Shutdown Decision

In the short run production (i.e., L is variable input, K is Fixed input), if a competitive firm in perfectly competitive market faces losses (i.e., $\pi < 0$ or $TR < TC$), should the Firm "continue to produce" or "shutdown"?

= stops producing temporarily

The Firm should continue to produce "if..."

Profit from continue to produce $\geq$ Profit if the firm shutdowns.

$TR - FC - VC \geq 0 - FC - 0$

$TR - VC \geq 0$

$TR \geq VC$

Meaning: IF total revenue generated is big enough to cover his variable cost, then he should continue to produce

Put it differently, IF $TR < VC$, then the Firm should shutdown.

SHUTDOWN RULE: shutdown if $TR < VC$ ***

Example
- suppose he currently produce output $q = 1000$ cookies/day.
- price of cookie (p) = 8 baht/
- FC = 4000 baht/day
  VC = 6000 baht/day
  So TC = $FC + VC$ = 4000 + 6000 = 10,000 baht/day
- $TR = p \cdot q = 8 \cdot 1000 = 8000$ baht/day.
- So, $\pi(1000) = TR(1000) - TC(1000)$
  $= 8000 - 10,000$
  $= -2,000$ baht/day → If he continues to produce, $\pi = -2000$ baht/day.

However, if he decides to shutdown, what is π when shutdown?

$\pi_{\text{when shutdown}} = TR - FC - VC = 0 - 4000 - 0 = -4000$ baht/day!

Observe that $\pi_{q>0} > \pi_{q=0 (= \text{shutdown})}$

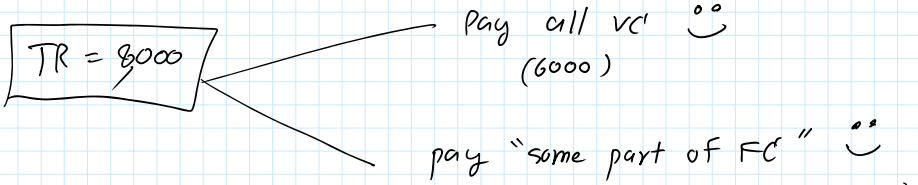
$(-2000) \quad (-4000)$

or you can say that $\text{loss}_{q>0}$ is lower than $\text{loss}_{q=0}$

Check with shutdown Rule: IF $TR < VC$, shutdown

$TR = p \cdot q = 8 \cdot 1000 = 8,000$ baht $>$ $VC = 6000$ baht/day

Since $TR > VC$, then it is in his best interest to continue!



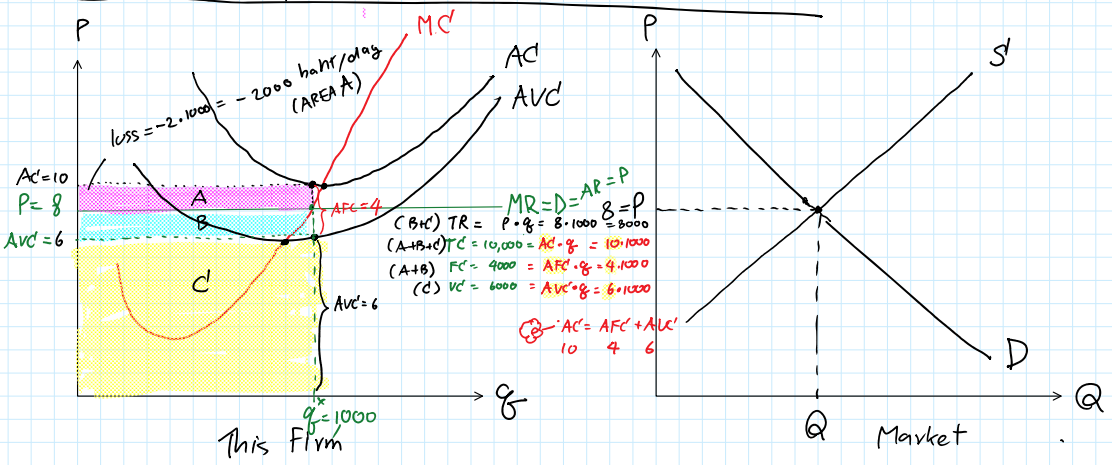
Then loss when he continues to produce = −2000

