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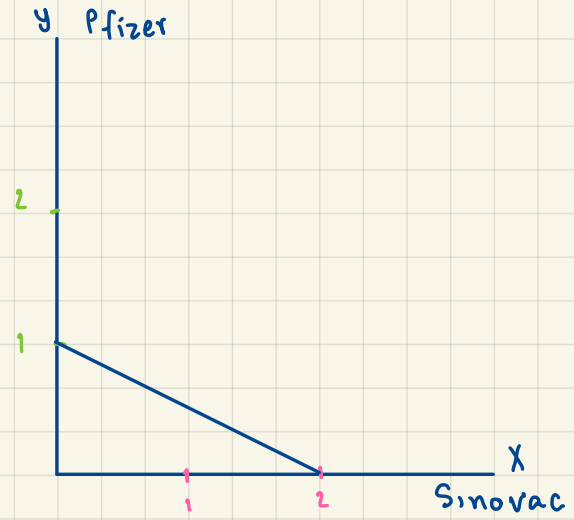
1. Two COVID-19 vaccines are available in Thailand, Sinovac and Pfizer priced at $20 and $40 respectively. Assumed that both vaccines are substitutes, answer the following questions clearly.

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.



Budget Constraint

$I = P_x X + P_y y$

$40 = 20x + 40y$

$40 = 20(0) + 40y$ $\quad 40 = 20(0) + 40y$

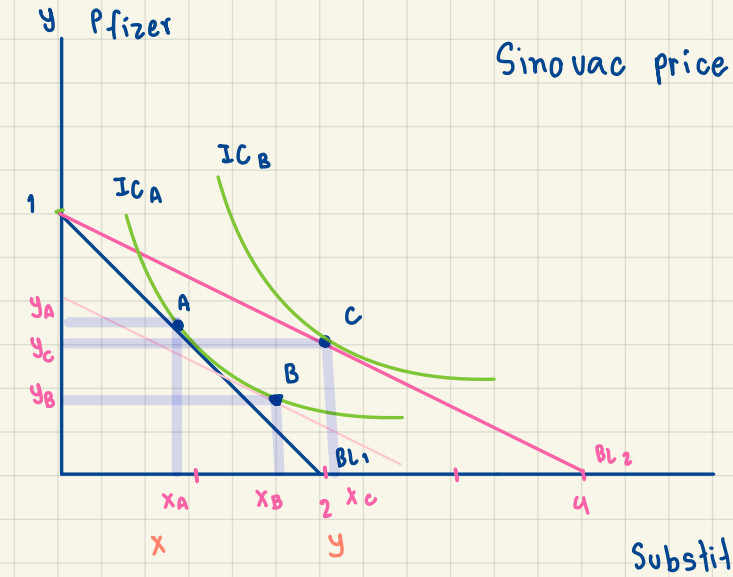
$\frac{40}{20} = x$ $\quad \frac{40}{40} = y$

$2 = x$ $\quad 1 = y$

$0 = y$ $\quad 0 = x$

If we have 40, We can consume 2 sinovac, 0 pfizer or consume 1 pfizer 0 sinovac

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.



