

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.

- 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 Q_1	50 pizzas
10	32 Q_2	45
12	24 Q_3	30 Q_4
14	16	20
16	8	12

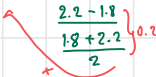
- Use the midpoint method to calculate your price elasticity of demand as the price of pizza increases from \$8 to \$10 if (i) your income is \$20,000 and (ii) your income is \$24,000.
- Calculate your income elasticity of demand as your income increases from \$20,000 to \$24,000 if (i) the price is \$12 and (ii) the price is \$16.

③ 2.

Price elasticity of demand for heating oil

• short-run $\eta_D = 0.2$

$$0.2 = \frac{\% \Delta Q_d}{\frac{P_2 - P_1}{\frac{P_1 + P_2}{2}}}$$

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


$$0.04 = \% \Delta Q_d$$

$\therefore$ The quantity for short-run will decrease 4 %

• long-run $\eta_D = 0.7$

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


$$0.14 = \% \Delta Q_d$$

$\therefore$ the quantity for long-run for heating oil will decrease for 14 %

b. The elasticity is depend on the time horizon

because the future is unpredictable, means that,

there is a possibility of substitutes for heating oil.

And that make the market changeable. People might

need other resources for this process.

7) i. When income = 20,000 \$

$$h_D = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in } P}$$
$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_2 + P_1)/2}$$

$$\begin{array}{l} P_1 = 8 \quad Q_1 = 40 \\ P_2 = 10 \quad Q_2 = 32 \end{array} \rightarrow \frac{32 - 40}{(40 + 32)/2} \div \frac{10 - 8}{(10 + 8)/2} = \frac{-8}{36} \div \frac{2}{9} = -\frac{12}{12} = -1$$

ii. When income = 24,000 \$

$$h_D = \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_1 + P_2)/2}$$

$$\begin{array}{l} P_1 = 8 \quad Q_1 = 50 \\ P_2 = 10 \quad Q_2 = 45 \end{array} \rightarrow \frac{45 - 50}{(50 + 45)/2} \div \frac{10 - 8}{(8 + 10)/2} = \frac{-5}{47.5} \div \frac{2}{9} = -0.974$$

b.) i. When the price is 12 \$

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

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{I_2 - I_1}{(I_1 + I_2)/2}$$

$$\begin{array}{ll} Q_1 = 24 & I_1 = 20,000 \\ Q_2 = 30 & I_2 = 24000 \end{array} \quad \rightarrow \quad \frac{30 - 24}{(24 + 30)/2} \div \frac{24000 - 20,000}{(20000 + 24000)/2} = \frac{6}{27} \div \frac{4000}{22000} = 1.222 \neq$$

ii. When the price is 16 \$

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

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{I_2 - I_1}{(I_1 + I_2)/2}$$

$$\begin{array}{ll} Q_1 = 8 & I_1 = 20,000 \\ Q_2 = 12 & I_2 = 24000 \end{array} \quad \rightarrow \quad \frac{12 - 8}{(8 + 12)/2} \div \frac{24,000 - 20,000}{(20000 + 24000)/2} = \frac{4}{10} \div \frac{4000}{22000} = 2.2 \neq$$