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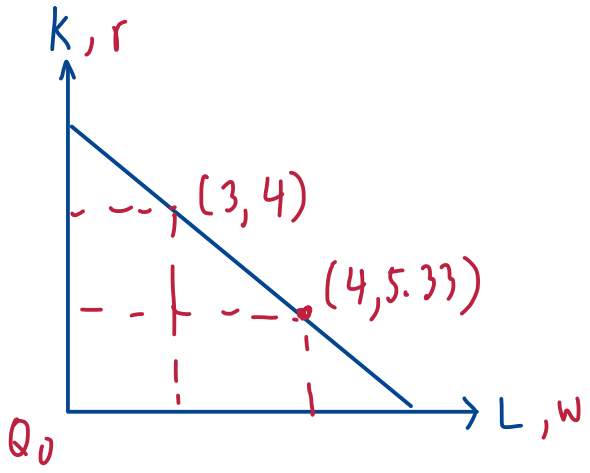
1. Consider a long-run production in which there are only two inputs labor and capital, and the input prices for labor and capital are wage (w) and interest rate (r), respectively. Suppose that at the equilibrium levels of labor and capital (L^*, K^*), the marginal product of labor (MP_L) and marginal product of capital (MP_K) are 6 and 8, respectively.

1.a) Calculate the marginal rate of technical substitution (MRTS), and state the cost-minimization conditions of this firm, given that the required output is fixed at Q_0. If the market wage rate (w) is \$3, what is the interest rate at the equilibrium?

$$\frac{MP_L}{w} = \frac{MP_K}{r} \Rightarrow \frac{MP_L}{MP_K} = \frac{w}{r}$$

$$\frac{6}{3} = \frac{8}{r} \; ; \; \therefore r = 4$$

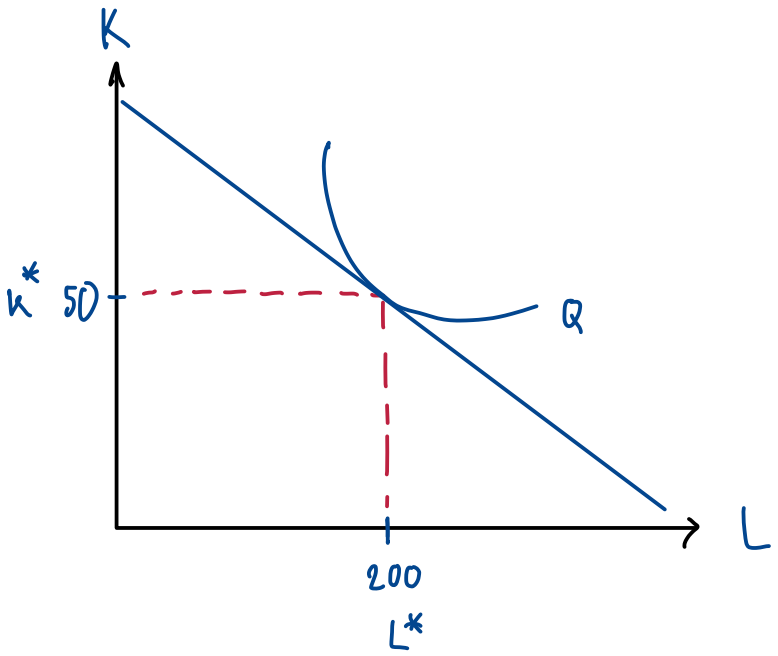
1.b) Suppose now that the wage rate (w) increases to \$4, *ceteris paribus* (อย่างอื่นไม่เปลี่ยน). Draw a diagram to illustrate the changes in the cost-minimizing combination of inputs.



$$\frac{6}{4} = \frac{8}{5.33}$$

2. Suppose that in the long-run production of wine, a firm uses two inputs: workers (L) and machines (K). At the required output of 3,000 bottles of wine, the firm's least-cost input combination is 200 units of L and 50 units of K, and the per-unit input prices for L and K are \$10 and \$20, respectively. Suppose further that at this least-cost combination of inputs, the marginal product of the 50th machine (MP_K) is 8 bottles of wine.

2.a) Draw a diagram to illustrate this firm's cost-minimization decision, where L is on the x-axis and K is on the y-axis. Also, explain the firm's cost-minimization conditions.



2.b) At the equilibrium in part a., what is the marginal product (MP_L) of the 200th workers?

