

Question 3 (Easy)

In June, KFC lowers the price of fried chicken from 50 Baht per piece to 30 Baht per piece. Then, KFC can sell more fried chicken from 600 pieces to 1,800 pieces and the sale of the drinks increases from 300 to 1,500 cups.

From the above information, answer the following questions

- Find "price elasticity" of demand for fried chicken with respect to price of fried chicken.
- Find "cross-price elasticity" of demand for the drinks with respect to price of fried chicken.
- Holding other things remain constant, if the fried chicken's price drops to be 25 Baht per piece, would the total revenue from selling fried chicken and drinks increase or not? Explain.

$$\begin{aligned} \text{a) } |\varepsilon_p^d| &= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \\ &= \frac{1800 - 600}{50 - 30} \times \frac{50}{600} \\ &= 5 \end{aligned}$$

$$\begin{aligned} \text{or } |\varepsilon_p^d| &= \frac{\frac{1800 - 600}{600}}{\frac{50 - 30}{50}} \\ &= \frac{2}{0.4} = 5 \end{aligned}$$

$$\begin{aligned} \text{b) } |\text{cross price elasticity}| &= \frac{\Delta Q_y}{\Delta P_x} \cdot \frac{P_x}{Q_y} \\ &= \frac{1200}{20} \times \frac{50}{300} \\ &= 60 \times \frac{50}{300} \\ &= 10 \end{aligned}$$

- c) In this case, both fried chicken and drinks are highly price elastic ($\varepsilon_p^d > 1$). Therefore % change in quantity > % change in price, meaning that if the price of fried chicken drops, the total revenue would increase.

Question 5 (moderate): The IS-LM model

Consider the following IS-LM model

$$C = 48 + 0.8Y^*$$

$$I = 98 - br^*$$

$$\frac{M_s}{P} = 250$$

$$L_d = 52 + 0.3Y^* - 150r^*$$

where

C = consumption

Y = income

I = investment

r = interest rate

$\frac{M_s}{P}$ = real money supply

L_d = real money demand

- Derive IS and LM equation. Graph the equations.
- Suppose that $b = 75$, find the equilibrium income (Y^*) and equilibrium interest rate (r^*)
- Now suppose instead that $b = 0$. Discuss the effectiveness of monetary policy.

d)

IS equation : $Y = 48 + 0.8Y + 98 - br$

$$Y = 146 + 0.8Y - br$$

$$0.2Y = 146 - br$$

$$0.2Y - 146 = -br$$

$$br = -0.2Y + 146$$

$$r = \frac{-0.2Y + 146}{b}$$

LM equation : $\frac{M_s}{P} = L_d$

$$250 = 52 + 0.3Y - 150r$$

$$198 - 0.3Y = -150r$$

$$\frac{198 - 0.3Y}{-150} = r$$

equilibrium Y : $\frac{-0.2Y + 146}{75} = \frac{198 - 0.3Y}{-150}$

$$\frac{-0.2Y + 146}{75} = -1.32 + 0.002Y$$

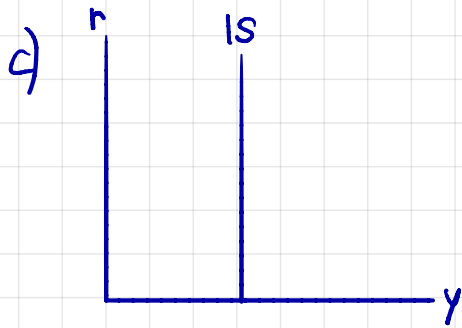
$$-0.2Y + 146 = 75(-1.32 + 0.002Y)$$

$$-0.2Y + 146 = -99 + 0.15Y$$

$$245 = 0.35Y$$

$$700 = Y$$

equilibrium r : $r = \frac{-0.2(700) + 146}{75} = 0.08$



If $b = 0$, the IS equation would be $r = \frac{-0.2Y + 146}{0}$.

From this equation, we see that the slope of IS would be undefined and hence the curve would appear vertical. Monetary policy does not have any impacts on the real GDP.

Question 6 (moderate): Consider the ice cream market in Bangkok. In July, the ice cream market demand and supply curves are given by the following equations where Q is the quantity of ice cream units and P is the price in dollars per unit of ice cream:

Demand: $Q = 14000 - 10P$

Supply: $Q = 2000 + 20P$

- Find the equilibrium price and quantity of ice cream in July.
- Calculate the price elasticity of demand and supply at the equilibrium price in July. Use the point elasticity formula to compute the values of these two elasticity.

Suppose that the city of Bangkok imposes on producers an excise tax of B 15 per unit of ice cream.

