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HW#5 Due February 25, 2021

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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	50 pizzas
10	32	45
12	24	30
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.

Homework is on the next page

η_D

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   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?

3. a) $\% \Delta P = \dfrac{P_1 - P_0}{\bar{P}} \times 100\%$

$= \dfrac{2.20 - 1.80}{\left(\frac{2.20 + 1.80}{2}\right)} \times 100\%$

$= \dfrac{0.4}{2} \times 100\% = 20\%$

η_D in the short run = 0.2 *

$0.2 = \dfrac{\% \Delta Q_D}{\% \Delta P}$

$0.2 = \dfrac{\% \Delta Q_D}{20\%}$

$\% \Delta Q_D = 4\%$

$\therefore$ Q_D will be decreased 4 % in short run

η_D in the short run = 0.7 *

$0.7 = \dfrac{\% \Delta Q_D}{\% \Delta P}$

$0.7 = \dfrac{\% \Delta Q_D}{20\%}$

$\% \Delta Q_D = 14\%$

$\therefore$ Q_D will be decreased 14 % in long run

b) The elasticity depends on the time horizon because it can be more substitutes while the time changes. The more substitutes, the more elasticity.

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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.

a. i) Income is $20,000

$P = 8$, $Q_D = 40$

$P = 10$, $Q_D = 32$

$$\eta_D = \frac{1}{\text{Slope}} \cdot \frac{\bar{P}}{\bar{Q}_D}$$

$$= \frac{1}{-\frac{1}{4}} \cdot \frac{(8+10)/2}{(40+32)/2}$$

$$= -4 \cdot \frac{18/2}{72/2}$$

$$= -4 \cdot \frac{1}{4}$$

$$= -1$$ #

ii) Income is $24,000

$P = 8$, $Q_D = 50$

$P = 10$, $Q_D = 45$

$$\eta_D = \frac{1}{\text{Slope}} \cdot \frac{\bar{P}}{\bar{Q}_D}$$

$$= \frac{1}{-\frac{2}{5}} \cdot \frac{(8+10)/2}{(50+45)/2}$$

$$= -\frac{5}{2} \cdot \frac{18}{95}$$

$$= \frac{-9}{19} \approx -0.47$$ #

b. i) The price is $12

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

$$= \frac{\frac{30-24}{24} \cdot 100}{\frac{24,000-20,000}{20,000} \cdot 100}$$

$$\eta_I = \frac{\frac{6}{24}}{\frac{4000}{20,000}} = \frac{5}{4} = 1.25$$ #

ii) The price is $16

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

$$= \frac{\frac{12-8}{8} \cdot 100}{\frac{24,000-20,000}{20,000} \cdot 100}$$

$$\eta_I = \frac{\frac{4}{8}}{\frac{4000}{20,000}} = \frac{5}{2} = 2.5$$ #