Tuesday, November 27, 2018 09:35 AM

Market Structure

Monopoly — Oligopoly (2-3 sellers) — Monopolistic Competition — Perfectly Competitive Market

① Single seller (Monopolist) & Many buyers
② Product w/o substitutes (Ex: Diamond, water supply) Electricity
③ Barriers to entry

① large number of buyers and sellers
② Standardized Product (or Homogeneous Product)
③ Free Entry & Free Exit
④ Perfect Information

Perfectly Competitive Market
- In the short-run
- In the long-run

In the short-run first: What is going on in the short run?

Issues:
- How a firm decides on how many products to be produced in order to maximize profits?
- How a market price is determined?
- What happens to "output decision" IF factor input's price ↑ or ↓?

(In the SR)

Lets begin...

Fact#1 Buyers and Sellers in the perfectly competitive market are ... price takers!

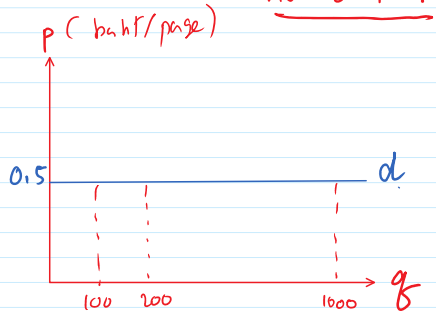
↓ take price as given and make decisions

For buyers: purchase decision
For sellers: output decision

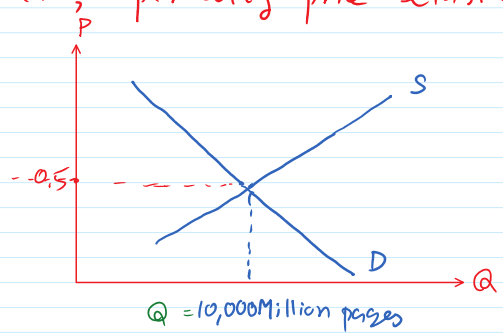
Example Let's assume that photo-copy mkt is a perfectly competitive market.

① + ② imply that buyers and sellers are price takers

Fact#2 Demand curve facing a competitive Firm is horizontal (i.e, perfectly price elastic)



(a) a Firm



(b) market

IF p=0.5, Firm can sell at any q & amount of sale does not affect the market price!

IF p>0.5, he will lose all sales!

IF p<0.5, quantity gets extremely large

(shop becomes explosive.)

Fact #3 A competitive firm that wants to maximize its profits will product at the quantity of output (q^*) where

price of product (P) = marginal cost (MC)

[= Marginal Revenue]

i.e., $P = MC$

$(= MR)$

First, let's get to know 3 key terms: TR, AR, MR.

- TR = Total Revenue = price of product (P) × quantity sold (q)
- AR = Average Revenue = $\frac{TR}{q}$ (Revenue per unit of output)
- MR = Marginal Revenue = $\frac{\Delta TR}{\Delta q} = \frac{TR_2 - TR_1}{q_2 - q_1}$

Example

(Baht/page)

(1) P	(2) q	(3) TR	(4) = (3)/(2) AR	MR
0.5	0	0	-	
0.5	1	0.5	0.5/1 = 0.5	0.5
0.5	2	1	1/2 = 0.5	0.5
0.5	3	1.5	1.5/3 = 0.5	0.5
0.5	4	2	2/4 = 0.5	0.5
0.5	5	2.5	2.5/5 = 0.5	0.5
0.5	6	3	3/6 = 0.5	0.5

Notice that

$MR = AR = P = 0.5$

for any output level in competitive market

This is not true w/ monopoly, by the way. In monopoly, $MR < P$!!!

Now, we are ready to talk about "profit maximization rule" that this firm will use to identify his profit maximizing output level (q^*)

$$\pi(q) = TR(q) - TC(q)$$

Goal: Find q^* that maximize the firm's profit.

