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HW#7 Due Feb 15, 2022

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3. Suppose the price elasticity of demand for heating oil is 0.2 in the short run and 0.7 in the long run.

   a. If the price of heating oil rises from $1.80 to $2.20 per gallon, what happens to the quantity of heating oil demanded in the short run? In the long run? (Use the midpoint method in your calculations.)

   b. Why might this elasticity depend on the time horizon?

7. Suppose that your demand schedule for pizza is as follows:

Price	Quantity Demanded (income = $20,000)	Quantity Demanded (income = $24,000)
$8	40 pizzas Q_1	50 pizzas
10	32 Q_2	45
12	24 Q_1	30 Q_2
14	16	20
16	8	12

   a. Use the midpoint method to calculate your price elasticity of demand as the price of pizza increases from $8 to $10 if (i) your income is $20,000 and (ii) your income is $24,000.

   b. Calculate your income elasticity of demand as your income increases from $20,000 to $24,000 if (i) the price is $12 and (ii) the price is $16.

(3) a.

Price elasticity of demand for heating oil

- short-run $\eta_D = 0.2$

$$0.2 = \frac{\% \Delta Q_d}{\frac{P_2 - P_1}{\frac{P_1 + P_2}{2}}}$$

$$0.2 = \frac{\% \Delta Q_d}{\frac{2.2 - 1.8}{\frac{1.8 + 2.2}{2}}} \} 0.2$$

$$0.04 = \% \Delta Q_d$$

∴ The quantity for short-run will decrease 4 %

- long-run $\eta_D = 0.7$

$$0.7 = \frac{\% \Delta Q_d}{\frac{2.2 - 1.8}{\frac{1.8 + 2.2}{2}}} \} 0.2$$

$$0.14 = \% \Delta Q_d$$

∴ the quantity for long-run for heating oil will decrease for 14 %

b. The elasticity is depend on the time horizon because the future is unpredictable, means that, there is a posibility of subsitutes for heating oil. And that make the market changeable. People might need other resurces for this process.

7 a.) i. When income = 20,000 $

$$\eta_D = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in } P}$$

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_2 + P_1)/2}$$

$P_1 = 8 \quad Q_1 = 40$

$P_2 = 10 \quad Q_2 = 32$

$$\rightarrow \frac{32 - 40}{(40 + 32)/2} \div \frac{10 - 8}{(10 + 8)/2} = \frac{-8}{36} \div \frac{2}{9} = -\frac{12}{12} = -1$$

ii. When income = 24,000 $

$$\eta_D = \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_1 + P_2)/2}$$

$P_1 = 8 \quad Q_1 = 50$

$P_2 = 10 \quad Q_2 = 45$

$$\rightarrow \frac{45 - 50}{(50 + 45)/2} \div \frac{10 - 8}{(8 + 10)/2} = \frac{-5}{47.5} \div \frac{2}{9} = -0.474$$

b.) i. When the price is 12 $

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

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{I_2 - I_1}{(I_1 + I_2)/2}$$

$Q_1 = 24$ $I_1 = 20{,}000$

$Q_2 = 30$ $I_2 = 24{,}000$

$$= \frac{30-24}{(24+30)/2} \div \frac{24000 - 20{,}000}{(20000 + 24000)/2} = \frac{6}{27} \div \frac{4000}{22000} = 1.222$$ ✱

ii When the price is 16 $

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

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{I_2 - I_1}{(I_1 + I_2)/2}$$

$Q_1 = 8$ $I_1 = 20{,}000$

$Q_2 = 12$ $I_2 = 24{,}000$

$$\rightarrow \frac{12 - 8}{(8+12)/2} \div \frac{24{,}000 - 20{,}000}{(20{,}000 + 24{,}000)/2} = \frac{4}{10} \div \frac{4000}{22{,}000} = 2.2$$ ✱