21.11.2012

MC CURVE

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

$\Delta FC = 0$ (Q)

$\therefore \quad MC = \frac{\Delta TC}{\Delta Q} = \frac{\Delta VC}{\Delta Q}$

$\frac{\Delta TC}{\Delta Q}$ = SLOPE OF TC CURVE

$\frac{\Delta VC}{\Delta Q}$ = SLOPE OF VC CURVE

Q: WHY IS AC CURVE U-SHAPED?

A: YOU MUST LOOK AT THE COMPONENT OF AC!

$$AC = AFC + AVC$$

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

OBSERVATION #1: FROM $Q=0$ TO $Q=Q_3$:

$$AFC + AVC = AC$$

$\downarrow$ (SPREADING EFFECT) $\quad \downarrow$ $\quad \downarrow$

(WHY?)

Q: WHY AVC IS FALLING?

A: $AVC = \frac{VC}{Q} = \frac{w \cdot L}{Q} = w \cdot \frac{L}{Q} = w \cdot \frac{1}{AP_L}$ $\quad \left[\frac{Q}{L} = AP_L\right]$

L = OUTPUT, WORKER

$$AVC = \bar{w} \cdot \frac{1}{AP_L}$$

GIVEN $\bar{w}$, AS $AP_L \uparrow$, AVC $\downarrow$, VICE VERSA.

WHEN $MP > AP \rightarrow AP \uparrow \rightarrow AVC \downarrow$

(SPECIALIZATION)

OBSERVATION 2: FROM $Q=Q_3$ TO $Q=Q_4$:

$$AFC + AVC = AC$$

$(\downarrow)$ $\quad (\uparrow)$ $\quad (\downarrow)$

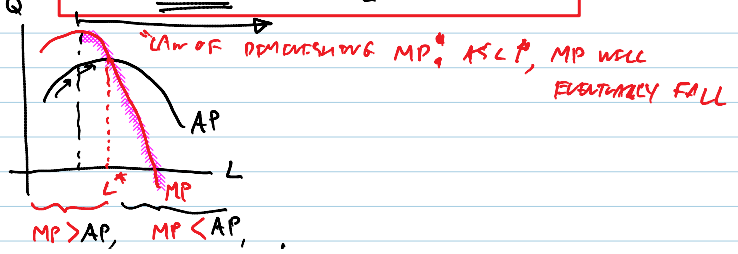
SPREADING EFFECT $\quad$ DIMINISHING RETURN EFFECT

REASON $\quad \downarrow AFC > \uparrow AVC$

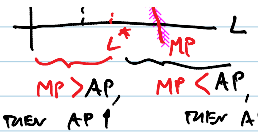
IS STRONGER OR DOMINATES

Q: WHY AVC IS RISING?

A: WHEN $MP < AP \rightarrow AP_L \downarrow \rightarrow AVC \uparrow$



"LAW OF DIMINISHING MP": AS L ↑, MP WILL EVENTUALLY FALL



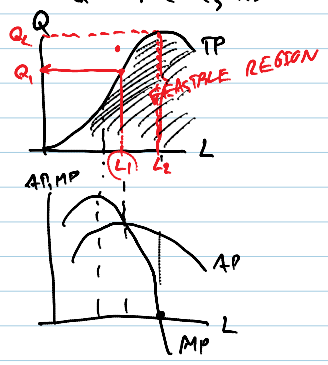
OBSERVATION 3 : BEYOND $Q = Q_4$:

$$AFC + AVC = AC \quad \text{[BAD NEWS]}$$
$$(\downarrow) \quad (\uparrow) \quad (\uparrow)$$

REASON : DIMINISHING RETURN EFFECT DOMINATES SPREADING EFFECT
(↑ AVC) (↓ AFC)

SUMMARY SO FAR, ...

