

COMM 220 – PRACTICE PROBLEM SET 1 SOLUTIONS

1. (a) Use the CPI of Vancouver as the base:

$$\text{Price in Vancouver} = \$300,000$$

$$\text{Price in Toronto} = \$290,000 * (143.2 / 135.8) = \$305,802.65$$

$$\text{Price in Montreal} = \$280,000 * (143.2 / 126.5) = \$316,964.43$$

Or, use the CPI of Toronto as the base:

$$\text{Price in Vancouver} = \$300,000 * (135.8 / 143.2) = \$284,497.21$$

$$\text{Price in Toronto} = \$290,000$$

$$\text{Price in Montreal} = \$280,000 * (135.8 / 126.5) = \$300,584.98$$

Or, use the CPI of Montreal as the base:

$$\text{Price in Vancouver} = \$300,000 * (126.5 / 143.2) = \$265,013.97$$

$$\text{Price in Toronto} = \$290,000 * (126.5 / 135.8) = \$270,139.91$$

$$\text{Price in Montreal} = \$280,000$$

Or, use 100 as the common base for all cities:

$$\text{Price in Vancouver} = \$300,000 * (100 / 143.2) = \$209,497.21$$

$$\text{Price in Toronto} = \$290,000 * (100 / 135.8) = \$213,549.34$$

$$\text{Price in Montreal} = \$280,000 * (100 / 126.5) = \$221,343.87$$

Montreal has the highest real price of apartment unit while Vancouver has the lowest.

- (b) Let the CPI for 2000 equals 100 and the CPI for 2006 equals 115, which reflects a 15% increase in the overall price level. To find the real price of long-distance telephone service in each period, divide the nominal price by the CPI for that year.

For 2000, we have 25/100 or 25 cents, and for 2006, we have 10/115 or 8.6957 cents. The real price therefore fell from 25 cents to 8.6957 cents.

$$\begin{aligned} &\% \text{ change in the real price of long-distance telephone service from 2000 to 2006} \\ &= (8.6957 - 25) / 25 = -65.2172\% \end{aligned}$$

- (c) Use Paul's graduation year as the base year:

$$\text{John's salary in real dollars} = \$36,000 * (115/100) = \$41,400 > \text{Paul's salary of } \$40,000$$

Or, use John's graduation year as the base year:

$$\text{Paul's salary in real dollars} = \$40,000 * (100/115) = \$34,782.6087 < \text{John's salary of } \$36,000$$

No, Paul actually has the lower salary in real dollars.

2. (a) Set $Q_D = Q_S$ to find the equilibrium price and quantity:

$$880 - 70P = 240 + 90P$$

$$P = (880 - 240) / (90 + 70) = \$4 \text{ per bushel}$$

Substitute $P = \$4$ into Q_D to find Q :

$$Q = 880 - 70(4) = 600 \text{ million bushels}$$

Or, substitute $P = \$4$ into Q_S to find Q :

$$Q_S = 240 + 90(4) = 600 \text{ million bushels}$$

(b) The price elasticity of supply, $E_P^S = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = (90)\left(\frac{4}{600}\right) = 0.60$

The price elasticity of demand, $E_P^D = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = (-70)\left(\frac{4}{600}\right) = -0.4667$

(c) At $P = \$5.00$, $Q_S = 240 + 90(5) = 690$ million bushels

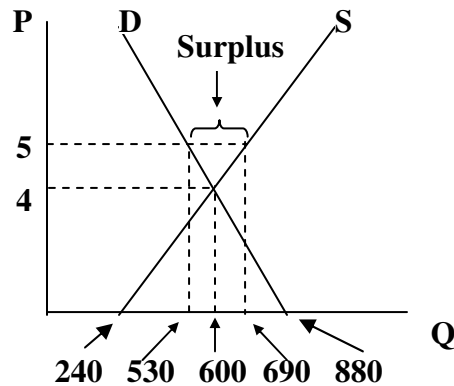
$$Q_D = 880 - 70(5) = 530 \text{ million bushels}$$

$$\text{Surplus} = Q_S - Q_D = 690 - 530 = 160 \text{ million bushels}$$

Yes, the government will be forced to purchase 160 million bushels of wheat.

The government will have to pay \$800 million ($\5.00×160).

(d)



3. (a) Given $P = \$40$ and $Q = 1280$,

$$E_P^S = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = d\left(\frac{40}{1280}\right) = 0.8 \Rightarrow d = 25.6$$

Substitute $P = 40$, $Q = 1280$, and $d = 25.6$ into $Q_S = c + dP$,

$$c = Q - dP = 1280 - 25.6(40) = 256$$

$$\text{So, } Q_S = 256 + 25.6P$$

Given $P = \$40$ and $Q = 1280$,

$$E_P^D = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = -b\left(\frac{40}{1280}\right) = -0.64 \Rightarrow b = 20.48$$

