

HW#11, Due May 6, 2021 Analyze the case the firm receives subsidy for the following two different cases to find out how the firm's quantity and profit change.

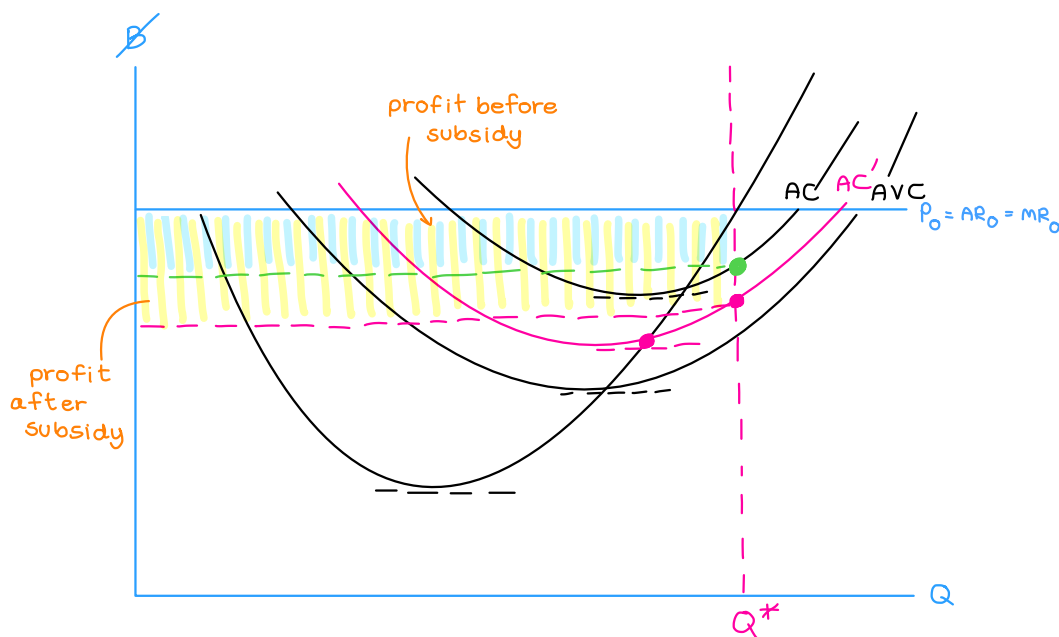
- The government gives a lump sum subsidy of 20,000 bahts to each firm.
- Suppose that the firm was producing 1,000 units and the government gives a subsidy of 20 bahts/unit so the total subsidy is also 20,000 bahts if the firm does not change its production of 1,000 units. Do you think, to maximize its profit with the subsidy of 20 bahts/unit, the firm will increase/decrease its production from 1,000 units? Does the firm receive higher profit? Does the firm receive more/less subsidy than 20,000 bahts?

a) The firm receives a lump sum subsidy of 20,000 baht.