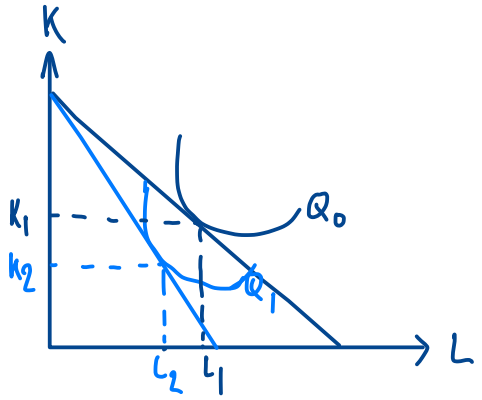
$$MRTS = \frac{w}{r}$$

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

$$\frac{MP_L}{8} = \frac{10}{20}$$

$$MP_L = 4$$

2.c) Suppose that the input price for *L* increases to $15 per unit, while the input price for *K* and the required amount of output are the same. Draw another diagram to illustrate the change in the least-cost input combination.



W ↑ → L ↓

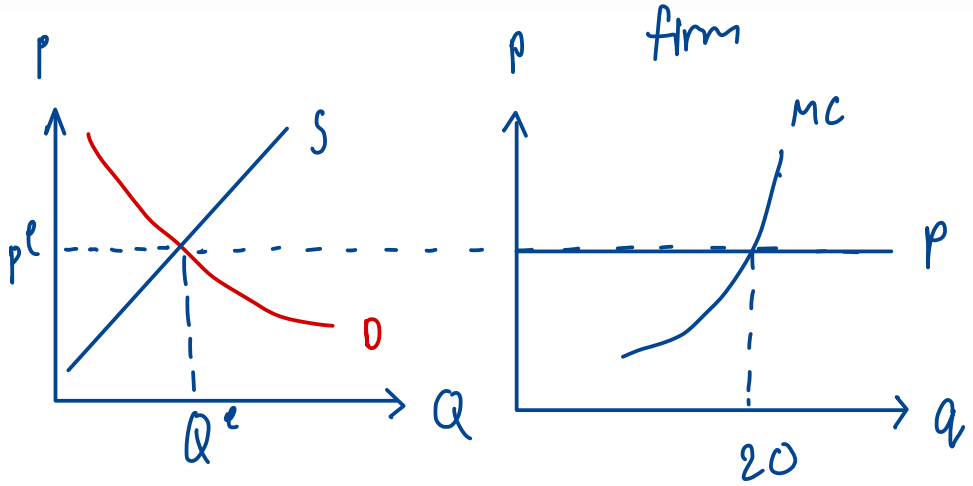
2.d) Explain the difference between short-run and long-run production.

Short run of production has at least one fixed factor utilized when it assumed to be constant.

In long run, a firm can adjust the amount of all factors of production

3. Consider a perfectly competitive market, in which the current equilibrium price is 150 baht per unit.

3.a) Suppose that a firm in this market sells 20 units of its output. State the profit-maximizing condition of this firm, and draw a diagram to illustrate how the equilibrium quantity is determined.



3.b) At this equilibrium quantity of 20 units, suppose that the firm's average total cost is 180 baht, and its average fixed cost is 60 baht. Calculate this firm's average variable cost, total revenue, total cost, and profit.