- Calculate the new equilibrium price and quantity in July for this ice cream market.

a)

$$\begin{aligned} \text{Demand} &= \text{Supply} \\ 14000 - 10P &= 2000 + 20P \\ 12000 &= 30P \\ 400 &= P \end{aligned}$$

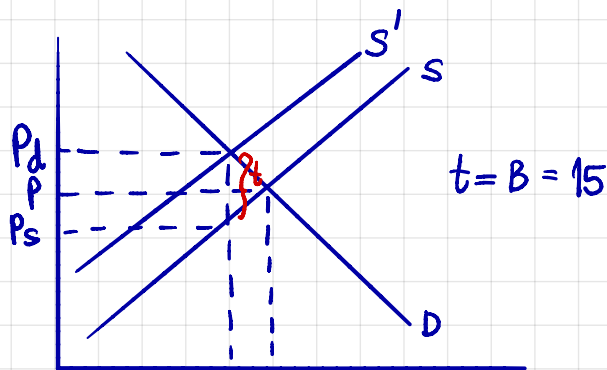
$$Q = 2000 + 20(400) = 10,000$$

b)

$$\begin{aligned} |\varepsilon_p^d| &= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \\ &\quad \swarrow \text{slope of demand equation} \\ &= |(-10) \times \frac{400}{10000}| \\ &= 0.4 \end{aligned}$$

$$\begin{aligned} |\varepsilon_p^s| &= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \\ &\quad \swarrow \text{slope of supply equation} \\ &= |20 \times \frac{400}{10000}| \\ &= 0.8 \end{aligned}$$

c)



$$P_d - P_s = t$$

$$P_d = P_s + t$$

Find new equilibrium:

$$14000 - 10(P_s + 15) = 2000 + 20P_s$$

$$14000 - 10P_s - 150 = 2000 + 20P_s$$

$$11850 = 30P_s$$

$$395 = P_s$$

$$P_{AT} = P_d = P_s + t = 395 + 15 = 410$$

$$Q = 14000 - 10(410) = 9900$$

Question 7 (moderate)

The demand and supply functions of a two-commodity model are as follows:

$$Q_{d1} = 18 - 3P_1 + P_2 \quad Q_{d2} = 12 + P_1 - 2P_2$$

$$Q_{s1} = -2 + 4P_1 \quad Q_{s2} = -2 + 3P_2$$

Find the equilibrium of the model.

$$Q_{d1} = Q_{s1}$$

$$18 - 3P_1 + P_2 = -2 + 4P_1$$

$$20 = 7P_1 - P_2 \quad \text{--- (1)}$$

$$20 + P_2 = 7P_1$$

$$P_2 = 7P_1 - 20$$

$$Q_{d2} = Q_{s2}$$

$$12 + P_1 - 2P_2 = -2 + 3P_2$$

$$14 = -P_1 + 5P_2 \quad \text{--- (2)}$$

$$\begin{array}{rcl} \textcircled{1} \times (-5) & -100 & = -35P_1 + 5P_2 \\ \textcircled{2} & 14 & = -P_1 + 5P_2 \\ \hline \textcircled{1} - \textcircled{2} & -114 & = -34P_1 \end{array}$$

$$P_1 = 3.35$$

$$P_2 = 7(3.35) - 20 = 3.45$$

$$Q_{d1} = Q_{s1} = -2 + 4(3.35) = 11.4$$

$$Q_{d2} = Q_{s2} = -2 + 3(3.45) = 8.35$$

Question 9 (HARD)

A study has shown that there are three groups of iPhone users, namely, *crazy*, *love-it*, and *just-live-with-it*. Demand for iPhone of each group can be given by:

crazy: $Q_c = 100 - P;$

Love-it: $P = 50 - Q_L;$

Just-live-with-it: $Q_j = 20 - P;$

where Q_c is the quantity demanded by crazy group, Q_L is quantity demanded by love-it group, and Q_j is the quantity demanded by just-live-with-it group.

