

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 bath

This means the TFC decreases.

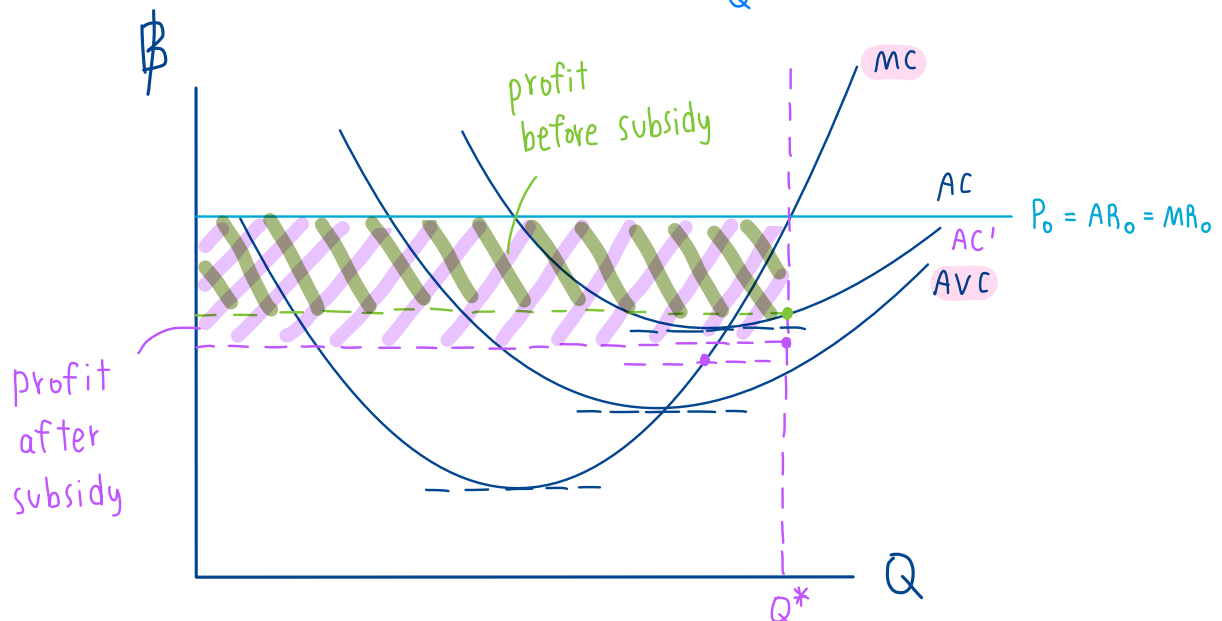
$$TC(Q) = TFC(Q) + TVC(Q)$$

$$TC'(Q) = TFC'(Q) + \text{MC}(Q) \quad \text{MC unchanged because}$$

$$\frac{d}{dQ} TC'(Q) = \frac{d}{dQ} [TFC'(Q) - 20,000 + TVC(Q)] \quad MC(Q) = \frac{d}{dQ} TVC(Q)$$