Sinovac price is slashed by a half = $\frac{20}{2} = 10$

$40 = 10x + 40(0)$

$\frac{40}{10} = x$

$4 = x$ $\quad 0 = y$

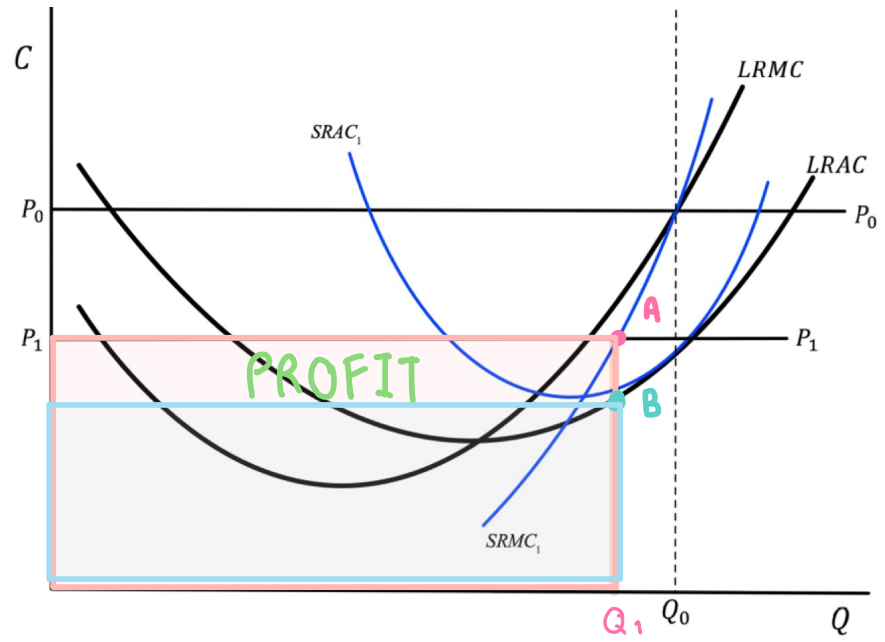
SE	$x_A \to x_B$ (+)	$y_A \to y_B$ (-)
IE	$x_B \to x_C$ (+)	$y_B \to y_C$ (+)
PE	$x_A \to x_C$ (+)	$y_A \to y_C$ (-)

Substitution effect (SE) the amount of sinovac increase ($x_A \to x_B$) it is positive because people substitutes x for y, for pfizer ($y_A \to y_B$) negitive

Income effect (IE) both of pfizer and sinovac increase when our income increase $x_B \to x_C$, $y_B \to y_C$, Overall price effect $x_A \overset{\oplus}{\to} x_C$, $y_A \overset{\ominus}{\to} y_C$

When sinovac price decrease it affect both of sinovac and pfizer. Sinovac people consume more from SE and IE. The amount of pfizer go down due to the price of sinovac go down

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.



Perfect competitive ; P = MC

$P_1 = SRMC_1$

Profit · $\pi = TR - TC$

$= P_1 \cdot Q_1 - SRAC_1 \cdot Q_1$

$= Q_1 (P_1 - SRAC_1)$

The equilibrium of P is P_1 , Q is Q_1 , MC is P

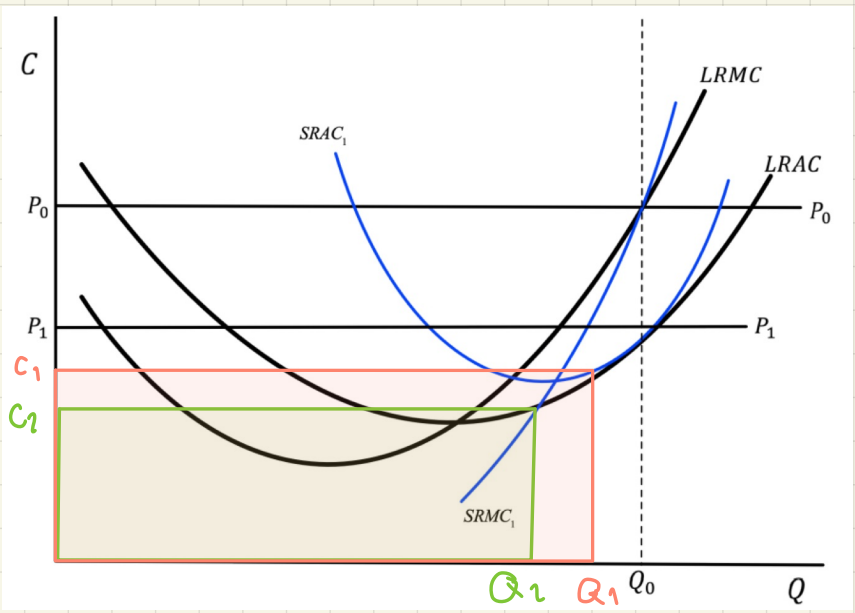
2.b) Show that at the new Short-Run equilibrium quantity Q_1, the profit earned according to the Long-Run cost curves $LRAC$ at Q_1 and price P_1 is higher than the profit in Short-Run found in 2.a).

