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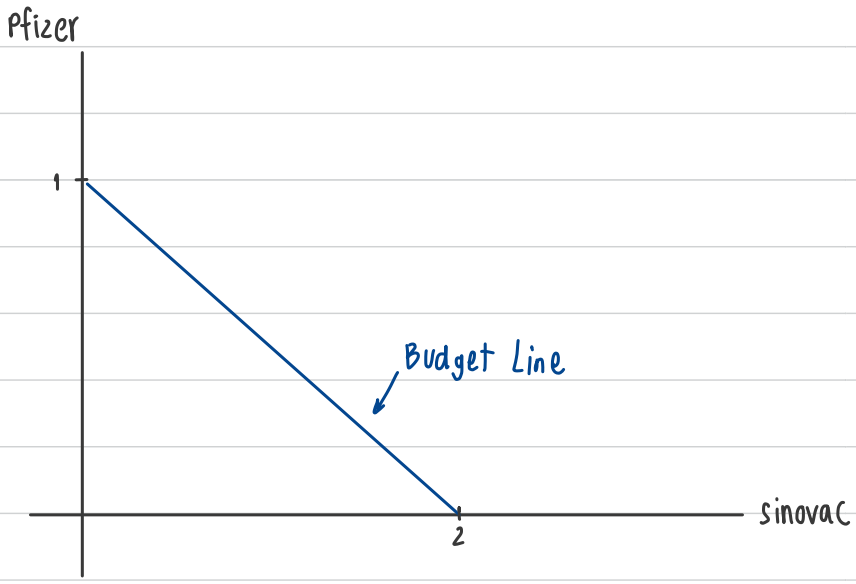
1. Two COVID-19 vaccines are available in Thailand, Sinovac and Pfizer priced at $20 and $40 respectively. Assumed that both vaccines are substitutes, answer the following questions clearly.

1.a) Draw a budget line for these two when a consumer has $40 and indicate all the essential information on the graph, given that Sinovac is displayed on the horizontal axis while Pfizer is on the vertical axis.

x-axis y-axis

Sinovac (x-axis) and Pfizer (y-axis)



Budget line = $M = P_1X_1 + P_2X_2$

Pfizer cost $40

Sinovac cost $20

then, find price per unit of Pfizer and Sinovac

- Focus only Pfizer → $40 = 40P$

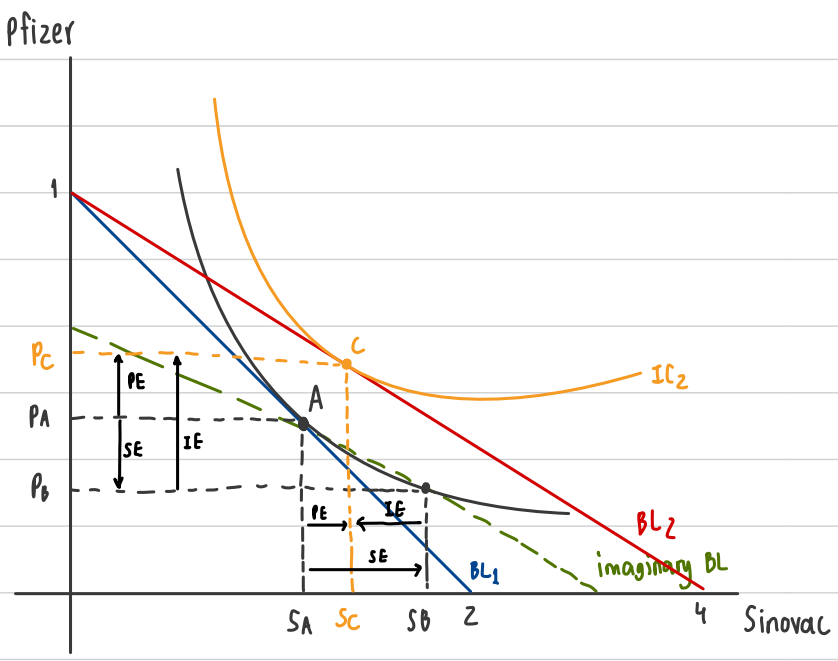
  $1 = P$

- Focus only Sinovac → $40 = 20P$

  $2 = P$

∴ Pfizer and Sinovac can't be perfect substitution. So, IC will be convex shape.