Fact#3C (continued)

Maximize $\pi(q) = TR(q) - TC(q)$

F.O.C for finding q that maximize Profits (π) is

$$\frac{d\pi(q)}{dq} = 0$$

$$\frac{d\pi(q)}{dq} = \frac{d\left[TR(q) - TC(q)\right]}{dq} = 0$$

$$= \frac{d\,TR(q)}{dq} - \frac{d\,TC(q)}{dq} = 0$$

$$= MR(q) - MC(q) = 0$$

$$MR(q^*) = MC(q^*)$$

To maximize the Firm's profit, the firm must produce at quantity of output where marginal revenue (MR) = marginal cost (MC)

— F.O.C

This is so called "Profit Maximizing Rule"

Note that, with perfectly competitive market, we know that $P = MR = AR$. So you can write another version of the above rule for perfectly competitive market as

$$P = MC \quad \text{OR} \quad P = MR = MC$$

To ensure that we really get the maximum of π, not minimum, we need the second order sufficient condition (S.O.S.C) which states that "slope of the profit curve must be decreasing around this point." $+ \to 0 \to -$

$$\equiv \frac{d\left(\frac{d\pi}{dq}\right)}{dq} < 0$$

Let's find it:

$$\frac{d\left(\frac{d\pi}{dq}\right)}{dq} = \frac{d\left[MR(q) - MC(q)\right]}{dq} < 0$$

$$= \frac{d\,MR(q)}{dq} - \frac{d\,MC(q)}{dq} < 0 \quad \left(\frac{d\,MR(q)}{dq} \leq 0\right)$$

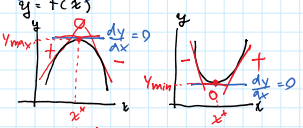
$$= -\frac{d\,MC(q)}{dq} < 0$$

Math Note

dependent variable

independent var

$y = f(x)$



(For finding x that gives y_{max})

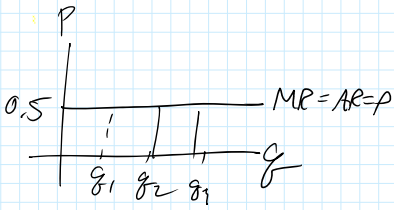
*** Mountain ***

(For finding x that gives y_{min})

*** Valley ***

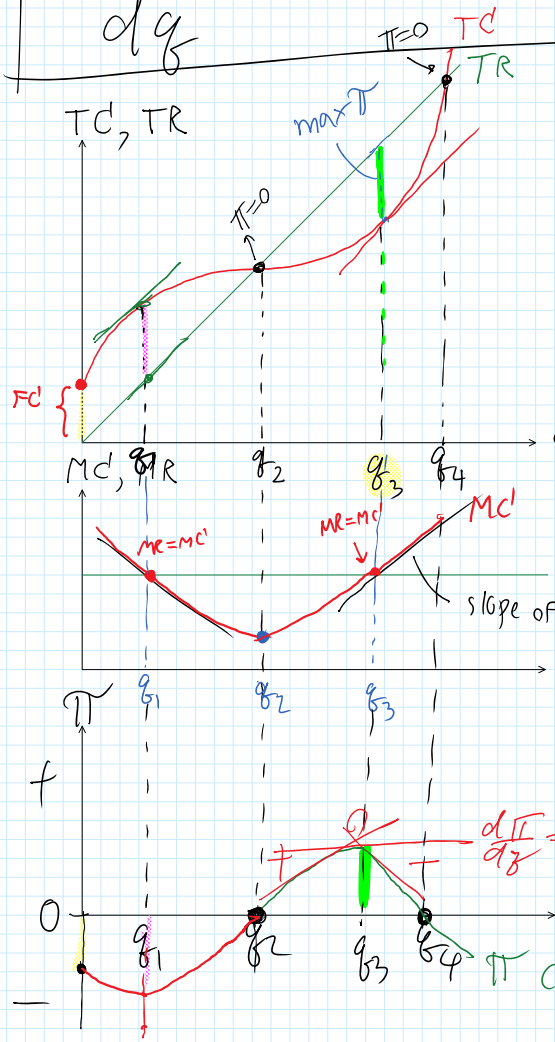
First order Necessary Condition to (F.O.N.C) get either max or min is

$$\frac{dy}{dx} = 0 \to \text{F.O.C}$$



$$= -\frac{d\,MC(q)}{dq} < 0$$

$$\boxed{\frac{d\left(\frac{d\Pi}{dq}\right)}{dq} = \frac{d\,MC(q)}{dq} > 0} \Rightarrow$$ S.O.C to gaurantee that we get max of Π, not min



