

HW#5 Due February 25, 2021

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.
- 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.)
 - Why might this elasticity depend on the time horizon?

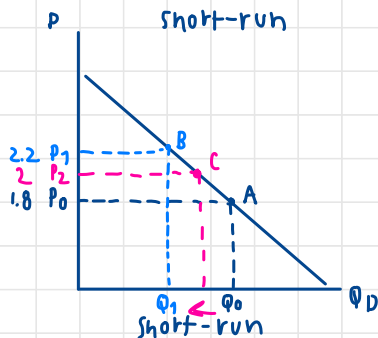
7. Suppose that your demand schedule for pizza is as follows:

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

- 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.
- 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.)



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

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

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

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

$$\eta_D = 0.2$$

η_D

$$P_0 = 1.8$$

$$P_1 = 2.2$$

$$P_2 = 2$$

$$\% \Delta P = 0.4$$

$\therefore$ Demand will decrease by 4% in the short-run

Long-run

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

$$0.7 = \frac{\% \Delta Q_D}{\frac{2.2 - 1.8}{2}}$$

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

$$0.7 \times 0.2 = \% \Delta Q_D$$

$$\% \Delta Q_D = 1.4$$

$\therefore$ Demand will decrease by 14% in long-run

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

This elasticity depend on the time horizon because when people have more time, there is a possible to find the substitute products. so, they might prefer that more than heating oil #

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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.

$$\begin{aligned}
 \text{(a) i) } \eta_P &= \frac{\% \Delta Q_D}{\% \Delta P} \\
 &= \frac{\frac{32-40}{\left(\frac{32+40}{2}\right)}}{\frac{10-8}{\left(\frac{10+8}{2}\right)}} \\
 &= \frac{-0.22}{0.22} = -1
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } \eta_P &= \frac{\% \Delta Q_D}{\% \Delta P} \\
 &= \frac{\frac{45-50}{\left(\frac{45+50}{2}\right)}}{\frac{10-8}{\left(\frac{10+8}{2}\right)}} \\
 &= \frac{-\frac{2}{19}}{\frac{2}{9}} = -0.474 \#
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } \eta_I &= \frac{\% \Delta Q_D}{\% \Delta I} \\
 &= \frac{\frac{30-24}{24}}{\frac{24000-20000}{20000}} \\
 &= 1.25 \#
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } \eta_I &= \frac{\% \Delta Q_D}{\% \Delta I} \\
 &= \frac{\frac{12-8}{8}}{\frac{24000-20000}{20000}} \\
 &= 2.5 \#
 \end{aligned}$$

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