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



BRIDGE

PRODUCTION	COSTS
• TP or Q	• $TC = FC + VC$
• $AP_L = \frac{Q}{L}$	• $AC = AFC + AVC$ — (I)
• $MP_L = \frac{\Delta Q}{\Delta L}$	• $MC = \frac{\Delta TC}{\Delta Q}$ — (II)

• $AVC = \frac{\bar{w}}{AP}$ ∴ AVC AND AP ARE INVERSELY RELATED

• HOW ABOUT MP & MC ? THE RELATIONSHIP

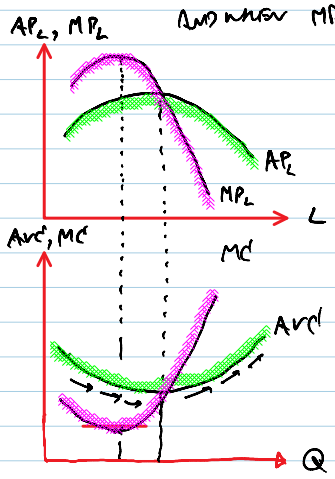
$$MC = \frac{\Delta TC}{\Delta Q} \text{ OR } = \frac{\Delta VC}{\Delta Q}$$

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

$\left[\frac{\Delta Q}{\Delta L} = MP_L\right]$

$$\boxed{MC = \frac{\bar{w}}{MP_L}}$$

INTERPRETATION ? ⇒ GIVEN $\bar{w}$, WHEN MP_L IS RISING (↑), MC IS FALLING (↓) AND WHEN MP_L IS FALLING (↓), MC IS RISING (↑).



- AVC IS A MIRROR IMAGE OF AP.
- MC IS A MIRROR IMAGE OF MP.

PRODUCTION
$AVC = \frac{w}{AP}$ — (I)
$MC = \frac{w}{MP}$ — (II)

COSTS

AP, MP

(III) RELATIONSHIP BETWEEN MC AND AVC

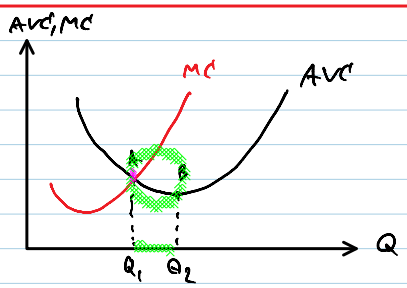
- MC CUTS FROM BELOW AT THE BOTTOM OF AVC.

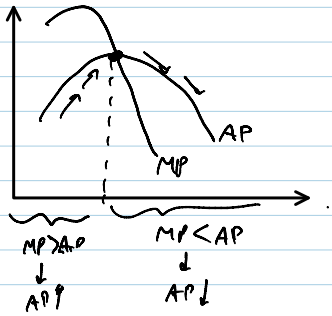
$MC = \frac{\Delta VC}{\Delta Q}$

- MC CUTS FROM BELOW AT THE BOTTOM OF AVC.
- WHEN MC < AVC, AVC IS FALLING.
- WHEN MC > AVC, AVC IS RISING.

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

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





PROOF:

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

$$VC = AVC \cdot Q$$

$$\frac{dVC}{dQ} = \frac{d(AVC \cdot Q)}{dQ}$$

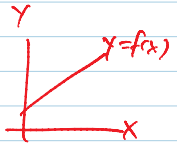
$\frac{dQ}{dQ} = 1$

$$MC = AVC \cdot \frac{dQ}{dQ} + Q \cdot \frac{d\,AVC}{dQ}$$

$$MC = AVC + Q \cdot \frac{d\,AVC}{dQ}$$

$$MC - AVC = Q \cdot \frac{d\,AVC}{dQ}$$

$$MC - AVC = \underset{>0}{Q} \cdot \text{SLOPE OF } AVC$$



$\frac{\Delta Y}{\Delta X}$

SLOPE OF Y

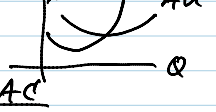
- IF $MC - AVC < 0$ OR $MC < AVC$, THEN SLOPE OF AVC MUST BE NEGATIVE. (= AVC IS FALLING)
- IF $MC - AVC > 0$ OR $MC > AVC$, THEN SLOPE OF AVC MUST BE POSITIVE. (= AVC IS RISING)

SUMMARY

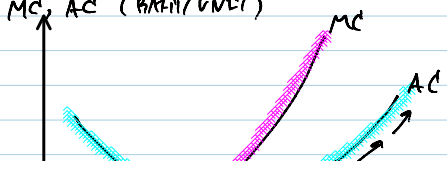
$$AVC = \frac{w}{AP} \quad \text{—(I)}$$

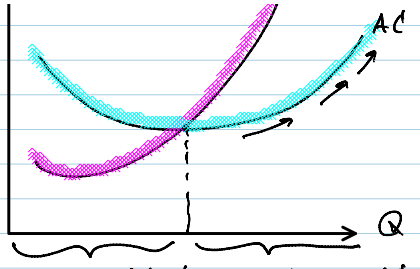
$$MC = \frac{w}{MP} \quad \text{—(II)}$$

