HW#7 Due Feb 15, 2022

Mankiw Page 107

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.

Short-run

$\eta_0 = 0.2$

price change from 1.8 → 2.2 ⇒ using midpoint method

η_0 (midpoint) $= \frac{1}{\text{slope}} \frac{P_1+P_2}{Q_1+Q_2}$

$0.2 = \frac{1}{\text{slope}} \frac{1.8+2.2}{Q_1+Q_2}$

$0.2 = \frac{1}{\text{slope}} \frac{4}{Q_1+Q_2}$

$Q_1+Q_2 = \frac{1}{\text{slope}} \frac{4}{0.2}$

$Q_1+Q_2 = \frac{1}{\text{slope}} (20)$

long run

$\eta_0 = 0.7$

price change from 1.8 → 2.2 ⇒ Using mid point method

η_0 (midpoint) $= \frac{1}{\text{slope}} \frac{P_1+P_2}{Q_1+Q_2}$

$0.7 = \frac{1}{\text{slope}} \frac{1.8+2.2}{Q_1+Q_2}$

$0.7 = \frac{1}{\text{slope}} \frac{4}{Q_1+Q_2}$

$Q_1+Q_2 = \frac{1}{\text{slope}} (5.71)$

∴ the elasticity of demand for heating oil in short run is less than long run, so the change in Quality in short run more than long run.

In the future, there will be more substitute of heating oil, so the elasticity in long run will be less than short run.

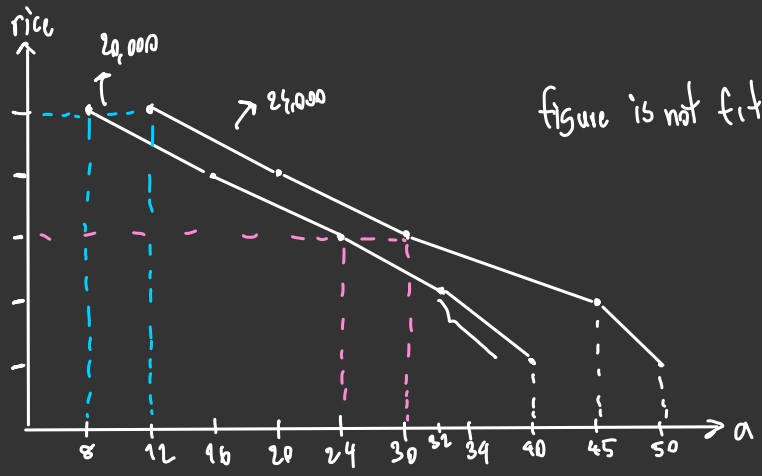

figure is not fit to scale !

Find elasticity from \$8 to \$10 both income (20,000 , 24,000)

$$\eta_0 \text{ (mid point)} = \frac{1}{\text{slope}} \left(\frac{P_1 + P_2}{Q_1 + Q_2} \right)$$

$$\text{slope} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{2}{-8} = -\frac{1}{4}$$

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

$$= -4 \times \frac{18}{72}$$

$$= -1 \#$$

$$\text{slope} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{10-8}{45-50} = \frac{-2}{5}$$

$$\eta_0 \text{ (mid point)} = \frac{1}{\text{slope}} \left(\frac{P_1 + P_2}{Q_1 + Q_2} \right)$$

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

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

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

b)

i) $12 $\eta_I = \frac{\%\Delta Q_D}{\%\Delta I}$

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

$\%\Delta I = \frac{24{,}000 - 20{,}000}{20{,}000} \times 100 = 20$

ii) $16 $\eta_I = \frac{\%\Delta Q_D}{\%\Delta I}$

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

$\%\Delta I = \frac{24{,}000 - 20{,}000}{20{,}000} \times 100 = 200$

$\eta_I = \frac{50}{20} = 2.5$ #