- Slope of TR is MR
- Slope of TC is MC (why?)

$$\frac{dTC}{dq} = MC$$

- From $q=0 \to q_2$ → Firm faces loss! ☹
- From $q_2 \to q_4$ → Firm enjoys positive Π. ☺
- At q_2 and q_4 → since TR = TC, then $\Pi = 0$.

$q=0 \to TR=0$
$q=1 \to TR=0.5$
$q=2 \to TR=1$

at q_1: MR = MC (First time)
at q_3: MR = MC (Second time)

FOC: MR = MC

SOC: $\frac{d\,MC(q)}{dq} > 0$

slope of MC curve must be on rising pa

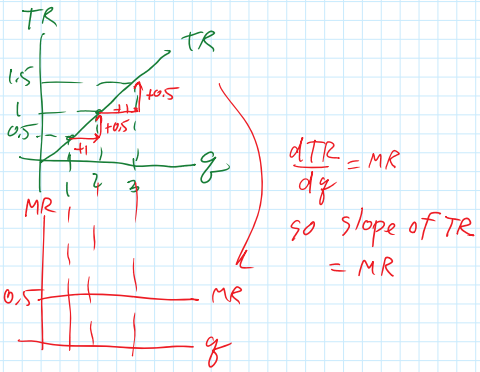
- q_3 maximizes the Firm's profit
- at q_3, both F.O.C and S.O.C are satisfied.

SUMMARY: Profit maximization rule is MR = MC
(Keep in mind that S.O.C must be valid too)

Intuition: Rational people think at the margin.

This is about MR & MC Rule

MC, MR



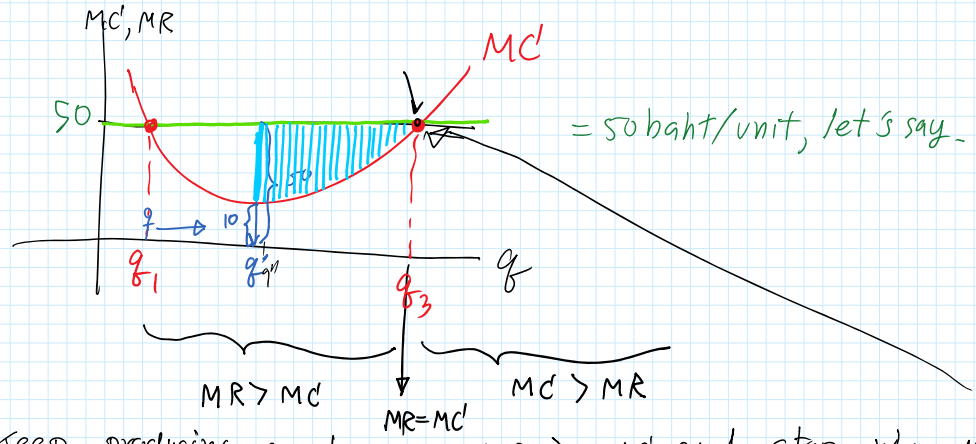
$\frac{dTR}{dq} = MR$

so slope of TR = MR

rt.

