Costs2

Thursday, November 15, 2018 09:40 AM

Cost of production (Continued)

LAST WEEK : TC FC VC (3)

THIS WEEK : AC AFC AVC MC (4)

Recall that $TC = FC + VC$ — (1)

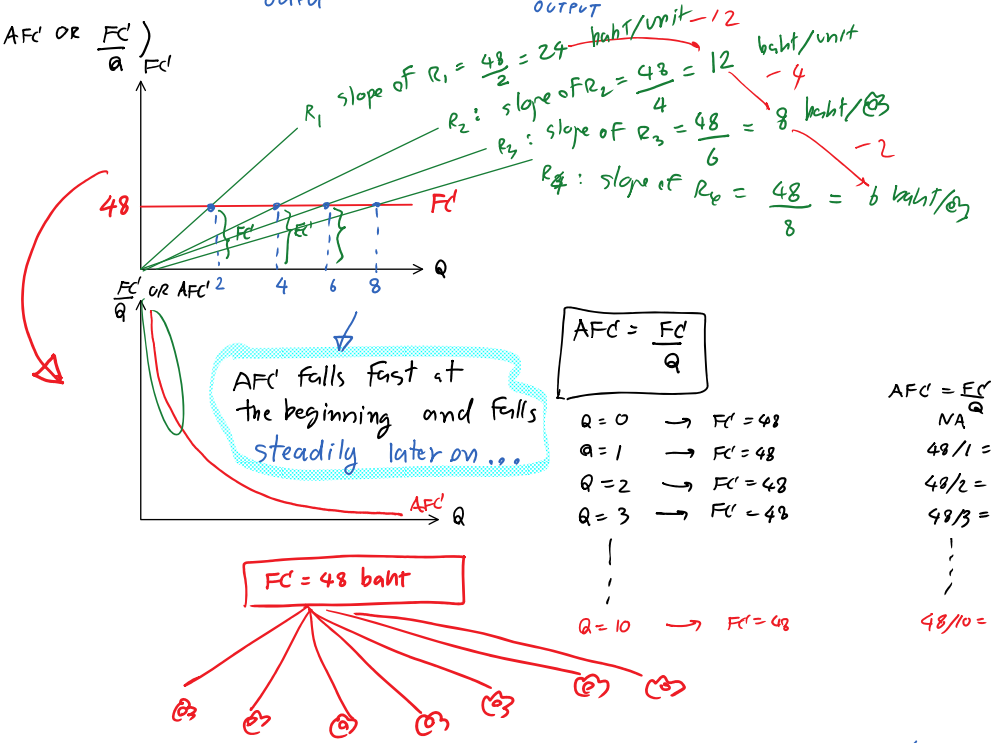
Then, dividing the above throughout by Q gives

$$\frac{TC}{Q} = \frac{FC}{Q} + \frac{VC}{Q}$$

$$AC = AFC + AVC \quad \text{— (2)}$$

- AC: AVERAGE COST OR "COST PER UNIT" OR "UNIT COST"
- AFC: AVERAGE FIXED COST OR FIXED COST PER UNIT OF OUTPUT
- AVC: AVERAGE VARIABLE COST OR VARIABLE COST PER UNIT OF OUTPUT

FACT #1 (AFC OR $\frac{FC}{Q}$)



$AFC = \frac{FC}{Q}$

Q = 0	→ FC = 48	NA
Q = 1	→ FC = 48	48/1 = 48
Q = 2	→ FC = 48	48/2 = 24
Q = 3	→ FC = 48	48/3 = 16
⋮	⋮	⋮
Q = 10	→ FC = 48	48/10 = 48

FC = 48 baht

As we produce more of outputs, FC is "spreading over" EACH UNIT OF OUTPUT. In other words, EACH UNIT OF OUTPUT HELPS SHARING THE FC!

