Perfect Competition.

1) Many buyers and many sellers. – no single buyer or seller can have any effect on price by buying or selling more or less.

2) Homogeneous product.
   – each seller produces essentially the same product that is perfect substitute for others' output.

every buyer + sellers is price taker.

3) Every firm has the same technology (i.e. production function) $Q = f(L, K)$

4) ——— the same access to L + K at the same prices of w + r. (same input quality)

5) Full Efficiency.

6) Free Entry and Exit to the market.

Every firm has the same cost curves.

Every firm wants to maximize profit.

Total Profit = Total Revenue − Total Cost.

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

Note If we are producing in Short Run

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

In perfect competition, every firm wants to

$$\max_{Q} \pi(Q) = TR(Q) - TC(Q)$$

Calculus.
$$\max_{x} f(x) = 5 + 16x - x^2$$

$$f'(x^*) = \frac{d f(x^*)}{dx} = 16 - 2x^* = 0, \quad x^* = 8 \text{ - critical point.}$$

$$\frac{d f(x)}{dx} = 16 - 2x$$

$$\frac{d^2 f(x)}{dx} = \frac{d}{dx}\left(\frac{d f(x)}{dx}\right) = -2$$

so at x^* $\frac{d^2 f(x^*)}{dx} = -2 < 0$

By sufficient conditions.

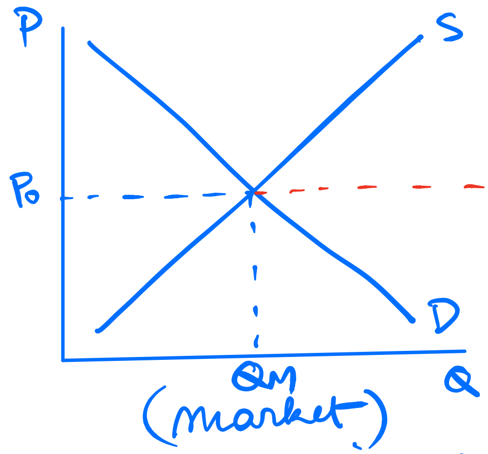
1st order suff cond 1) $f'(x^*) = 0$

2nd order suff. 2) $f''(x^*) < 0$

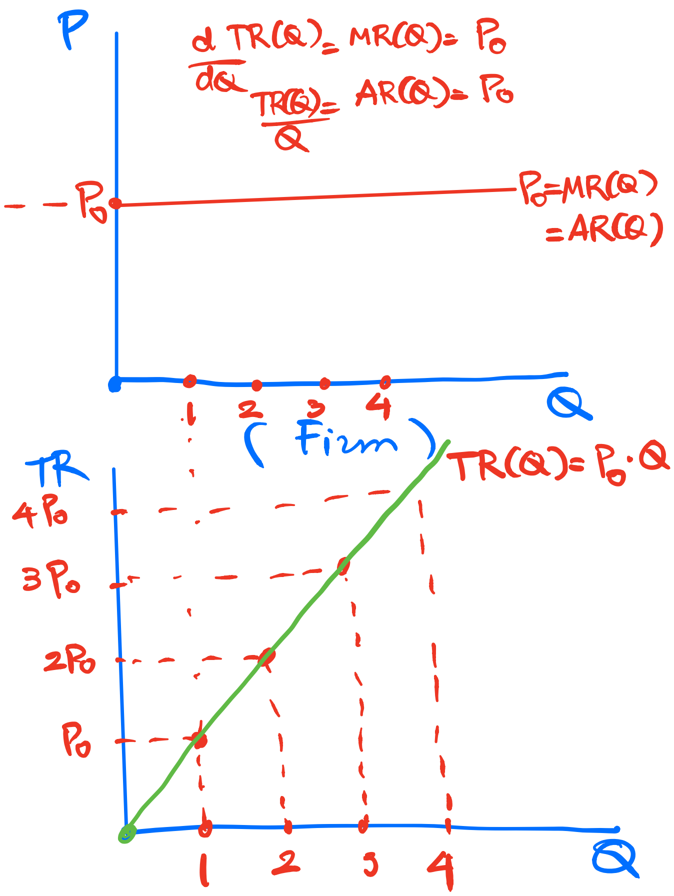
$$\left.\begin{array}{l} f'(x^*) = 0 \\ f''(x^*) < 0 \end{array}\right\} \Rightarrow x^* \text{ is max.}$$

Necessary Conditions

$$x^* \text{ is max} \Rightarrow \begin{array}{l} 1)\ f'(x^*) = 0 \\ 2)\ f''(x^*) \leq 0. \end{array}$$



Market Equilibrium is at price $= P_0$ and total market output (consumption) $= Q_M$.



$$\max_{Q} \ \pi(Q) = TR(Q) - TC(Q)$$

1st-order suff. condition.