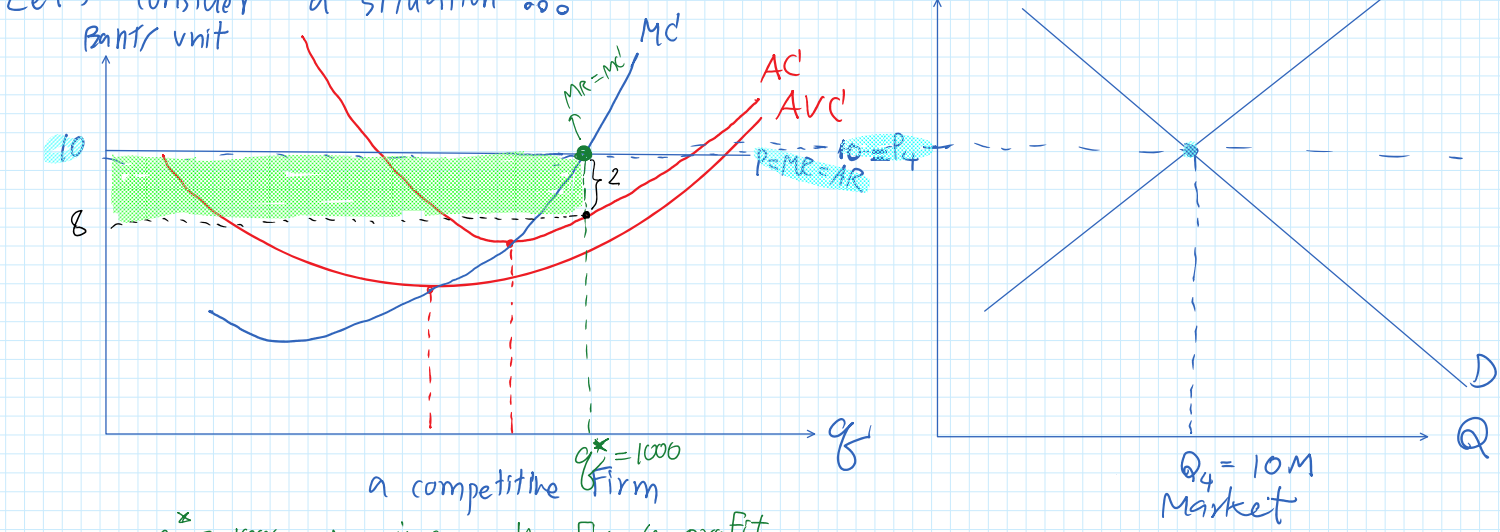
This is about MR & MC' Rule

How?



Keep producing as long as MR > MC' and stop when MR = MC' (at q_3)

Let's consider a situation ...



- $q^* = 1000$ maximizes the firm's profit.
- your TR = $P \times q$ = $10 \cdot 1000 = 10{,}000$ baht/day
- your π = $(P - AC') \cdot q$
  = $(10 - 8) \cdot 1000$
  = $2 \cdot 1000$
  = 2000 baht/day

other way to compute π is

$TR = P \times q = 10 \cdot 1000 = 10{,}000$

$TC' = AC' \cdot q = 8 \cdot 1000 = 8000$

$\pi = TR - TC' = 10{,}000 - 8000 = 2000$

$\left[AC' = \frac{TC'}{q} \right]$

$TC' = AC' \cdot q$

Operating at a Loss in the Short Run

Q: In the short run, if a competitive firm faces losses, should it continue to operate or shutdown?

By shutdown, it means that firm decides to stop producing for a temporary period, wait for a better market situation, and start to produce again.

A: The firm should shutdown if

$\pi_{\text{when shutdown}} > \pi_{\text{when continue}}$

or, in other words, shutdown if $\text{loss}_{\text{when shutdown}} < \text{loss}_{\text{when continue}}$

Shutdown if $\pi_{q=0} > \pi_{q>0}$

$0 - FC - 0 > TR - FC - VC$

$0 > TR - VC$

$VC > TR$

or $TR < VC$

He should shutdown if $TR < VC$ ⇒ SHUTDOWN RULE

Put it differently, he should continue to operate even though he faces losses if $TR \geq VC$.