MC & AVC —(III)→ TO EXPLAIN



(IV) . RELATIONSHIP BETWEEN MC AND AC





WHEN MC < AC, AC IS FALLING

WHEN MC > AC, AC IS RISING

PRODUCTION & COST & REVENUE

- TOTAL REVENUE (TR) = PRICE (P) × QUANTITY (Q)
- AVERAGE REVENUE (AR) = $\frac{TR}{Q}$

EX P = 40 BAHT/COOKIE

Q = 100 COOKIES/DAY

TR = 40 × 100 = 4000 BAHT/DAY

AR = $\frac{TR}{Q}$ = $\frac{4000}{100}$ = 40 BAHT/COOKIE

ON AVERAGE, EACH COOKIE GENERATES 40 BAHT/COOKIE.

- MARGINAL REVENUE (MR) = $\frac{\Delta TR}{\Delta Q}$ CHANGE IN TOTAL REVENUE / CHANGE IN OUTPUT SOLD.

(BAHT/DAY)

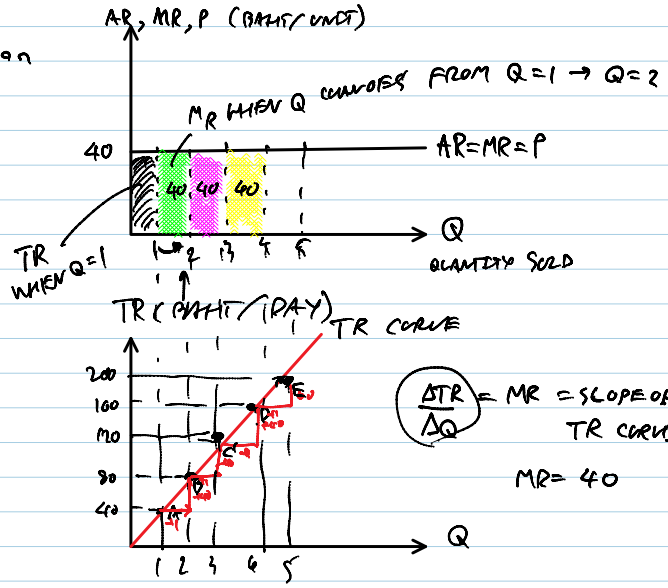
Q	P	TR	AR = TR/Q	MR = ΔTR/ΔQ
1	40	40	40/1 = 40	40
2	40	80	80/2 = 40	40
3	40	120	120/3 = 40	40
4	40	160	160/4 = 40	40
5	40	200	200/5 = 40	

WHEN P IS CONSTANT.

OBSERVE THAT P = AR = MR *

IS TRUE WHEN PRICE IS CONSTANT

GRAPHICALLY, ...



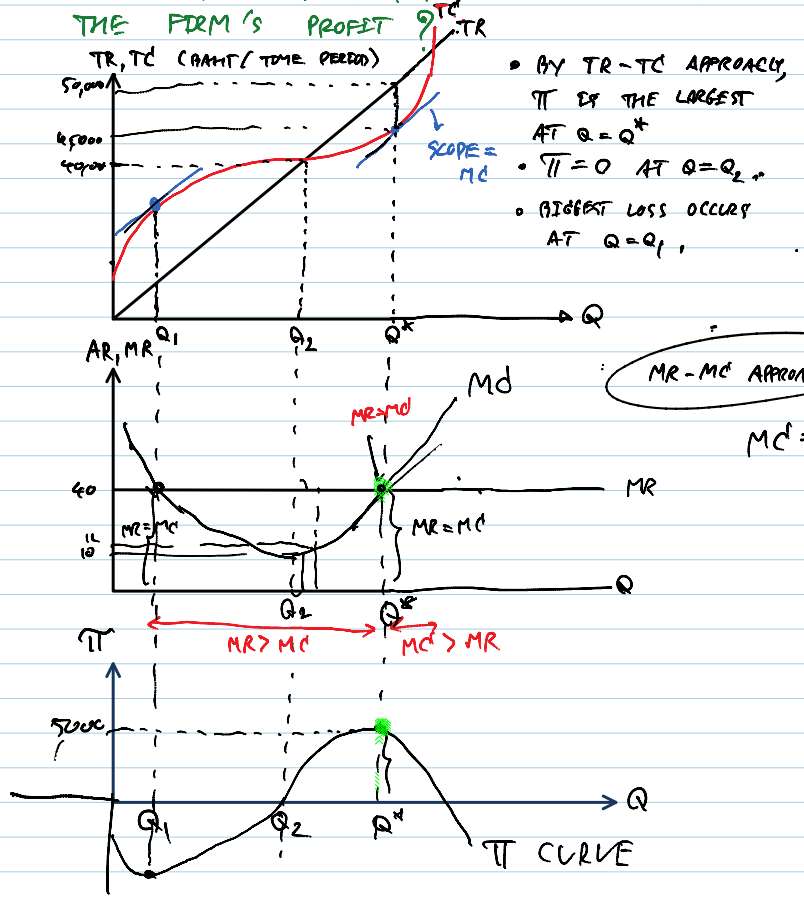
$\frac{\Delta TR}{\Delta Q}$ = MR = SLOPE OF TR CURVE