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

$$\pi'(Q^*) = TR'(Q) - TC'(Q)$$

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

at critical point Q^* we have $\Rightarrow$ $\underline{MR(Q^*) = MC(Q^*)}$

Check 2nd-order suff. condition at Q^*

$$\pi''(Q^*) = \frac{d}{dQ} MR'(Q^*) - \frac{d}{dQ} MC(Q^*) < 0$$

$\Rightarrow$ slope of MR < slope of MC at Q^*

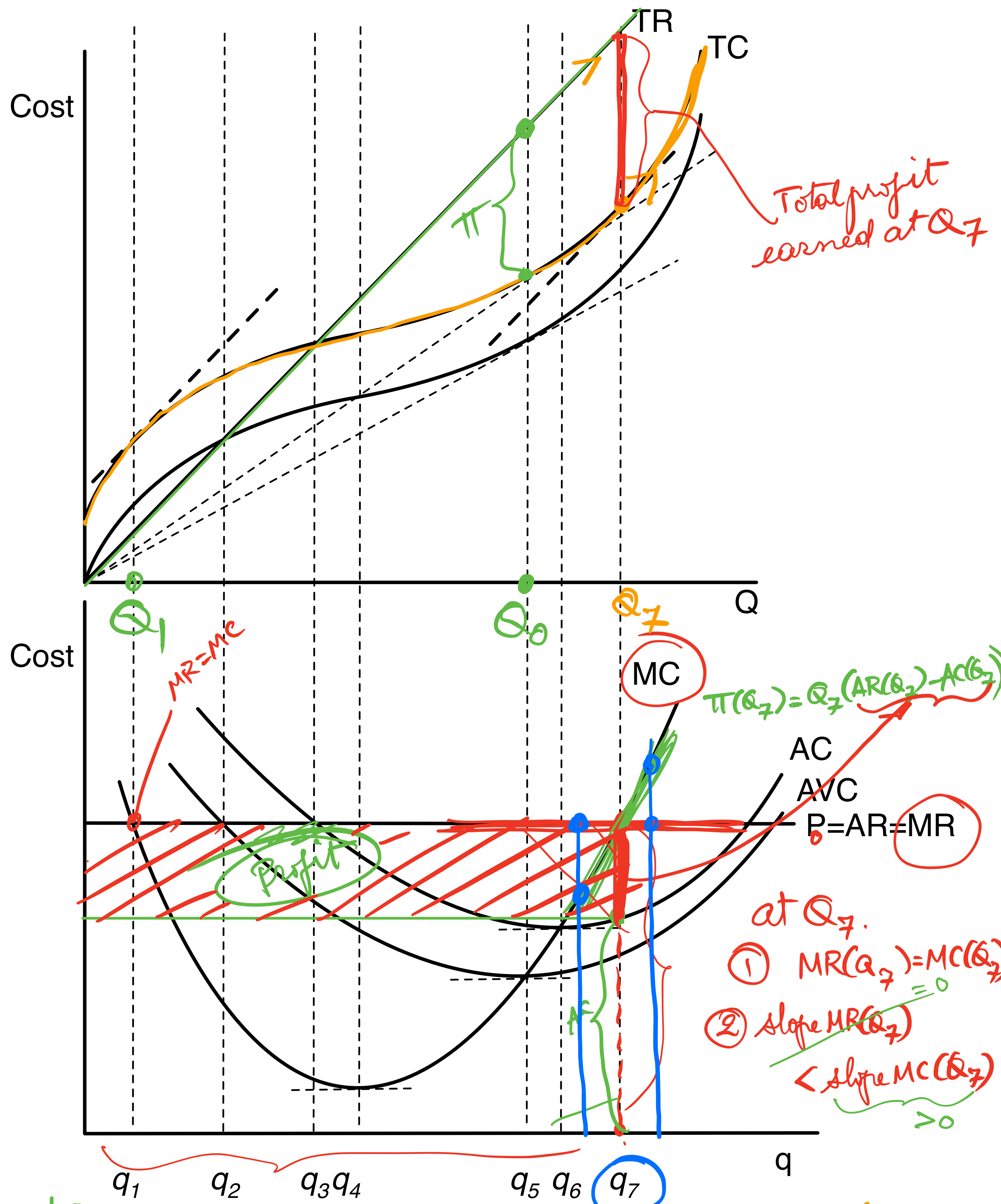
$\therefore$ we can conclude that Q^* maximizes profit if