Example

$TR = 100{,}000$ baht/month

$TC = 200{,}000$ baht/month

FC: 150,000 VC: 50,000

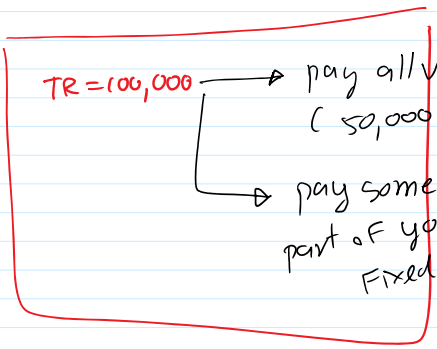
$\pi = TR - TC = 100{,}000 - 200{,}000 = -100{,}000$ baht

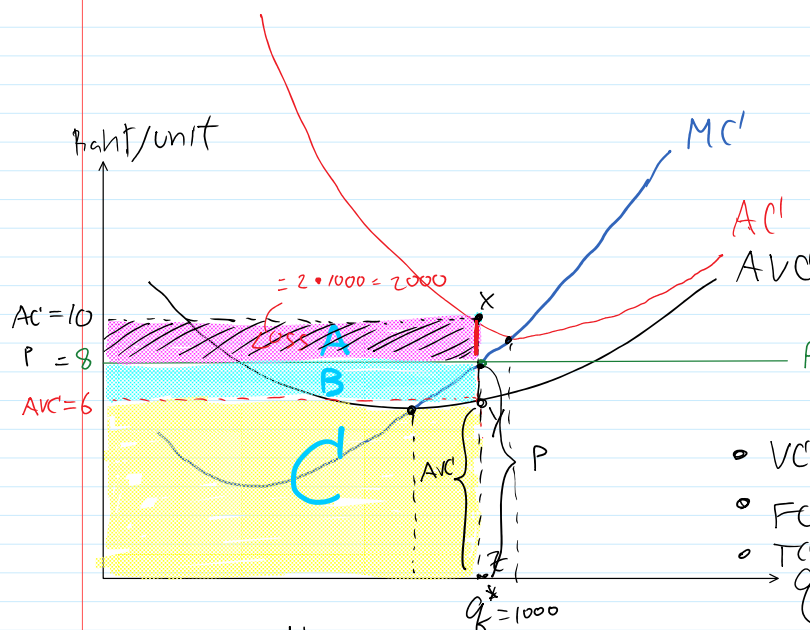
① : shutdown ⇒ $\pi = 0 - 150{,}000 - 0 = -150{,}000$ (TR, VC)

② : continue ⇒ $\pi = 100{,}000 - 150{,}000 - 50{,}000 = -100{,}000$

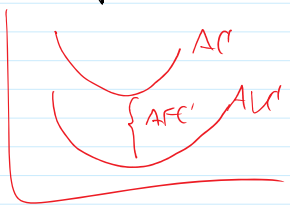
$\text{loss}_{\text{when } q>0} < \text{loss}_{\text{when } q=0}$

$(-100{,}000) < (-150{,}000)$





wrong...



111

- VC = AREA C
- FC = AREA A+B
- TC = AREA A+B+C

$6 = AVC$ × $q = 1000$

$AVC = \frac{VC}{q}$

$VC = AVC \cdot q$

$A+B+C$ − C = VC

At $q^* = 1000$, AC = 10 baht/㊀

AVC = 6 baht/㊀

AFC = 4 baht/㊀

$\pi = -2 \cdot 1000 = -2000$ baht (= AREA A)

or $\pi = TR - TC = (8 \cdot 1000) - (10 \cdot 1000)$

$= 8000 - 10000$

$= -2000$ baht (= AREA A)

