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.

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?

Price elasticity of demand for heating oil is 0.2 in short run
0.7 in long run.

a.) Given that $P_0 = 1.8$ and $P_1 = 2.2$

$$\%\Delta P = \frac{P_1 - P_0}{\left(\frac{P_1 + P_0}{2}\right)} \times 100\%$$

$$= \frac{2.2 - 1.8}{\left(\frac{2.2 + 1.8}{2}\right)} \times 100\%$$

$$= \frac{0.4}{\left(\frac{4}{2}\right) = 2} \times 100\% = 20\% \ *$$

η_D for short run $= 0.2$

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

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

$$0.2(20\%) = \%\Delta Q_D$$

$$\%\Delta Q_D = 4\% \ *$$

∴ the quantity demanded will decrease by 4% in short run.

η_D for long run $= 0.7$

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

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

$$0.7(20\%) = \%\Delta Q_D$$

$$\%\Delta Q_D = 14\% \ *$$

∴ the quantity demanded will decrease by 14% in long run.

b.) it depends on the time horizon because consumers can have a greater substitutes in long run than the short run which means greater substitutes lead to more elasticity.

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Price	Quantity Demanded (income = $20,000)	Quantity Demanded (income = $24,000)
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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.) Income at 20,000 , $P_0 = 8$ $Q_D = 40$
$P_1 = 10$ $Q_D = 32$

$$\eta_D = \frac{1}{\text{slope}} \cdot \frac{P_0 + P_1}{Q_0 + Q_1}$$

$$m = \frac{10-8}{32-40} = \frac{2}{-8} = -\frac{1}{4}$$

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

$$= -4 \cdot \frac{18}{72} \quad (18 \to 1,\ 72 \to 4)$$

$$= -1 \ *$$

Income at $24,000 , $P_0 = 8$ $Q_D = 50$
$P_1 = 10$ $Q_D = 45$

$$m = \frac{10-8}{45-50} = \frac{2}{-5}$$

$$\eta_D = \frac{1}{\text{slope}} \cdot \frac{P_0 + P_1}{Q_0 + Q_1}$$

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

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

$$= -\frac{9}{19} = -0.47 \ *$$

b.) i.) the price is $12 , $\eta_I = ?$

$$\%\Delta Q_D = \frac{30-24}{24} \times 100 = 25\%$$

$$\%\Delta I = \frac{24000-20000}{20000} \times 100 = 20\%$$

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

$$= \frac{25\%}{20\%} = 1.25$$

∴ Income elasticity at price $12 = 1.25 *

ii.) the price is $16 , $\eta_I = ?$

$$\%\Delta Q_D = \frac{12-8}{8} \times 100 = 50\%$$

$$\%\Delta I = \frac{24000-20000}{20000} \times 100 = 20\%$$

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

$$= \frac{50\%}{20\%} = 2.5 \ *$$

∴ Income elasticity at price $16 = 2.5 *