MR = 40

NOW WE ARE READY TO TALK ABOUT PROFIT MAXIMIZATION.

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

Q: WHAT LEVEL OF OUTPUT THAT MAXIMIZES THE FIRM'S PROFIT?



- BY TR-TC APPROACH, π IS THE LARGEST AT $Q = Q^*$
- $\pi = 0$ AT $Q = Q_2$, Q^*
- BIGGEST LOSS OCCURS AT $Q = Q_1$,

MR-MC APPROACH

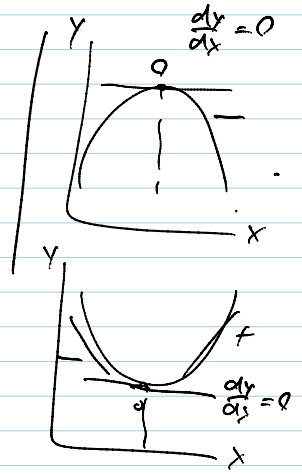
$MC = \frac{\Delta TC}{\Delta Q}$ = SLOPE OF TC CURVE

TO MAXIMIZE PROFIT, THE FIRM MUST PRODUCE WHERE $MR(Q^*) = MC(Q^*)$ ASSOCIATED W/ THE REQUIREMENT THAT MC MUST BE ON RISING PART.

IN CALCULUS:

TO MAX π, WE HAVE TO FIND 1ST ORDER CONDITION:

$$\frac{d\pi}{dQ} = 0$$



$$\frac{d\pi}{dQ} = \frac{d(TR(Q) - TC(Q))}{dQ} = 0$$

$$= \frac{d\,TR(Q)}{dQ} - \frac{d\,TC(Q)}{dQ} = 0$$

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

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

2ND ORDER CONDITION: (TO ENSURE THAT WHAT WE GET IS Q THAT

... MAX π, NOT MIN π)

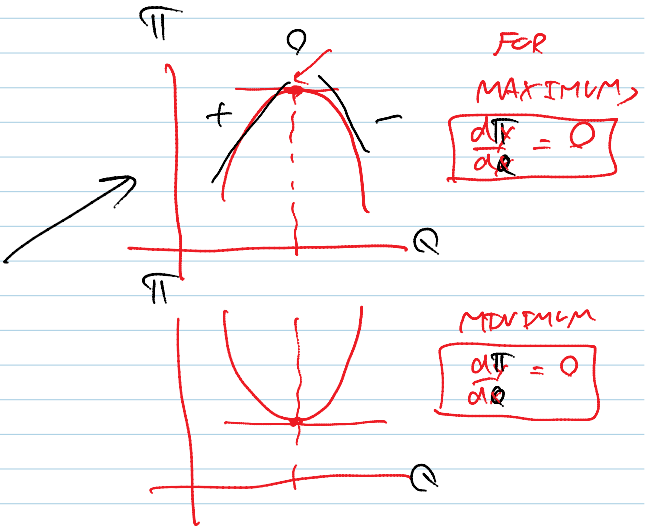
$$\frac{d^2\pi}{dQ^2} = \frac{d\left(\frac{d\pi}{dQ}\right)}{dQ}$$

$$= \frac{d\left(MR(Q) - MC(Q)\right)}{dQ}$$

$$= \frac{d\,MR(Q)}{dQ} - \frac{d\,MC(Q)}{dQ}$$

$$= -\frac{d\,MC(Q)}{dQ} \quad < 0$$

$$= \boxed{\frac{d\,MC(Q)}{dQ} > 0}$$



$\equiv$

SLOPE OF MC CURVE MUST BE POSITIVE

OR

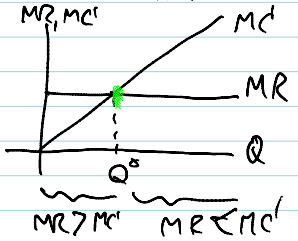
SLOPE OF MC CURVE MUST BE ON RISING PART.