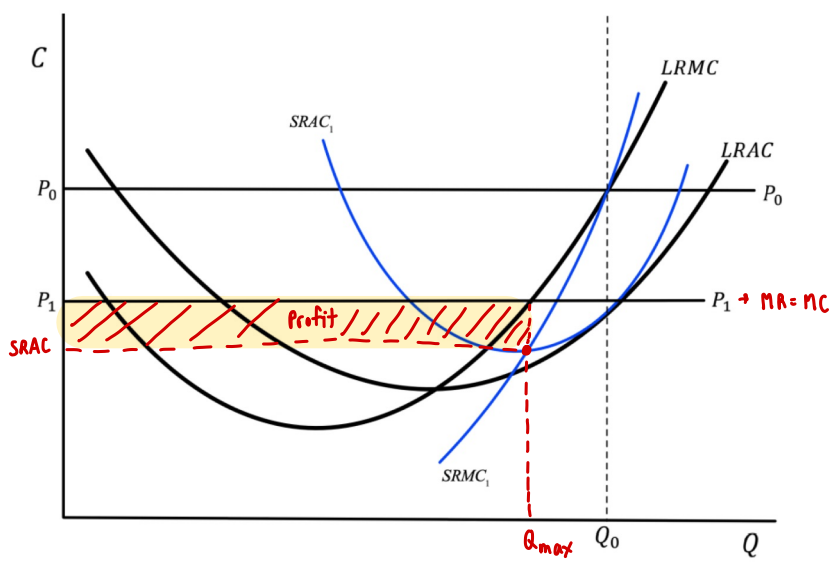
1.b) If a consumer sees that Sinovac is an inferior good while Pfizer is a normal good and Sinovac price is slashed by a half, analyze how consumer's equilibrium changes disaggregating price effect into substitution effect and income effect and explain.



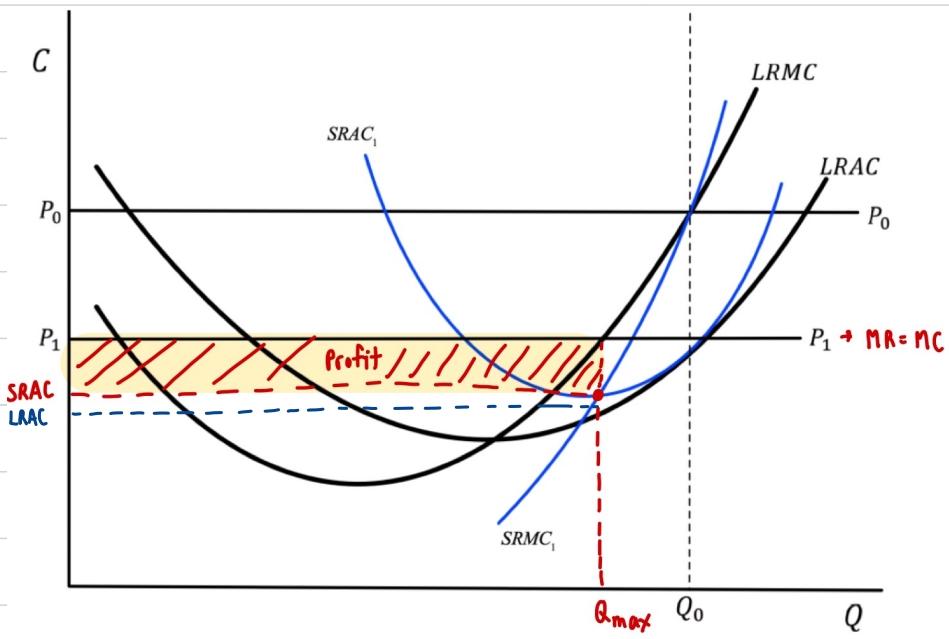
In parts of differents types of goods, Sinovac will be inferior goods and Pfizer would be normal goods.

When we focus on y-axis (Pfizer), P_A to P_C is price effect, P_A to P_B is substitution effects, and P_B to P_C is income effect. On the other hand, if we focus on x-axis (Sinovac), firstly S_A to S_C is price effect. Secondly, S_B to S_C is income effect. Lastly, S_A to S_B is substitution effect.

2.a) If the market equilibrium price decreases to P_1, in the short run according to the given Short-Run cost curves $SRAC_1$ and $SRMC_1$, find the new Short-Run equilibrium quantity Q_1 and profit of the firm. State the equilibrium conditions.