$TR = B + C$

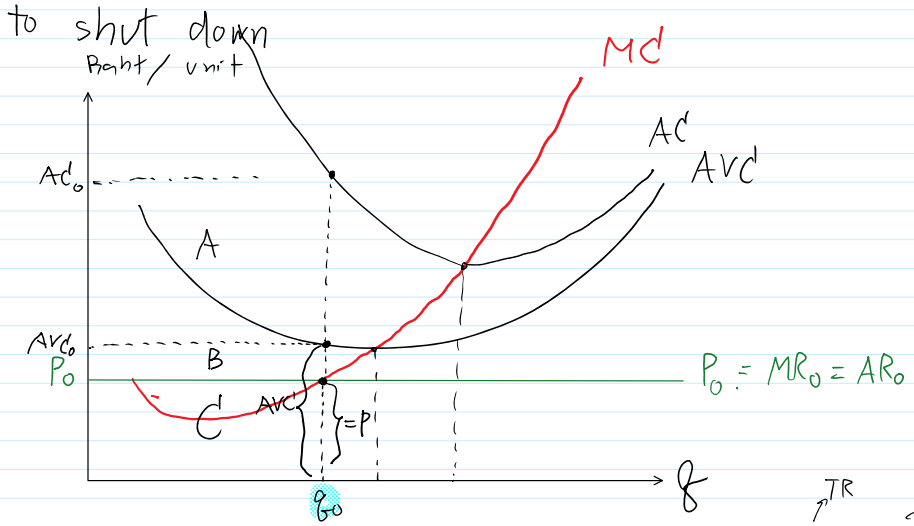
TC = AREA A+B+C

- Here, since $TR\ (= B+C) > VC\ (= C)$, he should continue to produce.

loss when continue = A

< loss when shutdown = −A − B (= FC) 111

Next, ...
let's see the case where it is better for the firm to shut down



- If he continues to produce, $\pi = TR - TC = C - (A+B+C) = -A-B$ (C: TR, $A+B+C$: TC)
- If he shuts down, $\pi = -A$

loss when shutting down $(-A) = FC$ < loss when continue $(-A-B) = FC$

- He does not make enough TR (he only make area C) to pay his all variable costs (which is area B+C). Then, it is in his best interest to shut down.

In addition, we have another version of shut down rule. Let's see...

First version: shut down if $TR < VC$.

Second version: shut down if $TR < VC$

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

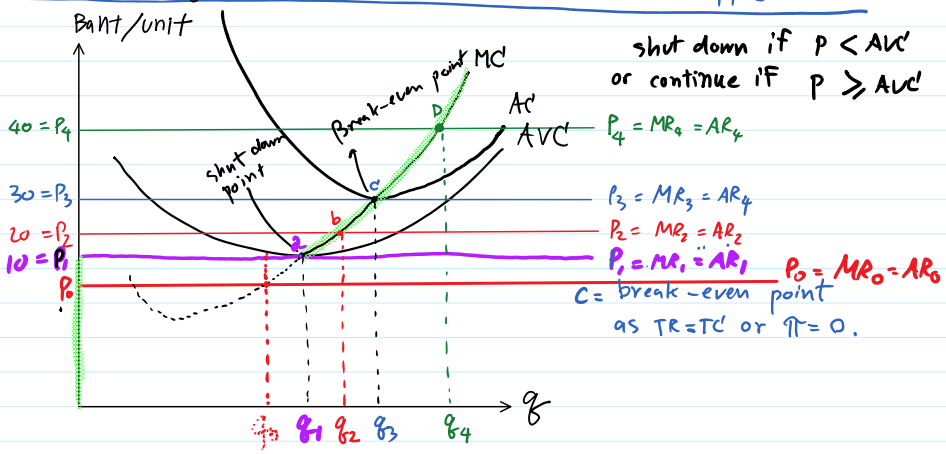
$$\frac{P \cdot q}{q} < \frac{VC}{q}$$

Shut down if $P < AVC$ → 2A

OR $MR < AVC'$ → 2B

OR $AR < AVC'$ → 2d

The perfectly competitive firm's short-run Supply curve.