ATC = 180

AFC = 60

AVC = 180 - 60 = 120

TR = p.q = 150 · 20 = 3000

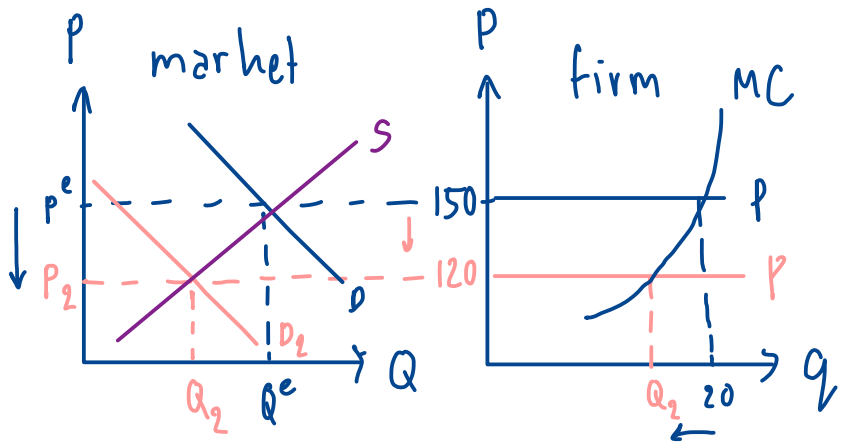
TC = AC · q = 180 · 20 = 3600

Profit = TR - TC = 3000 - 3600 = -600

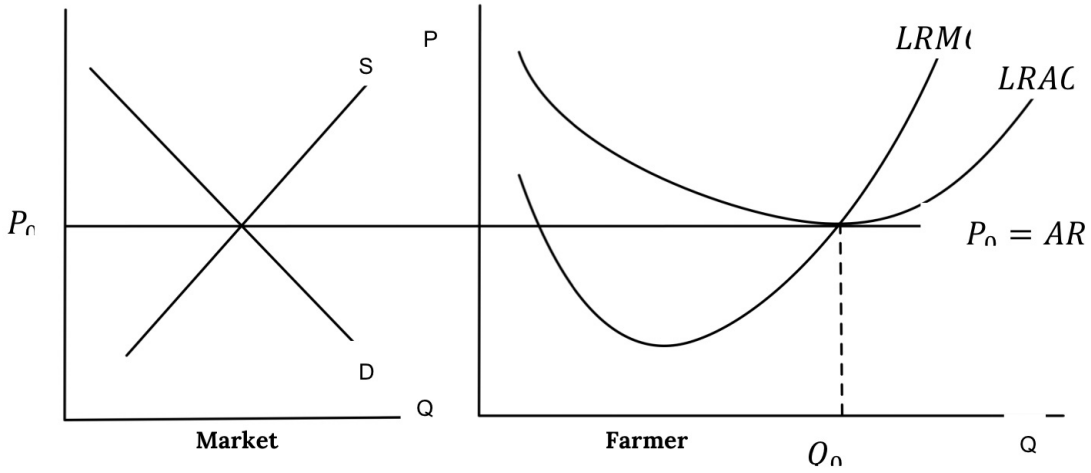
3.c) From part b., should this firm stay in the market in the short run? Justify your answer.

Yes, because P > AVC so that firm should still stay in the market.

3.d) Suppose now that the market demand decreases, and the market price decreases to 120 baht per unit. Draw two diagrams to illustrate: (i) the change in the equilibrium price and quantity in the market, (ii) how the change in the market price affects the firm equilibrium quantity and profit. Would your answer from part c. change?



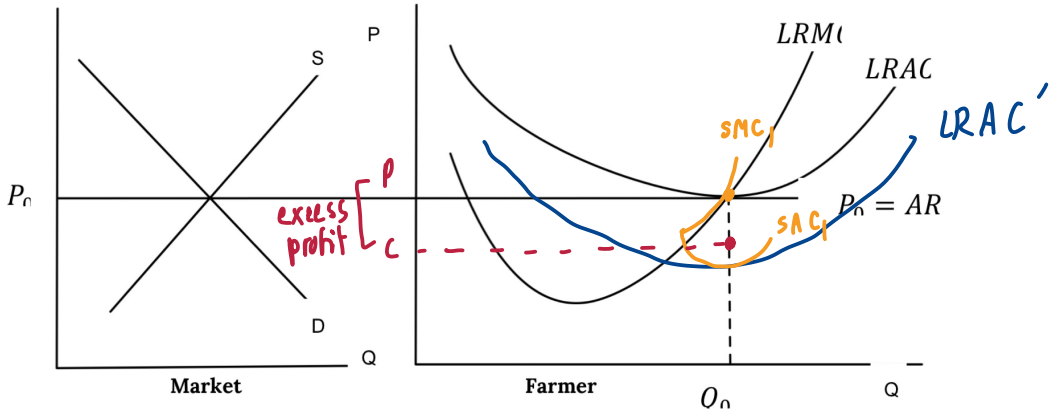
4. A Thai rice farmer is in a long run equilibrium in a perfect competition and produces at the quantity Q_0 as shown in the graph below.



4.a) The government grants a lump sum subsidy to every farmer. How will this change the LRAC? Explain why LRMC does not change.