2.b) Show that at the new Short-Run equilibrium quantity Q_1, the profit earned according to the Long-Run cost curves $LRAC$ at Q_1 and price P_1 is higher than the profit in Short-Run found in 2.a).

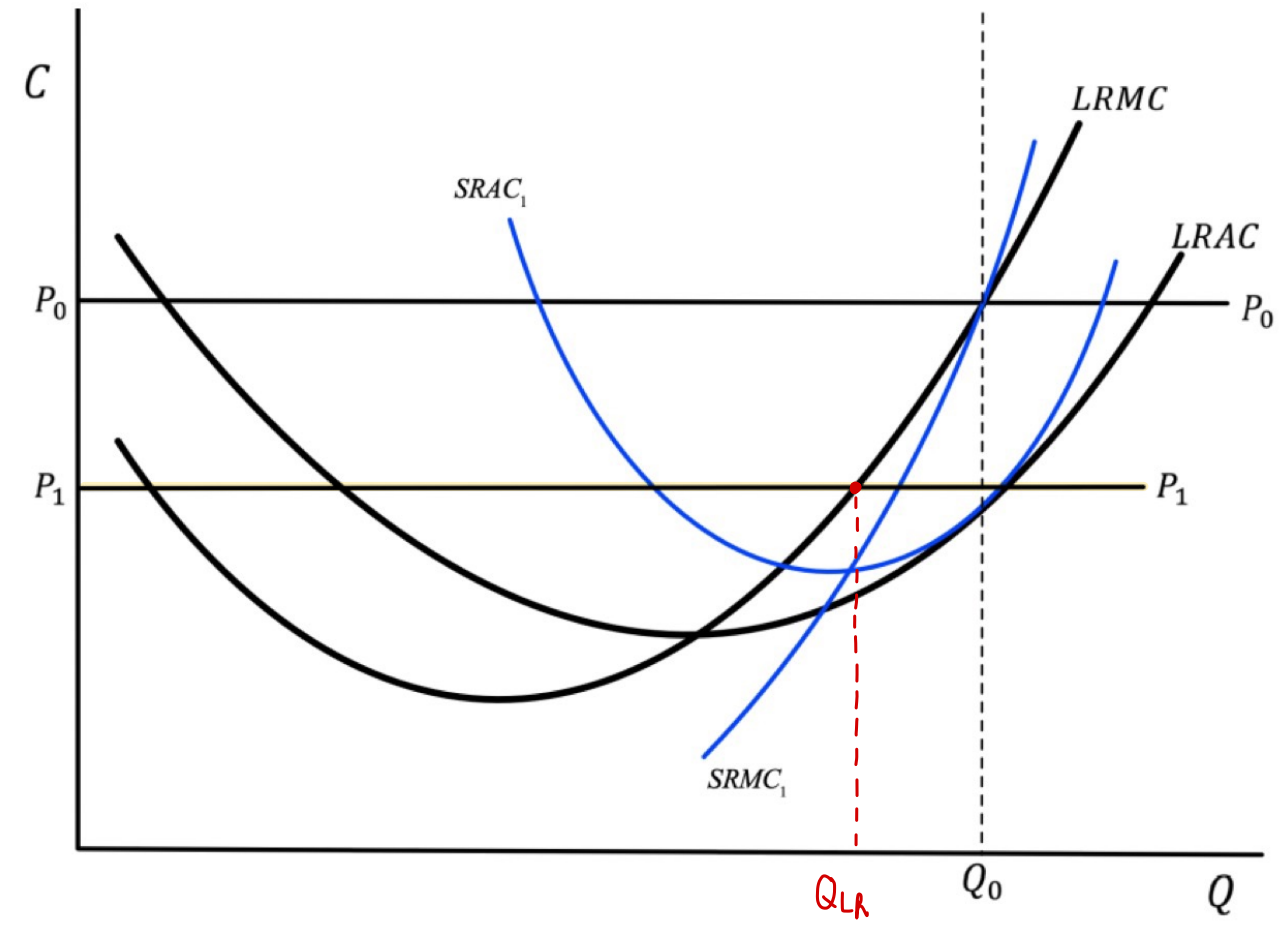


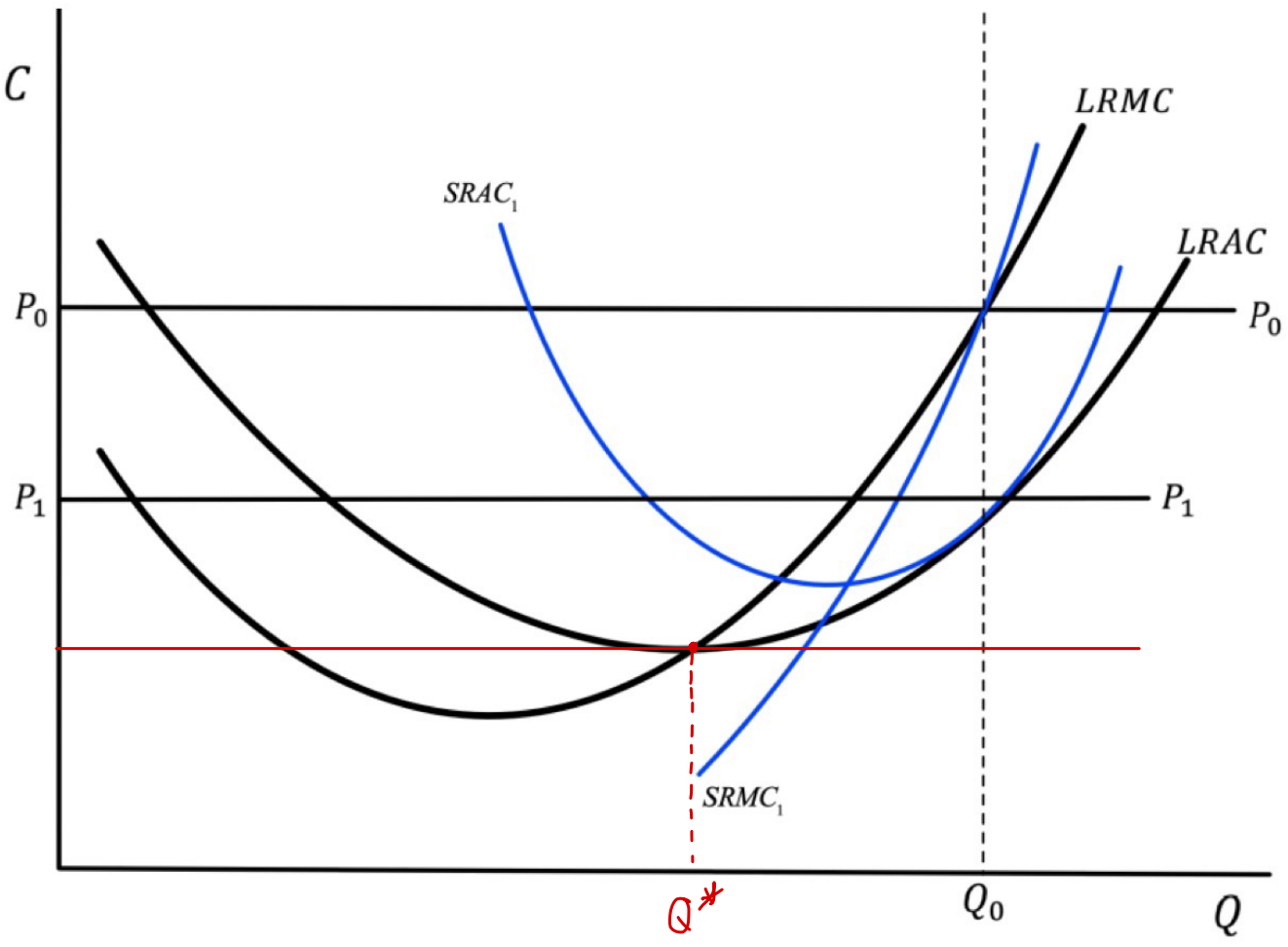
$\pi_{SR} = (P_1 - SRAC) \times Q_1$

$\pi_{LR} = (P_1 - LRAC) \times Q_1$

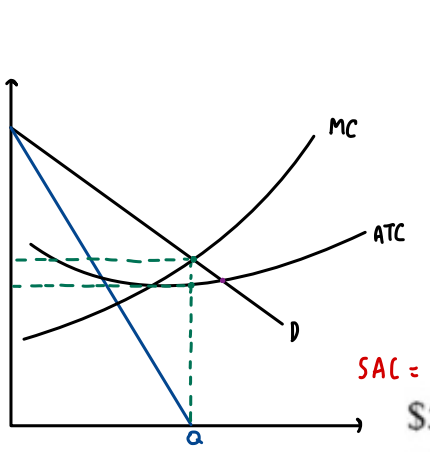
$\therefore \pi_{LR} > \pi_{SR}$

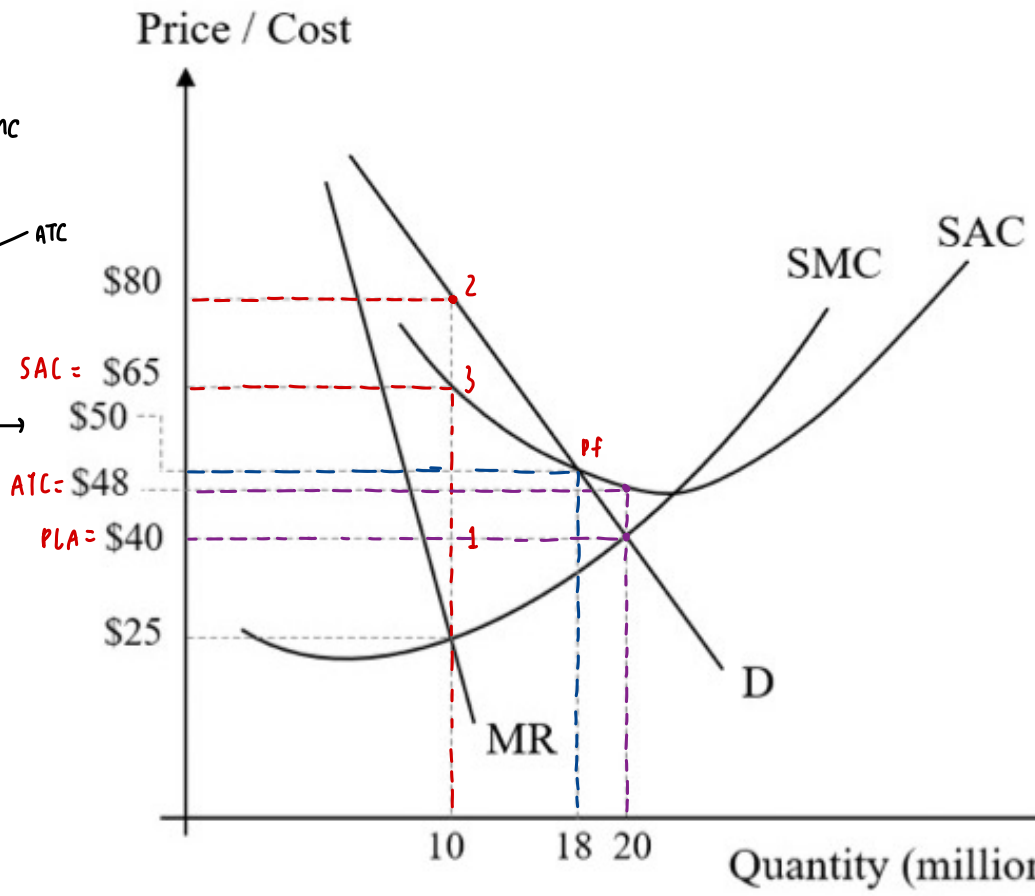
2.c) According to the Long-Run cost curves $LRAC$ and $LRMC$, find the equilibrium quantity the firm wants to produce at the new lower price P_1, when there is no new seller entering the market. State the equilibrium conditions.





3. Thai government decides to import vaccines from J&J through the Government Pharmaceutical Organization (GPO). Supposed that GPO can act as a private monopoly firm, demand, revenue and cost of importing are displayed in the following graph in USD. Note that a single dose of J&J vaccine is sufficient to immunize COVID-19. Answer the following questions clearly.





3.a) If GPO wants to maximize profit, how many million doses should they import and at which price can be sold for each dose?

Q^*_m = 10 million doses

P^*_m = 80 $per dose

3.b) According to 3.a), how much is the total profit that GPO receives in million USD?

π = (80-65)×10 = $150 million

3.c) If the government decides to intervene and set a fair price, how many million doses GPO needs to import and how much the price to be set?

Q^*_m = 18 million doses

P^*_f = $50 per dose

3.d) To achieve herd immunity with a new strategy, the target number of people privately vaccinated is 20 million people. How much **for a dose** that each person pays for the vaccine and how much does the government should subsidize **in total**?

Price = 40

Average cost = 48

Lose = 48-40 = $8 / 1 unit

Loss = 8×20 = 160

Subsidy = 160