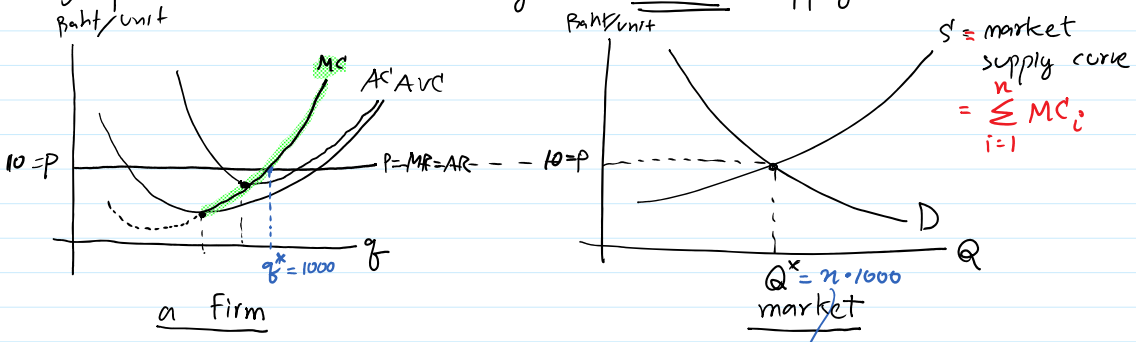


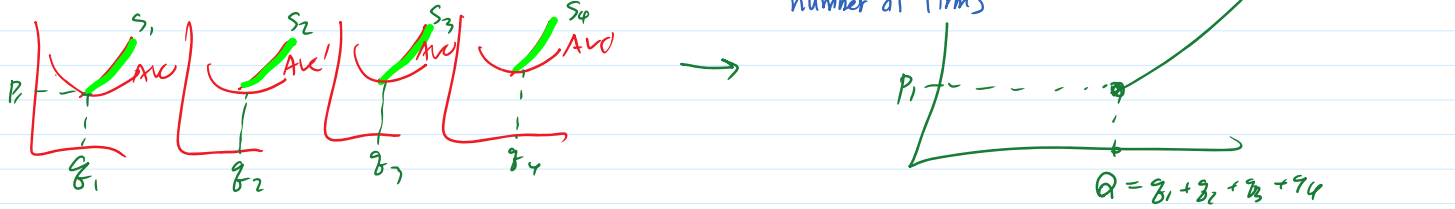
shut down if $P < AVC$
or continue if $P \geq AVC$

C = break-even point
as $TR = TC$ or $\pi = 0$.

- Short-run supply curve starts at "the bottom of AVC curve"

Big picture about how to get "Market Supply Curve"





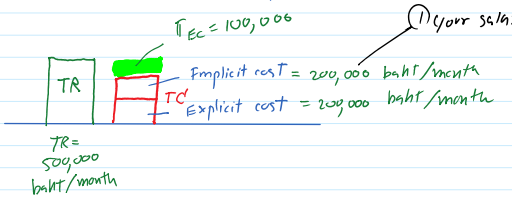
Thursday, November 29, 2018 10:14 AM

Perfectly Competitive Market in the Long Run

First, we have to understand about the difference between Economic Profit (π_{EC}) and Accounting Profit (π_{AC})

- Economic Profit = TR − TC (TC ≡ All resources we spend in the business)
  = TR − [Explicit cost + Implicit cost]
- Accounting Profit = TR − TC
  = TR − [Explicit cost (only)]
- When Implicit cost > 0, $\pi_{EC} < \pi_{AC}$. #

Case 1



① your salary that you could have earned when working somewhere else (100,000)

② Rental payement you could have earn if you rent it out (100,000)

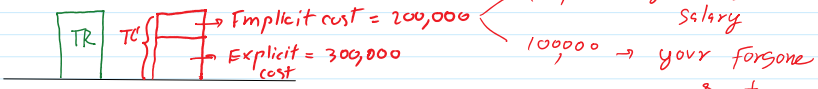
π_{EC} = TR − Ex. cost − Im. cost
= 500,000 − 200,000 − 200,000
= +100,000 baht/month

you earn "positive economic profit"

π_{AC} = TR − Ex. Cost
= 500,000 − 200,000
+ 300,000 baht/month

In this case,
- Both π_{EC} and π_{AC} are positive.
- Notice that $\pi_{AC} > \pi_{EC}$

case 2 (Zero Economic Profit case)