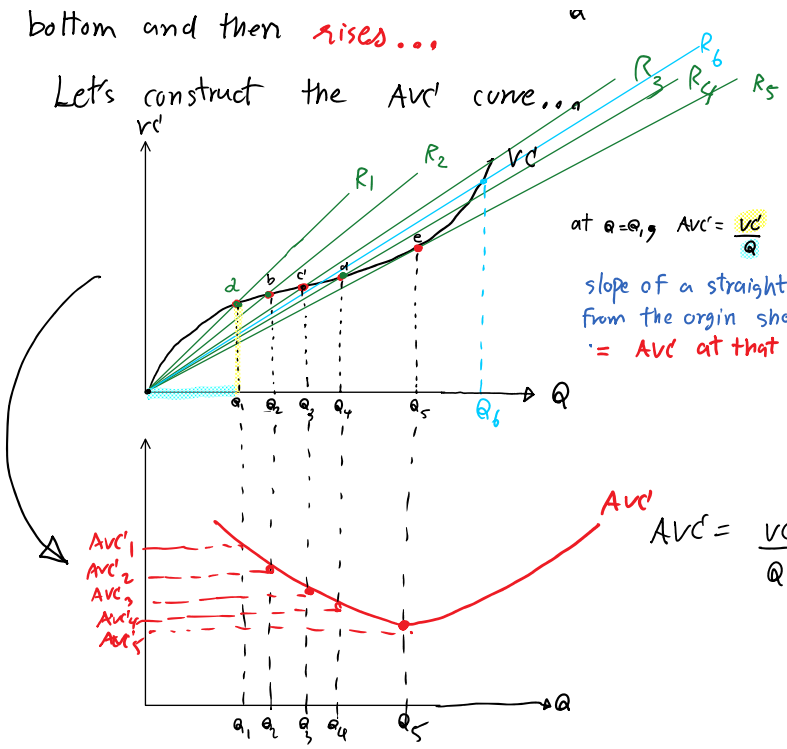
We call this as "Spreading effect"

Fact #2 ($\frac{VC}{Q}$ OR AVC)

- $AVC = \frac{VC}{Q}$ — variable cost per
- As we produce more of output (), $\frac{VC}{Q}$ falls first, hits the bottom and then

bottom and then rises...

- Let's construct the AVC' curve...



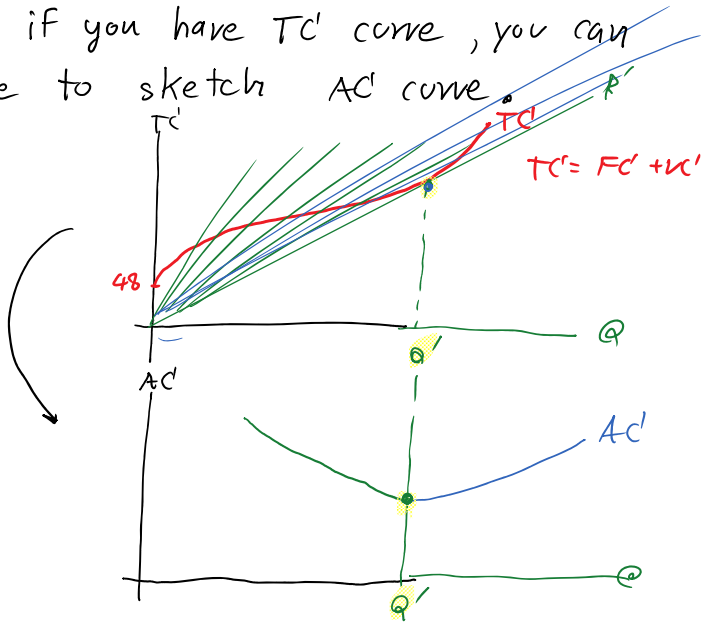
at $Q=Q_1$, $AVC' = \frac{VC'}{Q}$

slope of a straight line from the origin shooting to the VC' curve = AVC' at that specific output level!

$AVC' = \frac{VC'}{Q}$

Fact #3 ($\frac{TC'}{Q}$ or AC')

- In similar manner, if you have TC' curve, you can use our trick above to sketch AC' curve.
- $AC' = \frac{TC'}{Q}$

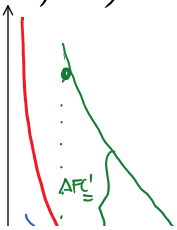


Fact #4 Let's combine three of them into a picture...

[AFC', AVC', AC' (ATC')]

First, recall that $AFC' + AVC' = AC'$

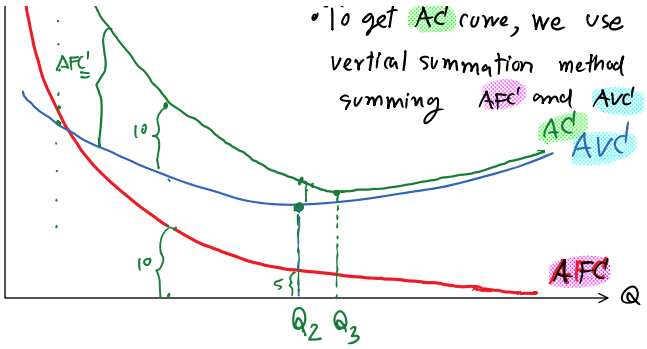
AFC', AVC', AC' (Baht/Q)



GAP between AC' and AVC' = AFC'

AC' = AVC' +

- To get AC' curve, we use vertical summation method by summing AFC' and AVC' vertically



• To get AC' curve, we use vertical summation method by summing AFC' and AVC' vertically.

