

HW#5 Due September 22, 2020

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.

(a.) Price Elasticity Midpoint Method $\rightarrow \eta_o = \frac{\Delta Q_o}{\text{midpoint } Q_o} \div \frac{\Delta P}{\text{midpoint } P}$

Short run

$$\eta_o = \frac{\Delta Q_o}{\text{midpoint } Q_o} \div \frac{\Delta P}{\text{midpoint } P}$$

$$0.2 = \chi \div \frac{0.4}{\frac{4}{2}}$$

$$0.2 = \chi \div \frac{0.4}{2}$$

$$\frac{\chi}{0.2} = 0.2$$

$$\chi = 0.2 \times 0.2$$

$$\chi = 0.04$$

\therefore The price elasticity of demand is 0.04 in short run.

long run

$$\eta_o = \frac{\Delta Q_d}{\text{mid } Q_d} \div \frac{\Delta P}{\text{mid } P}$$

$$0.7 = z \div \frac{0.4}{\frac{4}{2}}$$

$$0.7 = \frac{z}{0.2}$$

$$z = 0.14$$

\therefore The percent of quantity demanded is 0.14 in long run.

(b) Customer behaviour is one of the main factors that cause elasticity & inelasticity. In short run, when it was just the beginning of the change, most people might not be able to change their behaviour in a short period of time. So they have to pay for the fuel even the price is higher. In this case, the price elasticity of demand is 0.04 in short run, it's relatively inelastic. Despite that, if the price still keeps rising up for a while (long run), it will make people feel that fuel fee is too expensive to handle. The customers are going to change their behaviour, they will try to avert paying fuel fee. Some of them might use public transportation instead, or either use eco-car/electric-car. This change of behaviour affects the price elasticity of demand from 0.04 in short run to be 0.14 in long run which we could say that long run is a bit more elastic than short run in this case.

7.

(a)

income \$20,000

$$V_o = \frac{\Delta Q_o}{\text{mid } Q_o} \div \frac{\Delta P}{\text{mid } P}$$

$$V_o = \frac{(40-32)}{\frac{40+32}{2}} \div \frac{(8-10)}{\frac{8+10}{2}}$$

$$= \frac{8}{36} \div \frac{(-2)}{9}$$

$$= \frac{8}{36} \times -\frac{9}{2}$$

$$= |-1|$$

$$= 1$$

∴ The price elastic of demand is 1,
unit elastic.

income \$24,000

$$V_o = \frac{\Delta Q_o}{\text{mid } Q} \div \frac{\Delta P}{\text{mid } P} \quad \frac{Q+Q_2}{2} \div \frac{P+P_1}{2}$$

$$= \frac{(50-45)}{(50+45)} \div \frac{(8-10)}{(8+10)}$$

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

$$= \frac{5}{95} \times -9$$

$$= \left| -\frac{45}{95} \right|$$

$$= 0.4737$$

∴ The price elastic of demand is 0.4737,
relatively inelastic.

(b) The price is \$12

$$V_{I_1} = \frac{\% \Delta Q_o}{\% \Delta I}$$

$$V_{I_1} = \frac{\frac{(Q_1 - Q)}{Q} \times 100}{\frac{(I_1 - I)}{I} \times 100}$$

$$= \frac{\left(\frac{30-24}{24}\right) \times 100}{\left(\frac{24k-20k}{20k}\right) \times 100}$$

$$= \frac{\frac{6}{24} \times 100}{\frac{4000}{20000} \times 100}$$

$$= \frac{0.25 \times 100}{0.2 \times 100}$$

$$= \frac{0.25}{0.2}$$

$$= 1.25$$

relatively elastic

The price is \$16

$$V_{I_1} = \frac{\% \Delta Q_o}{\% \Delta I}$$

$$= \frac{\frac{(Q_1 - Q)}{Q} \times 100}{\frac{(I_1 - I)}{I} \times 100}$$

$$= \frac{12-8}{8} \times 100$$

$$= \frac{24k-20k}{20k} \times 100$$

$$= \frac{0.5 \times 100}{0.2 \times 100}$$

$$= \frac{0.5 \times 100}{0.2 \times 100}$$

$$= 2.5$$

relatively elastic