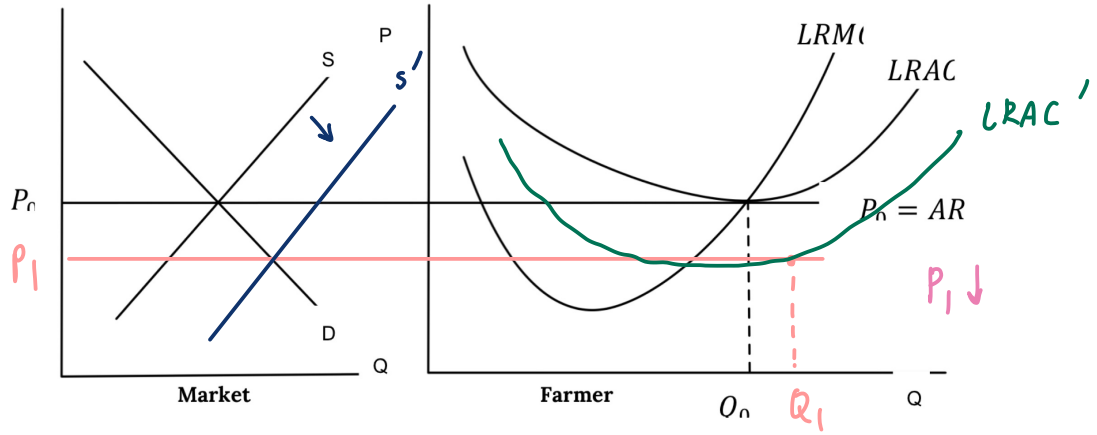
subsidy will decrease TC, so this make LRAS drops.
Because farmer is a price taker in the perfect competition, the competitive price and q^* remain constant. So, LRMC has no chance as there is no change in q.

4.b) No, since the profit maxzimization is when P: LRMC. Here both P and LRMC do not change, the optimal quantity to maximize profit will be the same (Q_0)



p > c their is excess profit

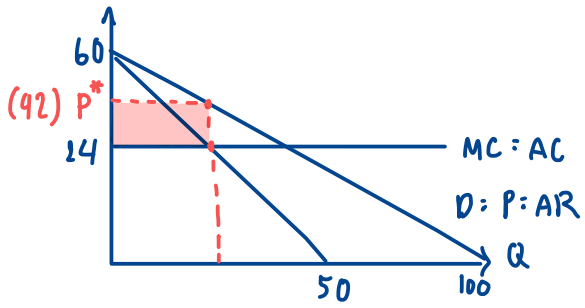
4.C) In long run, excess profit will attract new farmers to market, so supply increase.



when $s \uparrow \rightarrow p \downarrow \rightarrow q^* \uparrow$

5.a) when D is linear, MR is 2 times steeper

→ MR : P = 60 − 1.2Q



5.b). Profit - Maximizing Condition

MR = MC

60 − 1.2Q = 24

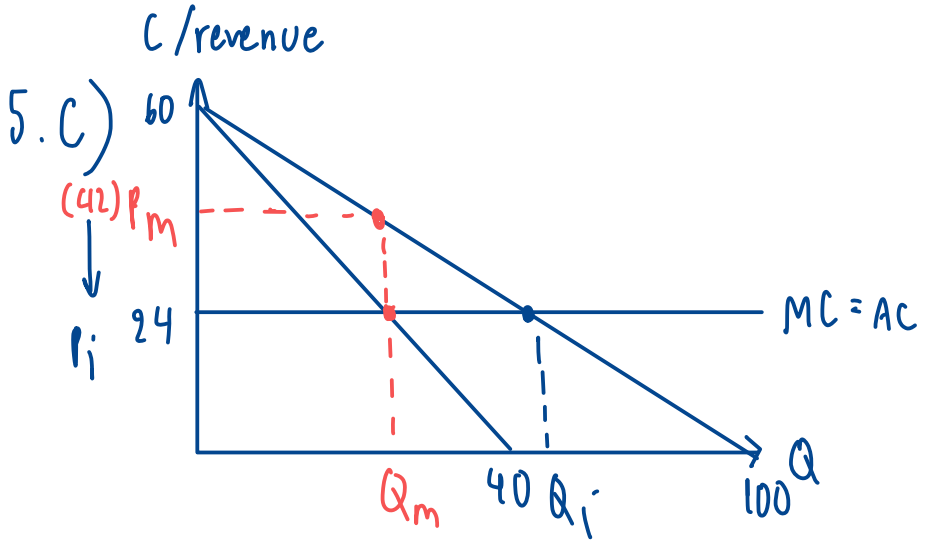
Q^* = 30 units #

P = 60 − 0.6(30) = 42

∴ Profit (π) = (P − C) · Q = (42 − 24) · 30

= 540 MB #

5.C)