Substitute $P = 40$, $Q = 1280$, and $b = 20.48$ into $Q_D = a - bP$,

$$a = Q + bP = 1280 + 20.48(40) = 2099.2$$

$$\text{So, } Q_D = 2099.2 - 20.48P$$

(b) To find the new demand curve with a 20% increase,

$$Q_D' = 1.2Q_D = (1.2)(2099.2 - 20.48P) = 2519.04 - 24.576P$$

To find the new supply curve with a 10% decrease,

$$Q_S' = 0.9Q_S = (0.9)(256 + 25.6P) = 230.4 + 23.04P$$

Equate Q_D' with Q_S' to find the new equilibrium price and quantity,

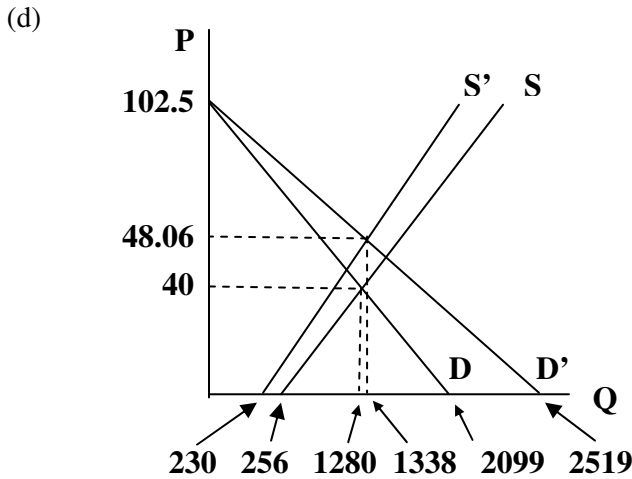
$$2519.04 - 24.576P = 230.4 + 23.04P$$

$$P = (2519.04 - 230.4) / (23.04 + 24.576) = \$48.0645 \text{ per ton}$$

Substitute $P = 48.0645$ into Q_S' to find Q ,
 $Q = 230.04 + 23.04(48.0645) = 1337.8065$ tons

Or, substitute $P = \$48.0645$ into Q_D' to find Q :
 $Q = 2519.04 - 24.576(48.0645) = 1337.8065$ tons

- (c) Percentage change in price = $(48.0645 - 40) / 40 = 20.16\%$
 Percentage change in quantity = $(1337.8065 - 1280) / 1280 = 4.516\%$



4. (a)

$$E_p^D = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{P}{Q} \right) = \frac{30}{18000} \left(\frac{20000 - 18000}{24 - 30} \right) = \frac{30}{18000} \left(\frac{-2000}{6} \right) = -.5556$$

$$E_p^D = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{P}{Q} \right) = \frac{24}{20000} \left(\frac{-2000}{6} \right) = -0.4$$

(b) $E_p^D = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{\bar{P}}{\bar{Q}} \right) = \frac{(24 + 30)/2}{(18000 + 20000)/2} \left(\frac{-2000}{6} \right) = -0.4737$

- (c) $Q_D = a + bP$
 $a = Q_D - bP = 18,000 - (-2,000 / 6)(30) = 28,000$
 Or, $a = 20,000 - (-2,000 / 6)(24) = 28,000$

$$Q_D = 28,000 - (2000/6)P = 28,000 - 333.3333P$$

- (d) Revenue ($P=30$) = $30 \times 18,000 = \$540,000$
 At $P = \$36$, $Q_D = 28,000 - 333.3333(36) = 16,000$
 Revenue ($P=36$) = $36 \times 16,000 = \$576,000$
 Revenue goes up by $\$36,000$ (i.e., $+6.67\%$) when price is increased by 20%

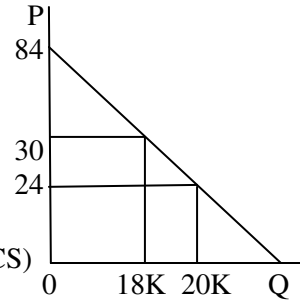
- (e) When demand is price inelastic, increase in price will increase total revenue.

(f) $P = \$30, Q_D = 18,000$
 $Q_D = 0, P = 28000 * 6 / 2000 = \84
 $CS(P=30) = 18000 * (84 - 30) / 2 = \$486,000$

$P = \$24, Q_D = 20,000$
 $CS(P=24) = 20000 * (84 - 24) / 2 = \$600,000$

Change in CS = $600,000 - 486,000 = \$114,000$ (an increase in CS)

Or, Change in CS = $(30 - 24)(18000 + 20000) / 2 = \$114,000$



5. (a) Price after the 10% drop = $12 * 0.9 = \$10.8$
 % change in Q_D when price drops by 10% = $(-1.5) * (-0.10) = +15\%$
 Q_D after the price decrease = $1.15 * 25000 = 28,750$
 Change in CS = $(12 - 10.8)(28750 + 25000) / 2 = \$32,250$ (an increase in CS)
- (b) Price after the 10% rise = $12 * 1.1 = \$13.2$
 % change in Q_D when price rises by 10% = $(-1.5) * (0.10) = -15\%$
 Q_D after the price increase = $0.85 * 25000 = 21,250$
 Change in CS = $(12 - 13.2)(25000 + 21250) / 2 = -\$27,750$ (a decrease in CS)