$(P_1 - SRAC_1) - (P_1 - LRAC)$

$= P_1 (LRAC - SRAC)$

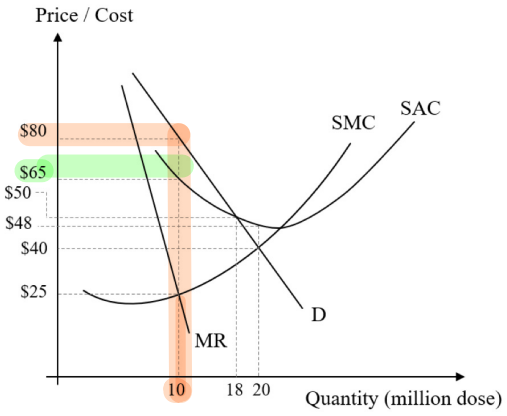
long-run cost curves LRAC at Q_1 and P_1 is higher than the profit in Shortrun , we can see from LRAC line is below SRAC and it has gap exist if give more time , it will be better

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.



decrease Q_1 to Q_2 and MC_1 to MC_2 so the total cost will decrease due to the maginal is decrease and we can see from the green box is smaller than pink box it mean short run start to become longrun

The market is not efficient, if they want to be efficient. They need to move to intersect point of LRMC & LRAC but it excess profit.



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?

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

3a. Max profit : MR = MC

they should import 10 doses

The price is 80 $

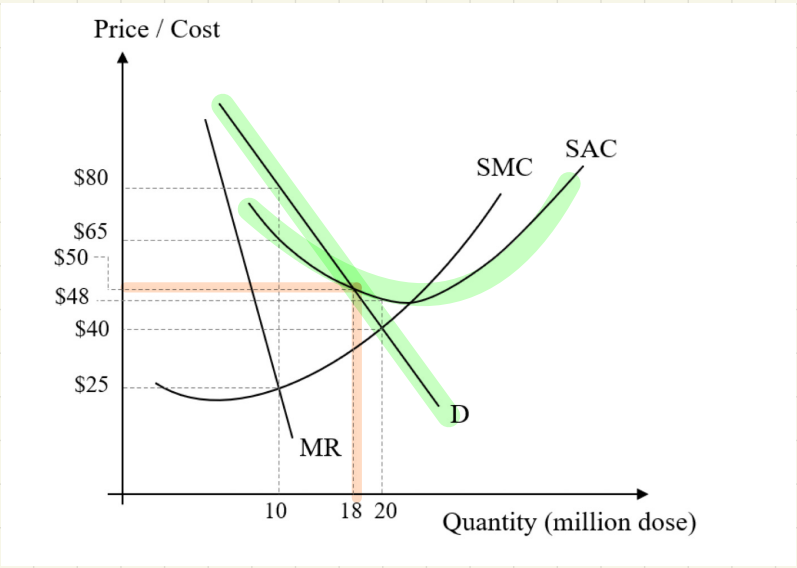
3 b. Profit : $\pi = TR - TC$

$= 80 \cdot 10 - 65 \cdot 10$

$= 800 - 650$

$= 150$

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?



Fair price : $\pi = 0$

$TR - TC = 0$

$\frac{TR}{Q} = \frac{TC}{Q}$

$AR = AC$

$D = SAC$

import 18 / price 50 $

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**?

$\pi = TR - TC$

$= Q(AR - AC)$

$= Q(40 - 80)$

$= -8Q$

the firm loss 8 $

If the firm want to set profit is 0

$0 = -8Q + R$

$R = 8Q$

Goverment should subsidize

8 x 20 million = 160 million

each person need to pay 40 $