$$\frac{TFC'(Q)}{Q} = \frac{TFC(Q)}{Q} - \frac{20,000}{Q}$$

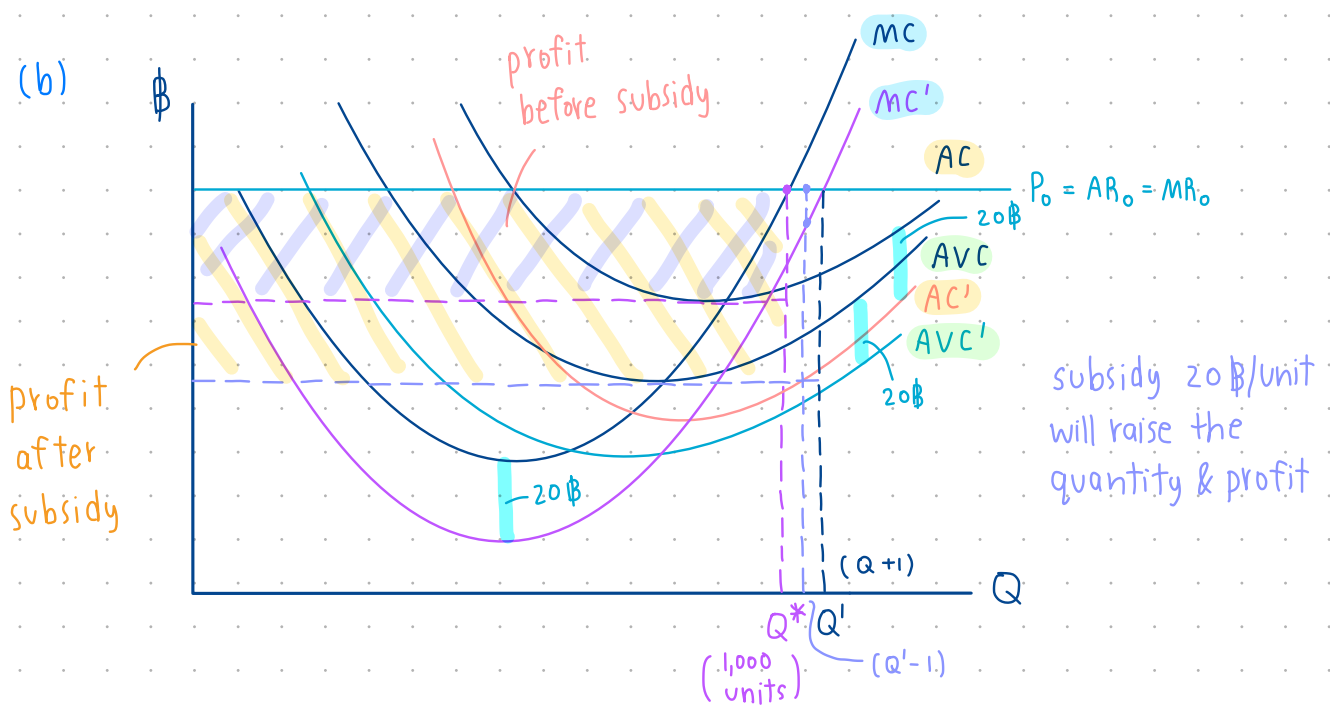
$$AFC'(Q) = AFC(Q) - \frac{20,000}{Q}$$



$\therefore$ Eq^m quantity Q^* does not change because MC and MR do not.

Q^* still satisfies the eq^m conditions but profit increase

$\Rightarrow$ the amount of lower fixed cost = 20,000 ANS



Before subsidy : Eq^m is at Q^* where

- 1) $MR(Q^*) = MC(Q^*)$
- 2) Slope $MR(Q^*) = 0 < \text{slope } MC(Q^*)$

After subsidy : Eq^m is at Q' where

- 1) $MR(Q') = MC(Q')$
- 2) Slope $MR(Q') = 0 < \text{slope } MC(Q')$

$$TC(Q) = TFC(Q) + TVC(Q)$$

$$TC'(Q) = TFC(Q) + TVC'(Q)$$

$$= TFC(Q) + TVC(Q) - 20Q$$

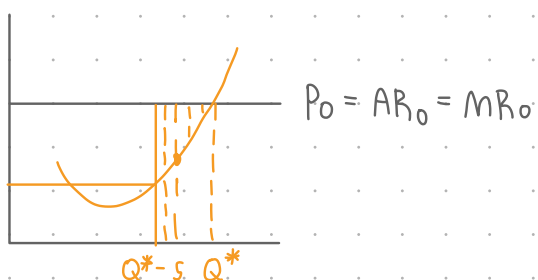
$$AVC'(Q) = AVC(Q) - 20$$

$$AC'(Q) = AFC(Q) + AVC(Q) - 20 = AC(Q) - 20$$

$$MC'(Q) = MC(Q) - 20$$

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

However, if the company produces more than Q' the cost will be higher and gain less revenue



$MR > MC$ เมื่อ $Q < Q^*$ $MR = MC$ ที่ Q^*
 $MR < MC$ เมื่อ $Q > Q^*$ Slope $MR < \text{slope } MC$

	MR	MC	Marginal Profit
$Q^* - 5$	10	6	4 (profit +4)
$Q^* - 4$	10	7	3
$Q^* - 3$	10	8	2
$Q^* - 2$	10	9	1
$Q^* - 1$	10	9.5	0.5
Q^*	10	10	0 (increase profit until 0)

Total profit