(2000 out of FC'=4000)

Then loss when he continues to produce = −2000

(if shutdown, loss = −4000 which is higher losses)

Graphical representation of this situation



- loss when $q>0$ = AREA A (−2000)
- loss when $q=0$ = AREA A+B (= FC' = −4000)
- so $loss_{q>0}$ (−2000) is lower than $loss_{q=0}$ (shutdown) (−4000)
- w/ shutdown rule, see TR and VC' (which area)

(B+C) = 8,000 (C) = 6000

Since, TR > VC', he should continue to produce.

Another version of shutdown rule

Recall that shutdown if $TR < VC'$ — (1)

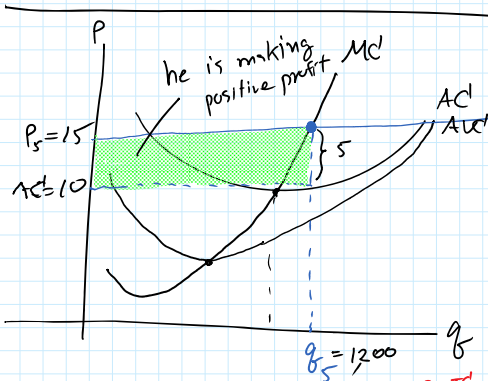
if $\frac{TR}{q} < \frac{VC'}{q}$

$\frac{P \cdot q}{q} < \frac{VC'}{q}$

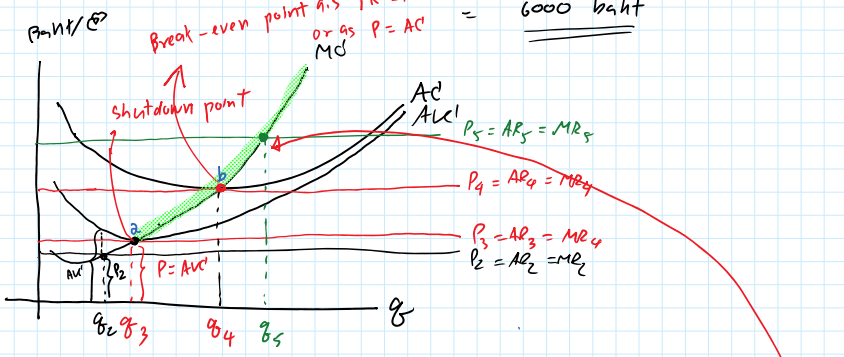
shutdown if $P < AVC'$ — (2A)

shutdown if $AR < AVC'$ — (2B)

Shutdown if MR < AVC' (2c)



$\pi = TR - TC'$
$= P \cdot q - AC' \cdot q$
$= (P - AC')q$
$= (15 - 10) \cdot 1200$
$= 5 \cdot 1200$
$= 6000$ baht



① point b : $P = MR = AR =$ minimum of AC' (Break-even Point)

② point a : $P = MR = AR =$ minimum of AVC' (Shutdown Point)

③ Notice that if $P < P_3$, firm does better by choosing "shutdown"

ex: at $P = P_2$, $P < AVC' \rightarrow$ shutdown yields lower losses.

④ Since firm will produce only $P \geq P_3$ onwards, i.e.

when $P = P_3$, it produces $q = q_3$ (where MR_5 cuts MC')

$P = P_4$, it produces $q_4 = q_4$ (where MR_4 cuts MC')

$P = P_5$, it produce $q = q_5$ (where MR_5 cuts MC')

then, the Firm's supply curve is the part of MC' curve starting from the point a upwards.

In other word, we will see the firm producing if $P \geq P_3$!

Second, $\uparrow P \rightarrow \uparrow q$ (supply curve)

$P = P_3 \rightarrow$ produce q_3

$P = P_4 \rightarrow$ produce higher q, q_4

$P = P_5 \rightarrow$ produce higher q, q_5.