AVC' + AFC'

Fact#5 (on MC' curve)

Marginal cost = additional cost when we want to produce an additional unit of cookie.

$$MC' = \frac{\Delta TC'}{\Delta Q}$$

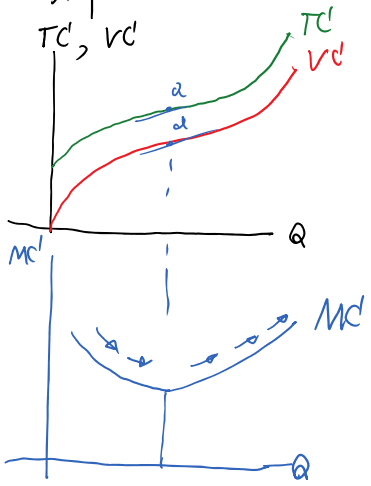
OR $$MC' = \frac{\Delta TC'}{\Delta Q} = \frac{\Delta (FC' + VC')}{\Delta Q}$$

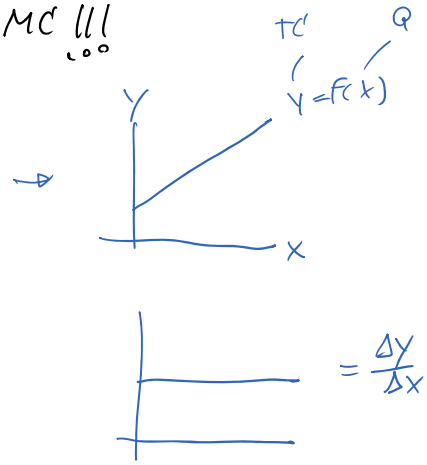
$$MC' = \frac{\Delta FC'}{\Delta Q} + \frac{\Delta VC'}{\Delta Q}$$ ($\Delta FC' \to 0$)

$$MC' = \frac{\Delta VC'}{\Delta Q}$$

• As $MC' = \frac{\Delta TC'}{\Delta Q}$, slope of TC' curve is MC' !!!

As $MC' = \frac{\Delta VC'}{\Delta Q}$, slope of VC' curve is also MC' !!!





Costs3

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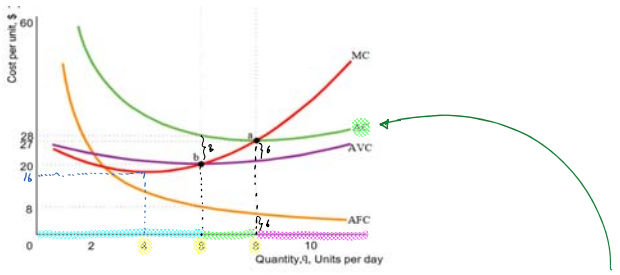


FACT #6 In the short run, Average Cost Curve (AC) is U-shaped, i.e., AC falls first, hits the bottom, and then rises!

(Good News) (Bad news)

Why this is the case? We will explain ...

Observe that ① when $0 < Q < 6$, $AFC \downarrow + AVC \downarrow = AC \downarrow$

② when $6 < Q < 8$, $AFC \downarrow + AVC \uparrow = AC \downarrow$

Since spreading effect is stronger than DMR Effect

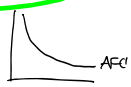
then AC is still falling.

③ when $Q > 8$, $AFC \downarrow + AVC \uparrow = AC \uparrow$

Since DMR Effect DOMINATES SPREADING EFFECT,

then AC is now heading up...