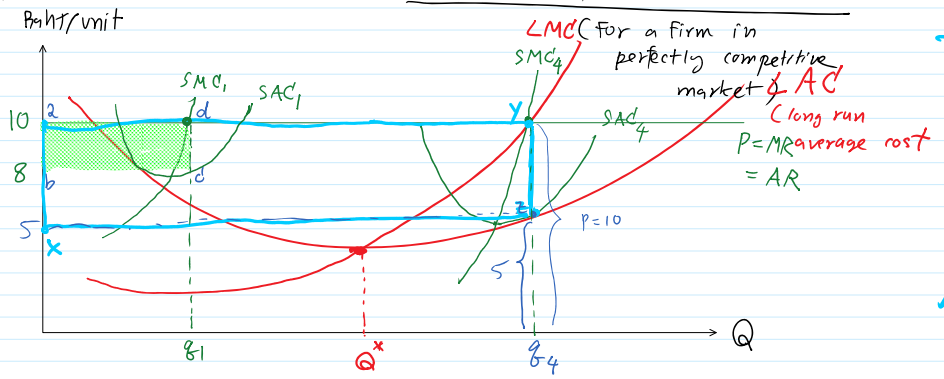
π_{EC} = TR − Explicit cost − Implicit cost
= 500,000 − 300,000 − 200,000
= 0 (Zero economic Profit)

π_{AC} = TR − Explicit cost
= 500,000 − 300,000
= +200,000 baht/month

Q: Should the firm still run this business when $\pi_{EC} = 0$?
Or in other words, should this guy quit the business and go back to work as a salary man earning 100,000 and rent out his home and earn 100,000 baht?

A: **No need!** TR is well-enough to pay to all resources, both obvious and hidden.

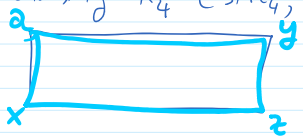
Now, we are ready to discuss Long-Run Competitive Equilibrium.



long run profit maximization for a firm

In the short run, with k=1 machine (SMC_1, SAC_1), q_1 maximizes your profit. Profit = $\square_{abdd}$

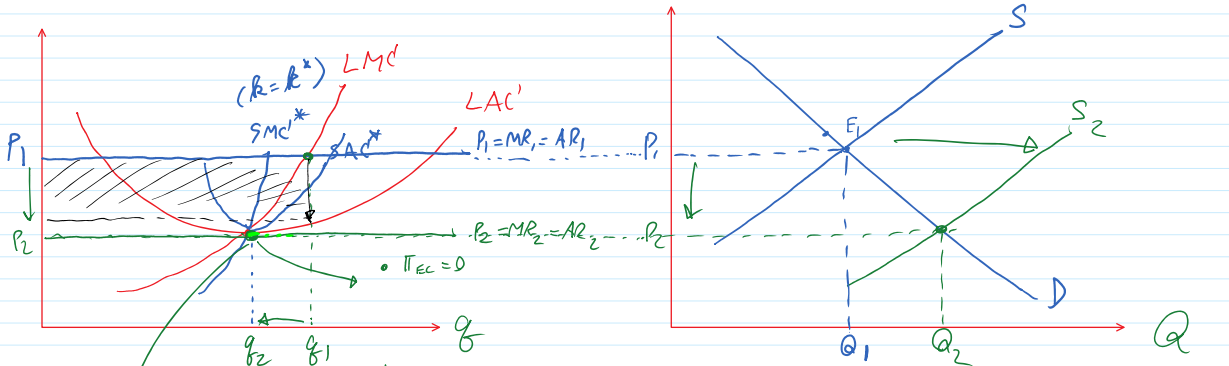
- When k can be adjusted in the long run, firm will get better profits when it produces by choosing k_4 (SMC_4, SAC_4) and producing at $q = q_{q4}$.



Unfortunately, the positive profit will not a last long profit. It is a temporary equilibrium... it will disappear... :: (sorry)

Positive Profit that existing Firms enjoying → new Firms enter (n ↑) → market supply curve will shift to the right → price of the produc will drop

→ at the end, all Firms will only obtain just zero economic profit ($\pi_{EC} = 0$) and produce at the bottom of LAC' curve. Let's see...



(1) Long-run competitive equilibrium:

$AR = MR = P = SMC' = SAC' = LMC' = LAC'$ occurs here !!!

Long-run competitive equilibrium:

1. $AR = MR = P = SMC = SAC = LMC = LAC$ occurs here

2. $\Pi_{EC} = 0$

3. Every competitive firm produces at the most efficient output level, which is q_2 (why?)
   b/c q_2 is the q that min LAC (cheapest)