$$\left\{\begin{array}{ll} 1) & MR(Q^*) = MC(Q^*) \\ 2) & \frac{d}{dQ} MR(Q^*) < \frac{d}{dQ} MC(Q^*) \end{array}\right\} \text{Equilibrium Conditions.}$$

(slope MR < slope MC) at Q^*

$\pi = TR - TC$

Perfect Competition Equilibrium of a Firm in Short Run



at Q_1 $MR(Q_1) = MC(Q_1)$

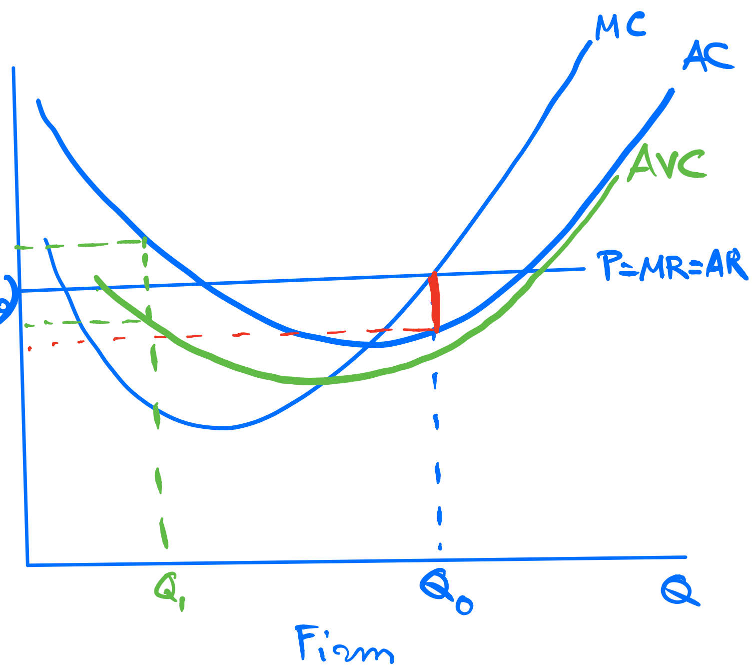
but $\underbrace{\text{slope } MR(Q_1)}_{=0} > \underbrace{\text{slope } MC(Q_1)}_{<0}$ } Q_1 actually minimizes π

$$\pi(Q_7) = TR(Q_7) - TC(Q_7)$$
$$= Q_7 \cdot AR(Q_7) - Q_7\, AC(Q_7)$$
$$= Q_7 \big(\underbrace{AR(Q_7) - AC(Q_7)}_{''} \big)$$
$$= Q_7 \big(\text{Average Profit}(Q_7) \big)$$

H.W. Why does the firm not produce at the quantity that maximizes average profit?

Average profit $= AR(Q) - AC(Q)$

SR Equilibrium.