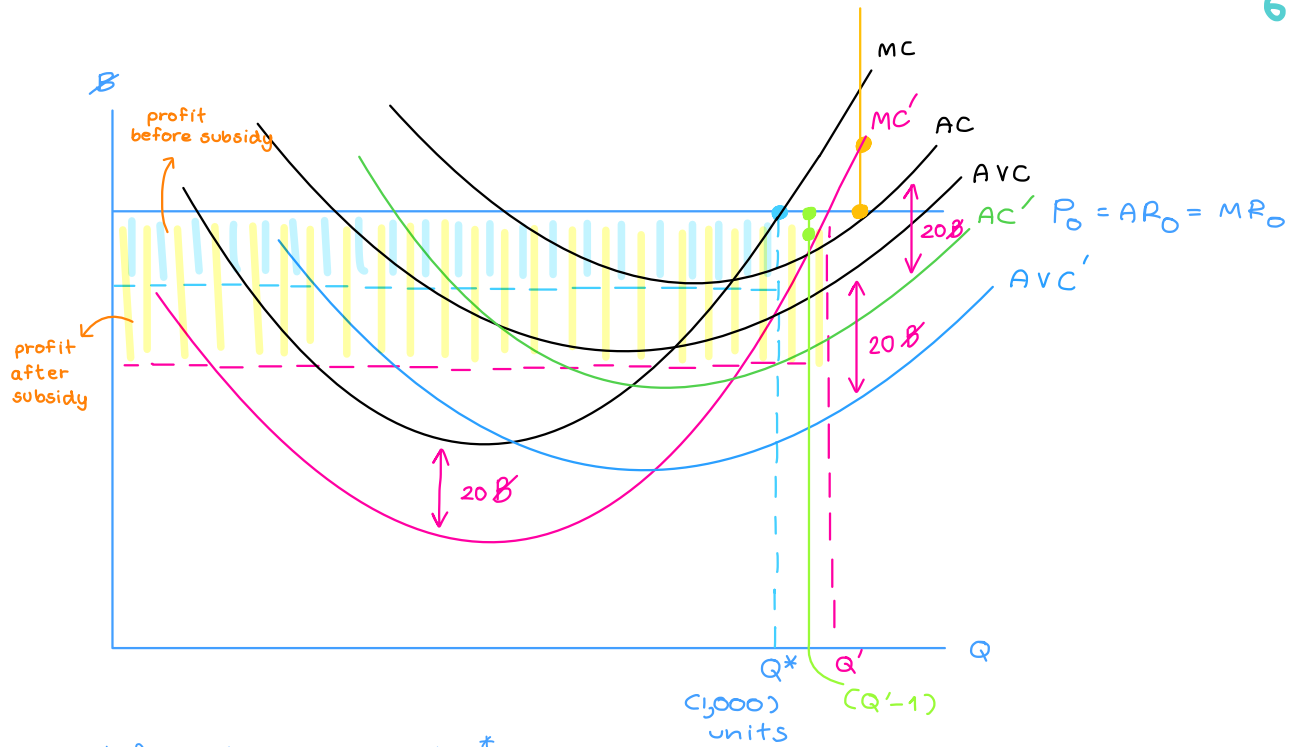
The means the TFC decreases.

$$\begin{aligned}
 TC(Q) &= TFC(Q) + TVC(Q) \\
 \frac{d}{dQ} TC'(Q) &= TFC'(Q) + TVC'(Q) \\
 &= \frac{d}{dQ} (TFC(Q) - 20,000 + TVC(Q)) \\
 \frac{TFC'(Q)}{Q} &= \frac{TFC(Q)}{Q} - \frac{20,000}{Q} \\
 AFC'(Q) &= AFC(Q) - \frac{20,000}{Q}
 \end{aligned}$$

unchanged = MC unchanged
because $MC(Q) = \frac{d}{dQ} TVC(Q)$



∴ Eq. quantity Q^* does not change because
MC & MR do not
- Q^* still satisfies the eq. conditions
but profit increases
= the amount of lower fixed cost
= 20,000

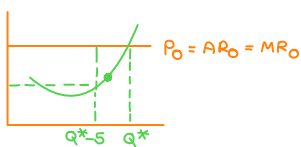


before subsidy : Eq. is at Q^*
 where 1) $MR(Q^*) = MC(Q^*)$
 2) slope $MR(Q^*) = 0 < \text{slope } MC(Q^*)$

after subsidy : Eq. is at Q'
 where 1) $MR(Q') = MC(Q')$
 2) slope $MR(Q') = 0 < \text{slope } MC(Q')$

$$\begin{aligned} TC(Q) &= TFC(Q) + TVC(Q) \\ TC'(Q) &= TFC(Q) + TVC'(Q) \\ &= TFC(Q) + TVC(Q) - 20Q \\ AVC'(Q) &= AVC(Q) - 20 \\ AC'(Q) &= AFC(Q) + AVC(Q) - 20 = AC(Q) - 20 \\ MC'(Q) &= MC(Q) - 20 \end{aligned}$$

$\therefore$ To maximize its profit, the firm will increase its production to $Q' (> 1,000 \text{ units})$ and gain higher profit. The firm will also receive subsidy more than 20,000 baht according to the quantity it produces. However, if the firm produces more than Q' the cost will be higher and gain less revenue.



$MR > MC$ เมื่อ $Q < Q^*$
 $MR < MC$ เมื่อ $Q > Q^*$
 $MR = MC$ เมื่อ $Q = Q^*$
 II: slope $MR < \text{slope } MC$

	MR	MC	Marginal profit	
$Q^* - 5$	10	6	4	Total profit
$Q^* - 4$	10	7	3	
$Q^* - 3$	10	8	2	
$Q^* - 2$	10	9	1	
$Q^* - 1$	10	9.5	0.5	
Q^*	10	10	0	(เมื่อ profit สูงสุด)