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	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.

3) A Midpoint elasticity : $\eta_D = \dfrac{\left[\dfrac{(Q_1 - Q_0)}{(Q_1 + Q_0)/2} \times 100\right]}{\left[\dfrac{(P_1 - P_0)}{(P_1 - P_0)/2} \times 100\right]}$ $\dfrac{\% \Delta Q_D}{\% \Delta P}$

Price ↑ ($1.8 to $2.2)

$\% \Delta P = \dfrac{(2.2 - 1.8)}{(2.2 - 1.8)/2} \times 100$

$= 0.2 \times 100$

$= 20\%$ ※

• In short run

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

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

$20 \times 0.2 = \% \Delta Q_D$

$4 = \% \Delta Q_D$ ※

• In long run

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

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

$14 = \% \Delta Q_D$ ※

∴ Q_D changes by 4% (short run) | Q_D changes by 14% (long run)

B Long run price elasticity is higher because consumers can find a lot of subsitutes to replace heating oils.

⑦ (a) Midpoint method :

income = 20,000

$$\frac{1}{\text{slope}} \times \frac{\left(\frac{P_1 + P_2}{2}\right)}{\left(\frac{Q_1 + Q_2}{2}\right)} = |\eta_D|$$

$$\frac{1}{-\frac{1}{4}} \times \frac{\left(\frac{8+10}{2}\right)}{\left(\frac{40+32}{2}\right)} = |\eta_D|$$

$$-4 \times \frac{1}{4} = |\eta_D|$$

$$\frac{-4}{4} = |\eta_D|$$

$$|\eta_D| = -1$$

income = 24,000

$$\frac{1}{\text{slope}} \times \frac{\left(\frac{P_1 + P_2}{2}\right)}{\left(\frac{Q_1 + Q_2}{2}\right)} = |\eta_D|$$

$$\frac{1}{-\frac{2}{5}} \times \frac{\left(\frac{8+10}{2}\right)}{\left(\frac{40+32}{2}\right)} = |\eta_D|$$

$$|\eta_D| = 0.47$$

(b) Income elasticity of demand : $\eta_I = \dfrac{\% \Delta Q_D}{\% \Delta I}$

$$\eta_I = \frac{\frac{New - old}{old} \times 100}{\frac{New - old}{old} \times 100}$$

(i) price is \$12

Quantity changes from 24 to 30

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

$\eta_I = 1.25$ #

price is \$16

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

$\eta_I = 2.5$

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