CONCLUSION:

> TO MAXIMIZE π, THE FIRM MUST PRODUCE AT THE LEVEL OF OUTPUT (Q) WHERE MR IS EQUAL TO MC WITH THE REQUIREMENT THAT MC MUST BE ON RISING PART.

PROFIT MAXIMIZATION RULE

NOTE IN MARKET



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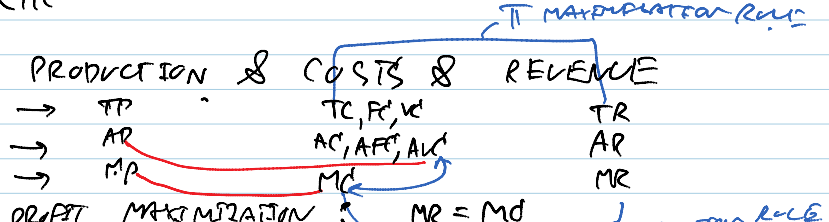
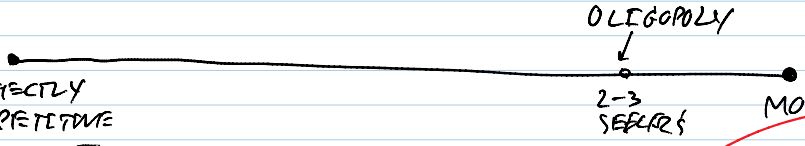


- WE ARE IN THE SHORT RUN.

NEW TOPIC : PERFECTLY COMPETITIVE MKT



MONOPOLIST IS PRICE MAKER ! OR PRICE SETTER

- SINGLE SELLER (MONOPOLIST)
- LARGE NUMBER OF BUYERS
- SELLING THE GOOD W/ NO CLOSE SUBSTITUTE
- BARRIER TO ENTRY

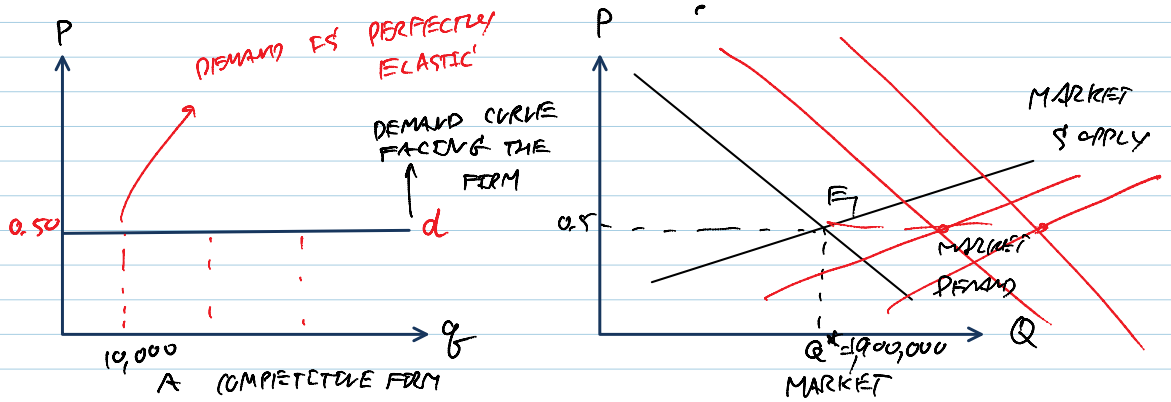
- LARGE NUMBER OF BUYERS AND SELLERS (A CONSUMER IS ATOMATIC) — (1)
- PRODUCT IS NON-DIFFERENTIATED, (OR HOMOGENEOUS PRODUCTS) — (2)
  i.e., CONSUMERS SEE NO DIFFERENCE BETWEEN BUYING FROM SHOP A OR SHOP B.
- FREE TO ENTER OR EXIT (FOR SELLERS) — (3)
- PERFECT INFORMATION — (4)

WITH (1) & (2), IT IMPLIES THAT BUYERS & SELLERS ARE ~~PRICE TAKERS~~.