- Ideal Price : P = MC
- Quantity ↑ from $Q_m \rightarrow Q_1$

- Before intervention

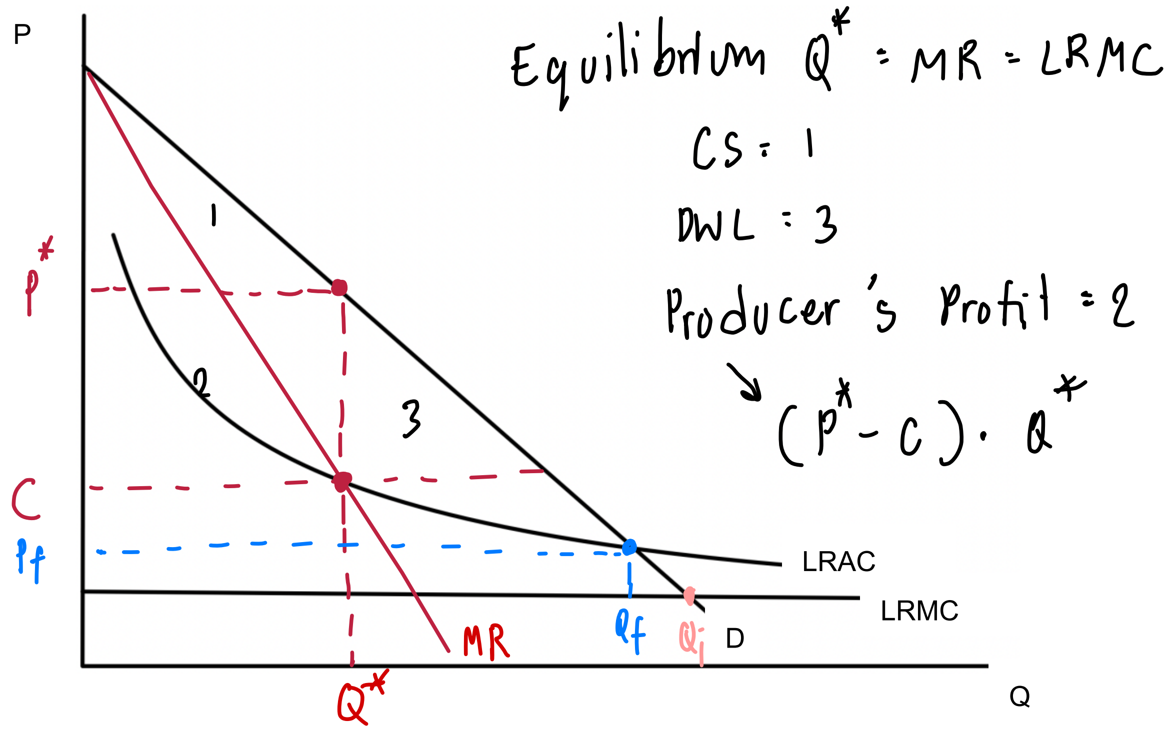
CS : 1 PS : 2 (π) DWL : 3

- After Intervention

CS : 1+2+3 PS : − DWL : −

∴ Intervention present HL from taking the advantages from consumer and removes the DWL.

6. The producer of the upcoming vaccine for COVID-19 is a monopoly who wants to price their vaccine to maximize profit. The cost of producing the vaccine is mostly fixed cost involving the research so that the Long Run Average Cost (LRAC) keeps declining the more vaccine is produced. The Long Run Marginal Cost (LRMC) is a small constant cost at all production level.



6.a) If the demand of vaccine is downward sloping as usual, show the equilibrium price and quantity that will maximize the profit. State the equilibrium conditions. Identify the profit and the deadweight loss to the society.

6.b) Assumed that monopoly price is $50 per dose, marginal cost $10, calculate the Lerner's index of monopoly power.

6.c) Determine the Ideal Price? Will the monopoly earn any profit at this Ideal Price? Explain.

6.d) Determine the Fair Price? Is there still deadweight loss at this Fair Price? Explain.

b. lerner's index → $i = \frac{P - MC}{P} \Rightarrow \frac{50 - 10}{50} = 0.8$ #

c. Ideal Price → P = MC ⇒ \$10 # (at Pi, Firm face loss bc P < LRAC)

d. Fair Price → P = LRAC # (at Pf, no DWL bc firm is at normal profit)