- Find the domain set of prices that justifies the demand equation for each group of iPhone user. And, rewrite each demand function in a more appropriate way.
- At what domain set of prices, do all the three types of iPhone users stay active in the market?
- Find the function for market demand for iPhone. Be precise about what is needed to make your equation justified.

a) Crazy : $P < 100$
 Love it : $P < 50$
 Just live with it : $P < 20$

b) $P < 20$

c) $Q = 0 ; P \geq 100$
 $Q = 100 - P ; 50 \leq P < 100$
 $Q = (100 - P) + (50 - P) = 150 - 2P ; 20 \leq P < 50$
 $Q = (150 - 2P) + (20 - P) = 170 - 3P ; 0 \leq P < 20$

Now, suppose that market supply equation is given by

$$p = 4 + 3w + \frac{3}{8}Q.$$

- Find the equilibrium when $w = 1/3$ where w is wage rate for each unit of labor hired.
- How much does each type of consumer consume in the equilibrium?
- What is the likely effect on market equilibrium when wage drops? State your prediction and develop intuition for your result. (Note: Answer to this question could be made in qualitative sense. You don't need to get into algebraic solution with numbers solved.)

d) Market supply : $P = 4 + 3\left(\frac{1}{3}\right) + \frac{3}{8}Q$
 $= 5 + \frac{3}{8}Q$

The producer would supply iPhones at $P \geq 5 \rightarrow P = 5 + \frac{3}{8}(0) = 5$

$$P = 5 + \frac{3}{8}Q$$

$$(P - 5) \times \frac{8}{3} = Q$$

$$\frac{8P - 40}{3} = Q$$

Equilibrium :

$$\frac{8P}{3} - \frac{40}{3} = 170 - 3P$$

$$\frac{12P}{3} = \frac{550}{3}$$

$$P = 32.35$$

At $P = 32.35$, the 'just live with it' group would be unwilling to buy iPhones, hence market demand equation is $150 - 2P = Q$

$$150 - 2P = \frac{8P}{3} - \frac{40}{3}$$

$$\frac{490}{3} = \frac{14P}{3}$$

$$35 = P$$

$$Q = 150 - 2(35) = 80$$

e)

Crazy :	$Q_C = 100 - 35 = 65$
Love it :	$Q_L = 50 - 35 = 15$
Just live with it :	$Q_J = 0$

f) A drop in wage would increase the producer's supply. Thus it is likely that more output would be produced.

Price support V.S. Price guarantee

a. Suppose that the supply and demand for rice are given by the following equations where Q is the quantity in units of rice and P is the price per unit of rice:

Supply of rice: $Q = \frac{1}{2}P - 3$

Demand for rice: $Q = 27 - \frac{1}{3}P$

What are the equilibrium price and quantity in the rice market without government intervention? Illustrate your answer with a well labeled graph.

b. The government tries to raise rice prices using a *price support program*. It sets the price at \$54 per unit of rice, and *commits to buy any leftover rice*. Given this program, how much rice do consumers buy? How much rice does the government buy? What is the cost of the program to the government?

c. Now, suppose the government still wants to keep the price of rice at \$54 per unit of rice, but instead of implementing a price support program the government decides to enact a price guarantee program that will *subsidize* the rice producers. Under this scenario, how much rice will consumers buy? What is the cost of the

program to the government? Illustrate your answer with a well labeled graph.

d. Given the market and the programs described in this problem answer the following questions and provide a rationale for your answer to each question. Which program will the consumers prefer? Which program will the producers prefer? Which program will the government prefer?

e. Could you think of any reason for the government to prefer the price guarantee program?

a)

$$\begin{aligned}\frac{1}{2}P - 3 &= 27 - \frac{1}{3}P \\ \frac{5}{6}P &= 30 \\ P &= 36 \\ Q &= \frac{1}{2}(36) - 3 = 15\end{aligned}$$

b)

$$\begin{aligned}Q_d &= 27 - \frac{1}{3}(54) \\ &= 9\end{aligned}$$

At \$54, consumers would buy 9 units of rice

$$\begin{aligned}Q_s &= \frac{1}{2}(54) - 3 \\ &= 24\end{aligned}$$

Meanwhile, producers would be willing to supply 24 units

Therefore, the total leftover would be $24 - 9 = 15$ units of rice in which they have to pay $\$54 \times 15 = \810

c) Under a price guarantee program, producers receive \$54 per unit of rice and produce 24 units.

For consumers to buy 24 units of rice, the price has to be set at:

$$\begin{aligned}Q &= 27 - \frac{1}{3}P \\ 24 &= 27 - \frac{1}{3}P \\ 3 &= \frac{1}{3}P \\ 9 &= P\end{aligned}$$

Therefore, for each unit of rice, the government must pay a subsidy of $\$54 - \$9 = \$45$ per unit.

Altogether 24 units of rice are produced and sold, hence the program costs $\$45 \times 24 = \1080

- d)
- Consumers would prefer the price guarantee program because they can purchase rice at \$9 per unit.
 - The producers would be indifferent between the 2 programs because in both programs, they receive the price per unit of \$54 and are able to sell 24 units
 - The government would prefer the price support program because it costs less
- e) Under the price support program, the government would have to pay for storage cost for the leftover rice.