- PERFECTLY COMPETITIVE MARKET

Q: WHAT LEVEL OF OUTPUT A COMPETITIVE FIRM SHOULD PRODUCE IN ORDER TO MAX π ?

Q: SHOULD IT STOP OR CONTINUE TO PRODUCE WHEN IT FACES LOSSES ?



SHOULD THE FIRM PRODUCE IF IT FACES LOSS ?

CONCEPT : PROFIT WHEN CONTINUE TO PRODUCE ($\pi_{q>0}$)

VS,

PROFIT WHEN STOP PRODUCING ($\pi_{q=0}$)

SHUT DOWN : STOPS PRODUCING "TEMPORARILY"
(AND WAIT UNTIL MARKET CONDITION IMPROVES)

NOTE : SHUT DOWN IS A DECISION IN THE SHORT RUN

THE MANAGER SHOULD CONTINUE TO PRODUCE IF

$$\pi_{q>0} \geq \pi_{q=0} \text{ (= SHUT DOWN)}$$

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

$$TR - VC \geq 0$$

$$TR \geq VC \quad \text{[SHUT DOWN RULE]}$$

- CONTINUE TO PRODUCE IF REVENUE GENERATED (TR) CAN COVER THE VARIABLE COST (VC)
  - EX: PAYMENT TO RAW MATERIALS
    PAYMENT TO THE WORKERS
- FIXED COST IS "IRRELEVANT" TO THIS DECISION.

NOTE :
- FIXED COST
- SUNK COST : COSTS THAT HAVE ALREADY BEEN COMMITTED OR PAID AND CANNOT BE RECOVERED.

"DON'T CRY OVER SPILT MILK"

EX: WTP = 150 BAHT TO WATCH A MOVIE
COST = 100 BAHT / TICKET

GO BACK HOME	BUY ANOTHER TICKET
WTP = 150	WTP = 150
COST = [illegible]	COST = 100

WTP = 150

COST = ~~100~~ + 100

SINCE COST > BENEFIT

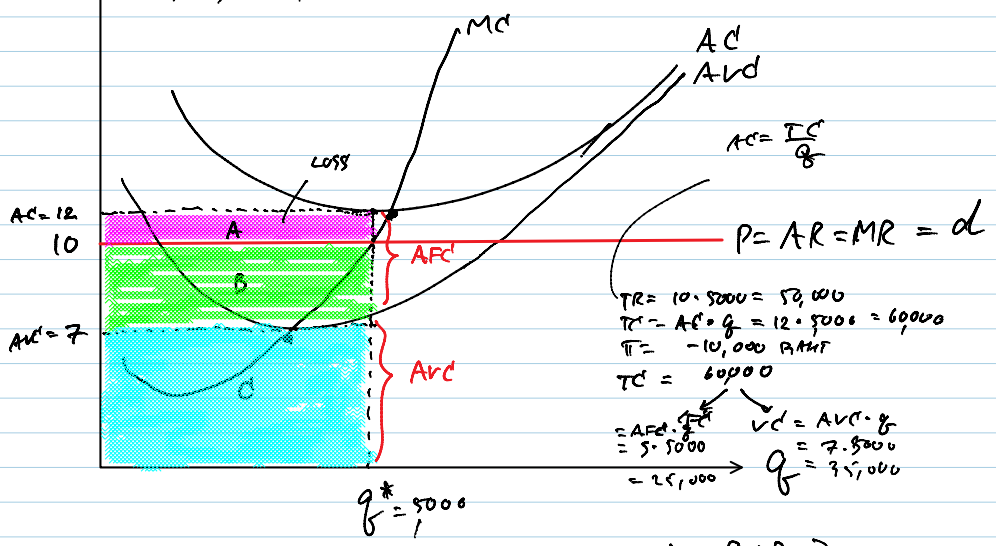
THEN ~~GO HOME~~

COST = 100

B > C

THEN, BUY ANOTHER ITEM

P, AR, MR, AC, AFC, AVC, MC



TR = B + C

TC = A + B + C

π = (B + C) − (A + B + C) = −A

FC = A + B

VC = C

π WHEN CONTINUE TO PRODUCE ($\pi_{q>0}$) = −A ☹

vs

π WHEN SHUT DOWN ($\pi_{q=0}$) = −A − B ☹☹

LOSS WHEN CONTINUE TO PRODUCE < LOSS WHEN SHUTDOWN

SO, THE FIRM SHOULD CONTINUE TO PRODUCE !