So far we know that ↓ AFC is named as "SPREADING EFFECT"



How could we define the effect of ↑ in AVC?

you have to know first what makes AVC ↓ and ↑ ...

$$AVC = \frac{VC}{Q} \quad \text{(baht)} \quad \text{(}\frac{\text{baht}}{\text{unit}}\text{)}$$

$$= \frac{w \cdot L}{Q} = w \cdot \frac{L}{Q} = w \cdot \frac{1}{\frac{Q}{L}} = w \cdot \frac{1}{AP_L}$$

$Q = F(L, \bar{K})$

Ex: $w = 300$ baht/ร/day

$L = 10$ ร/day

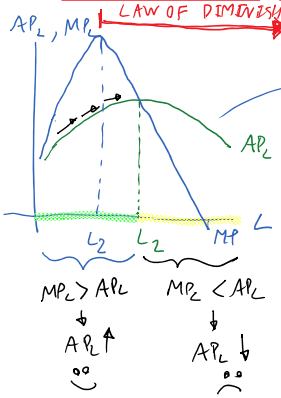
$VC = w \cdot L = 300 \cdot 10 = 3000$ baht/day

$$AVC = \frac{\bar{w}}{AP_L}$$

→ Given w fixed, iF $AP_L \uparrow$, then AVC or $\frac{VC}{Q} \downarrow$

iF $AP_L \downarrow$, then AVC or $\frac{VC}{Q} \uparrow$

Labour productivity (AP_L) influences Fall and Rise oF AVC.



IF $MP_L > AP_L$ → $AP_L \uparrow$ → $AVC \downarrow$

IF $MP_L < AP_L$ → $AP_L \downarrow$ → $AVC \uparrow$

↑ AVC can be named as "Diminishing Return Effect"

Example about AVC & AP_L

Suppose $w = 300$ baht/ร/day

B/F : $L_1 = 10 \rightarrow Q_1 = 1000$ ชิ้น/day . $AP_L = \frac{Q_1}{L_1} = \frac{1000}{10} = 100$ ชิ้น/คน

$VC'_1 = w \cdot L_1 = 300 \cdot 10 = 3000$ baht

$AVC'_1 = \frac{VC'_1}{Q_1} = \frac{3000}{1000} = 3$ baht/ชิ้น

A/F $L_2 = 11 \rightarrow Q_2 = 1200$ ชิ้น/day $AP_L = \frac{Q_2}{L_2} = \frac{1200}{11} = 109.09$ ชิ้น/คน

$VC'_2 = w \cdot L_2 = 300 \cdot 11 = 3300$ baht

$AVC'_2 = \frac{VC'_2}{Q_2} = \frac{3300}{1200} = 2.75$ Baht/ชิ้น

See... When $AP_L \uparrow$, AVC' will be falling. #

Fact#7 Marginal cost curve (MC') is also U-shaped. (Why?)

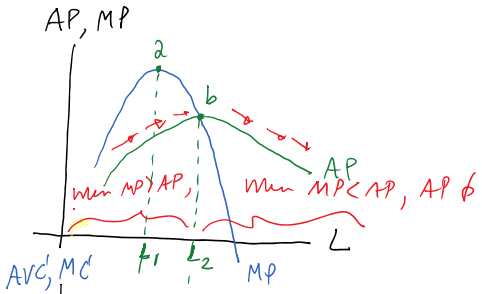
$$MC' = \frac{\Delta VC'}{\Delta Q} = \frac{\Delta(w \cdot L)}{\Delta Q} = w \cdot \frac{\Delta L}{\Delta Q} = w \cdot \frac{1}{\frac{\Delta Q}{\Delta L}} = w \cdot \frac{1}{MP_L}$$

Then $\boxed{MC' = \frac{w}{MP_L}}$ → Given w fixed, if $MP_L \uparrow$, it will help reducing MC'.

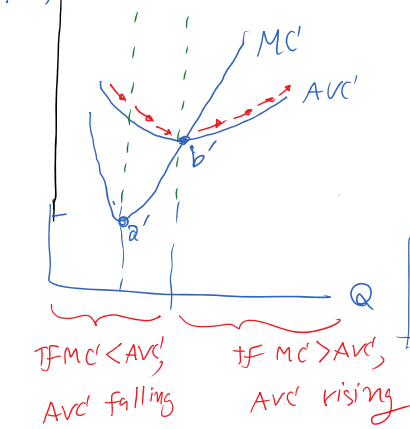
if $MP_L \downarrow$, it will push MC' up. :(

Last picture ...

PRODUCTION SIDE



COST SIDE



#1 $\boxed{AVC' = \frac{w}{AP}}$

IF AP ↑, AVC' ↓

IF AP ↓, AVC' ↑

#2 $\boxed{MC' = \frac{w}{MP}}$

IF MP ↑, MC' ↓

IF MP ↓, MC' ↑

- AVC' is a mirror image of AP
- MC' ∪ MP

Salvador Dali 's Swans Reflecting Elephants (1937)