
28	60
32	40
36	20
40	0

1. State the formula for determining PED between two prices

2. By how much does the quantity of ski poles demanded decrease for every \$1 increase in price of ski poles? How did you determine this value?

3. Assume the price of ski poles increases from \$4 to \$5.
 - a. How many ski poles are demanded at \$4?

b. How many ski poles are demanded at \$5?

c. By what percentage did the quantity demanded fall?

d. By what percentage does price rise when it goes from \$4 to \$5?

4. Calculate the PED for ski poles between when the price increases from \$4 to \$5.

5. Assume price of ski poles increases from \$28 to \$29.

a. How many ski poles are demanded at \$28?

b. How many ski poles are demanded at \$29?

c. By what percentage did the quantity demanded fall?

- d. By what percentage does price rise when it goes from \$28 to \$29?

6. Calculate the PED for ski poles when the price increases from \$28 to \$29.

7. How does the PED for ski poles at high prices compare to the PED for ski poles at low prices? What accounts for this difference?

Part 2 - The responsiveness of consumers to price changes depends on many factors, which can be summarized with a useful acronym:

S - the number of substitutes a good has

P - the proportion of consumers' income a good represents

L - whether the good is a luxury or a necessity

A - whether the good is addictive

T - the amount of time consumers have to respond to a price change.

With these determinants of PED in mind, answer the following questions:

8. Assume there are 20 different manufacturers of ski poles. Why would demand for a *particular manufacturer's* ski poles be far more elastic than demand for *ski poles in general*? Explain your answer clearly.

9. Assume SMITH manufactures ski poles and that the number of competitors in the industry has recently increased from 20 to 30.
- a. How does the increase in competition affect consumers' responsiveness to an increase in the price of SMITH ski poles? Explain.

- b. What will happen to the equilibrium price and quantity of ski poles when the number of manufacturers increases?

- c. Based on your answer to (b), what should happen to the PED for ski poles in general following the increase in the number of manufacturers in the industry?

10. Explain why skiers in Switzerland (a high income country) have a very different PED for ski poles than consumers in India (a lower income country).

11. In some communities, skiing is a way of life. Why are consumers in these communities less responsive to changes in the price of ski poles than those who live in communities far from the mountains and only ski while on vacation?

12. Explain why the demand for goods like cigarettes and illegal drugs tends to be more inelastic than demand for soft drinks or ice cream.

Part 3 - Practicing PED calculations: Using the simple equation for PED, answer each of the following questions.

13. Assume the price of cigarettes increases by 50% due to a new law that raises the tax on cigarettes.

- a. In the short run, PED for cigarettes is 0.3. By what percentage will the quantity demanded fall following a 50% increase in the price? Show your work.

- b. In the long-run, PED for cigarettes is 0.8. By what percentage will the quantity demanded fall in the long-run? Show your work.

- c. Explain why PED for cigarettes is more elastic in the long-run than in the short-run.

14. Recently a drought caused a sharp decline in the corn harvest, reducing supply. The price per bushel jumped from \$40 to \$70, while quantity fell from 12 million to 9 million bushels.

- a. Calculate the PED for corn

- b. Is demand for corn elastic or inelastic between these prices? How do you know?

- c. Calculate the total amount spent on corn before the drought

- d. Calculate the total amount spent on corn after the drought.

- e. Overall were farmers hurt or helped by the drought? Explain?

15. Apples are currently selling for 3 CHF per kilogram and apple consumers are spending 1.5 million CHF per year. Lower taxes on imported apples push the price down to 2 CHF per kilogram, and as a result total expenditures on apples falls to 1.2 million CHF.

- a. How many apples were being bought prior to the decrease in import taxes?

- b. How many apples are being bought after the decrease in import taxes?

- c. Without solving for PED, determine whether demand for apples is inelastic, unit elastic or elastic. How did you determine this?

- d. Now calculate the PED for apples using the prices given and the quantities you determined in parts a) and b). Does your calculation support your answer to part c)?

Part 4 - PED and Linear Demand Equations - IB Higher Level only

16. The weekly demand for airplane tickets between Zurich and London is represented by the equation $Q_d = 2000 - 5P$. The price of tickets recently increased from \$200 to \$250.

- a. Calculate the original quantity demanded (at \$200)

- b. Calculate the new quantity demanded (at \$250)

- c. Calculate the PED for tickets from Zurich to London between \$200 and \$250

- d. Describe the PED for plane tickets when the price rises from \$200 to \$250 and explain how airlines revenues are likely affected by the price increase.

- e. What is the PED for plane tickets if the price rises again from \$250 to \$300?

- f. Why does the PED change when the price of plane tickets rises?

17. Assume the demand for plane tickets changes to $Q_d = 2000 - 4P$

- a. Calculate the PED for plane tickets when the price rises from \$200 to \$250.

- b. How does this value compare to the PED you calculated in 15(c)?

- c. What is the relationship between the 'b' variable in the demand equation and PED?