- YOU CAN SEE THAT THE MANAGER CAN USEFULLY MIX TR (= B + C) TO COVER VC ☺ PARTIALLY
  1. PAY TO VARIABLE COSTS (C)
  2. PAY SOME PART OF FIXED COSTS (B) ☹ FC COULD

★ ANOTHER VERSION OF SHUT DOWN RULE :

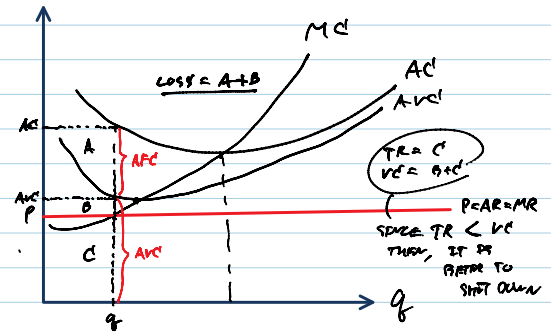
SHUT DOWN IF TR < VC

OR

SHUT DOWN IF $\frac{TR}{q} < \frac{VC}{q}$

$P < AVC$

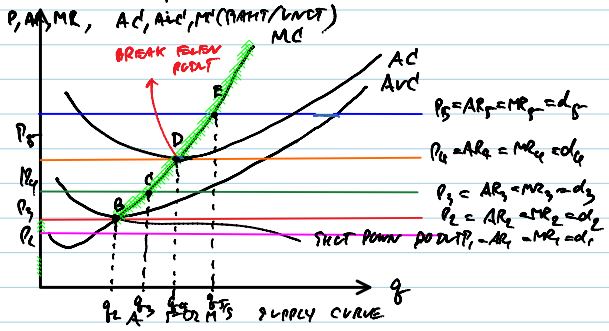
(PRICE / UNIT) (VC / UNIT)



28.11.12 (15.30 →)

SO FAR,
- CHARACTERISTICS OF PERFECTLY COMPETITIVE MKT
- PROFIT MAXIMIZING CONDITION
  (⇒ WHICH q DELIVERS HIGHEST POSSIBLE PROFITS)
- SHOULD THE FIRM PRODUCES IF IT EXPERIENCES LOSS? (SHUT DOWN RULE/CONDITION)

NOW, A FIRM'S SUPPLY CURVE : THE RELATIONSHIP BETWEEN PRICE OF THE GOOD AND AMOUNT THAT THE FIRM IS WILLING TO SELL.



- A SHORT RUN SUPPLY CURVE FOR A PRICE TAKING FIRM IS A PART OF MC CURVE STARTING FROM POINT B (SHUT DOWN POINT)
- POINT B IS CALLED "SHUT DOWN POINT" WHERE P = MINIMUM OF AVC.
- POINT D IS CALLED "BREAK EVEN POINT" WHERE P = MINIMUM OF AC (OR ATC)

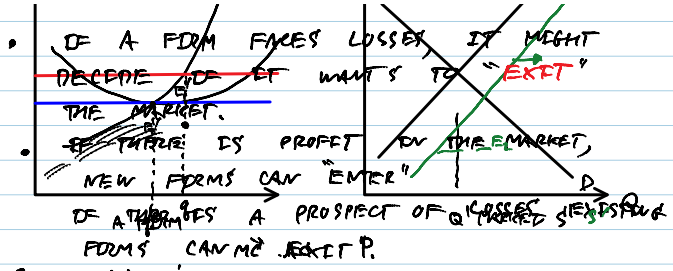
PERFECTLY COMPETITIVE MARKET IN THE LONG RUN.

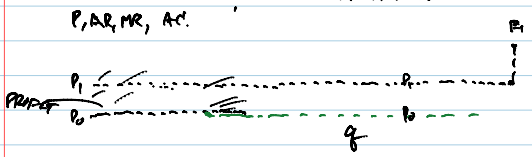
- IN THE LONG RUN, THERE IS ONLY VARIABLE INPUTS. (NO FIXED INPUTS)

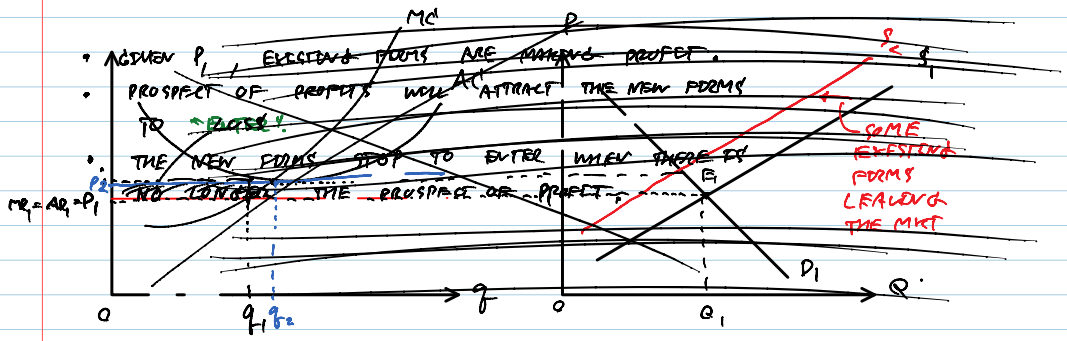
$Q = F(L, K)$

BOTH L AND K ARE VARIABLE INPUTS.

- IF A FIRM FACES LOSSES, IT MIGHT DECIDE TO EXIT "EXIT"

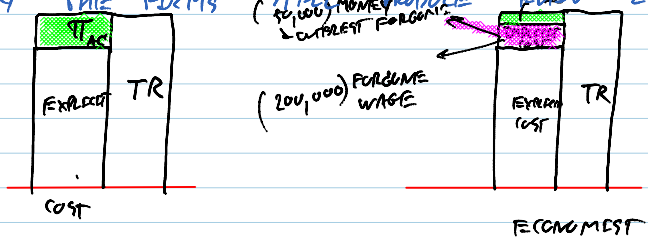






- NOTICE THAT IN THE LONG-RUN, ALL FIRMS EARN ZERO PROFIT. (P = MINIMUM OF AC)

- WHY THE FIRMS (STILL OWNERS) PRODUCE EVEN ZERO PROFITS?



ACCOUNTANT'S VIEWPOINT

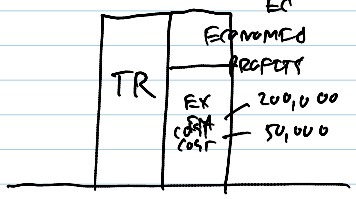
$\Pi_{AC} = TR - TC$

$\Pi_{EC} = TR - TC$ (BOTH EXPLICIT AND IMPLICIT COSTS ARE TAKEN INTO A/C)

IN GENERAL, $\Pi_{AC} > \Pi_{EC}$

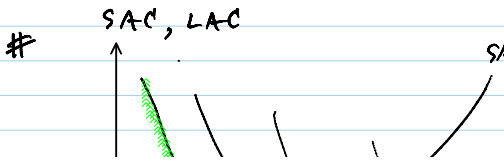
Π_{AC}: ACCOUNTING PROFIT

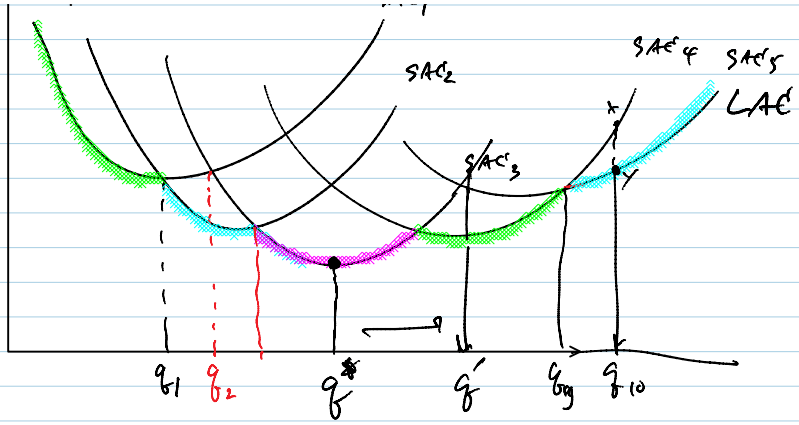
Π_{EC}: ECONOMIC PROFIT



$\Rightarrow TR = TC$

WHEN REVENUE GENERATED IS ENOUGH TO PAY ALL ECONOMIC COST, BOTH IMPLICIT AND EXPLICIT COST, IT IS SENSIBLE FOR A FIRM TO STAY IN THE MARKET




SAC2
SAC4
SAC5
LAC
SAC3
q1
q2
q*
q'
q9
q10