at Q_0 because

1) $MR(Q_0) = MC(Q_0)$

2) slope $MR(Q_0) <$ slope $MC(Q_0)$

Average profit at Q_0
$= AR(Q_0) - AC(Q_0)$

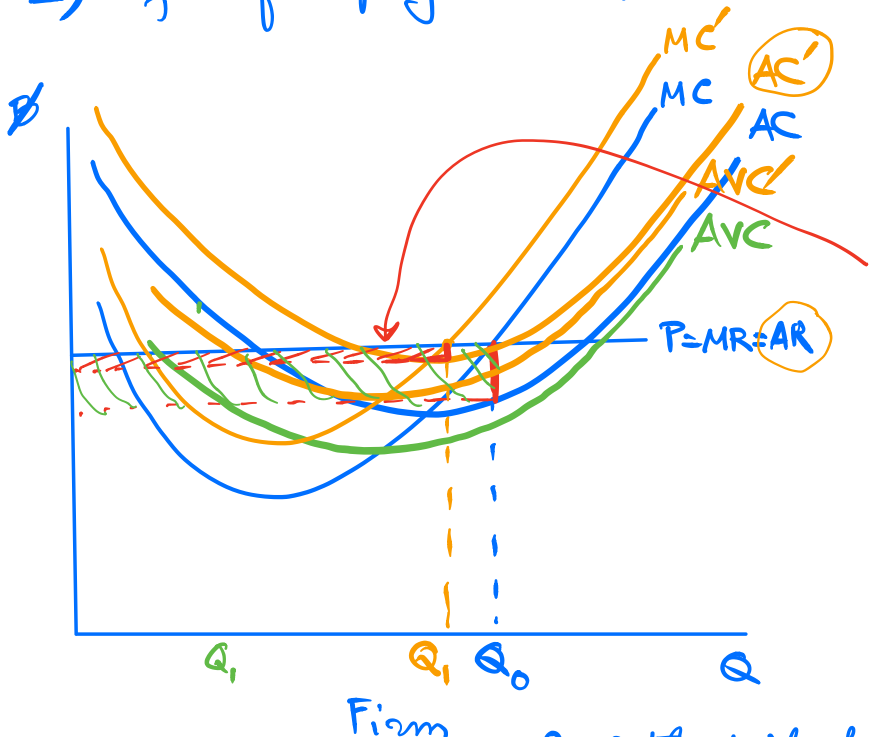
At Q_0, total profit
$= (AR(Q_0) - AC(Q_0)) \cdot Q_0$

Note. The firm does not necessarily max profit at quantity where AC is minimum

- at any Q, $AFC(Q) = AC(Q) - AVC(Q)$

Application

1) If the firm pays tax 10฿/unit.



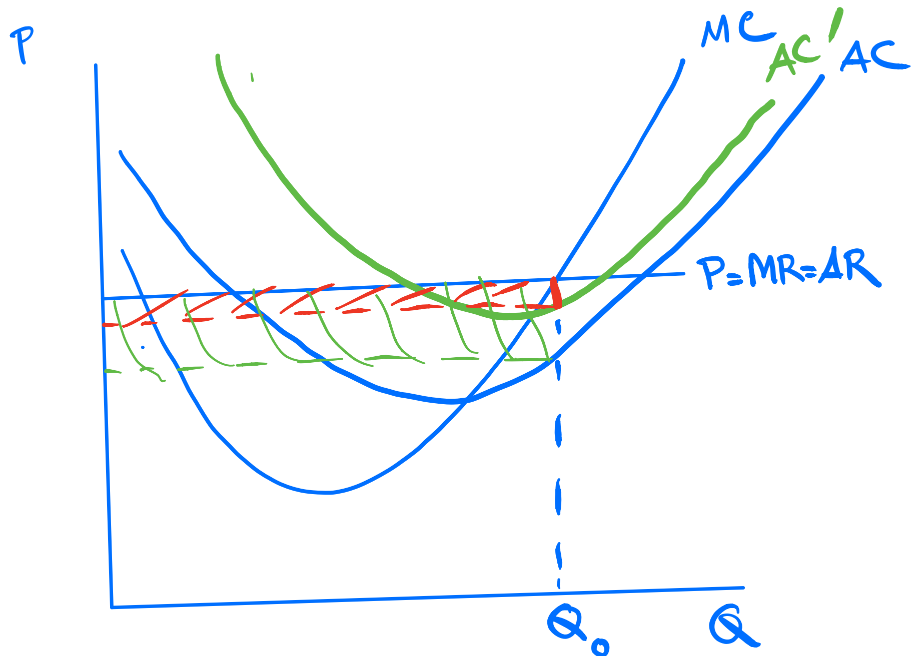
– Firm produces less at Q_1, where

1). $MR(Q_1) = MC'(Q_1)$

2) slope $MR(Q_1)$ < slope $MC'(Q_1)$

<u>HW.</u> The tax can be so high that the firm is making a loss in SR. Show this and explain why the firm does not shut down in SR.

2.) Increase in Fixed Cost. – Rent, License Fees.



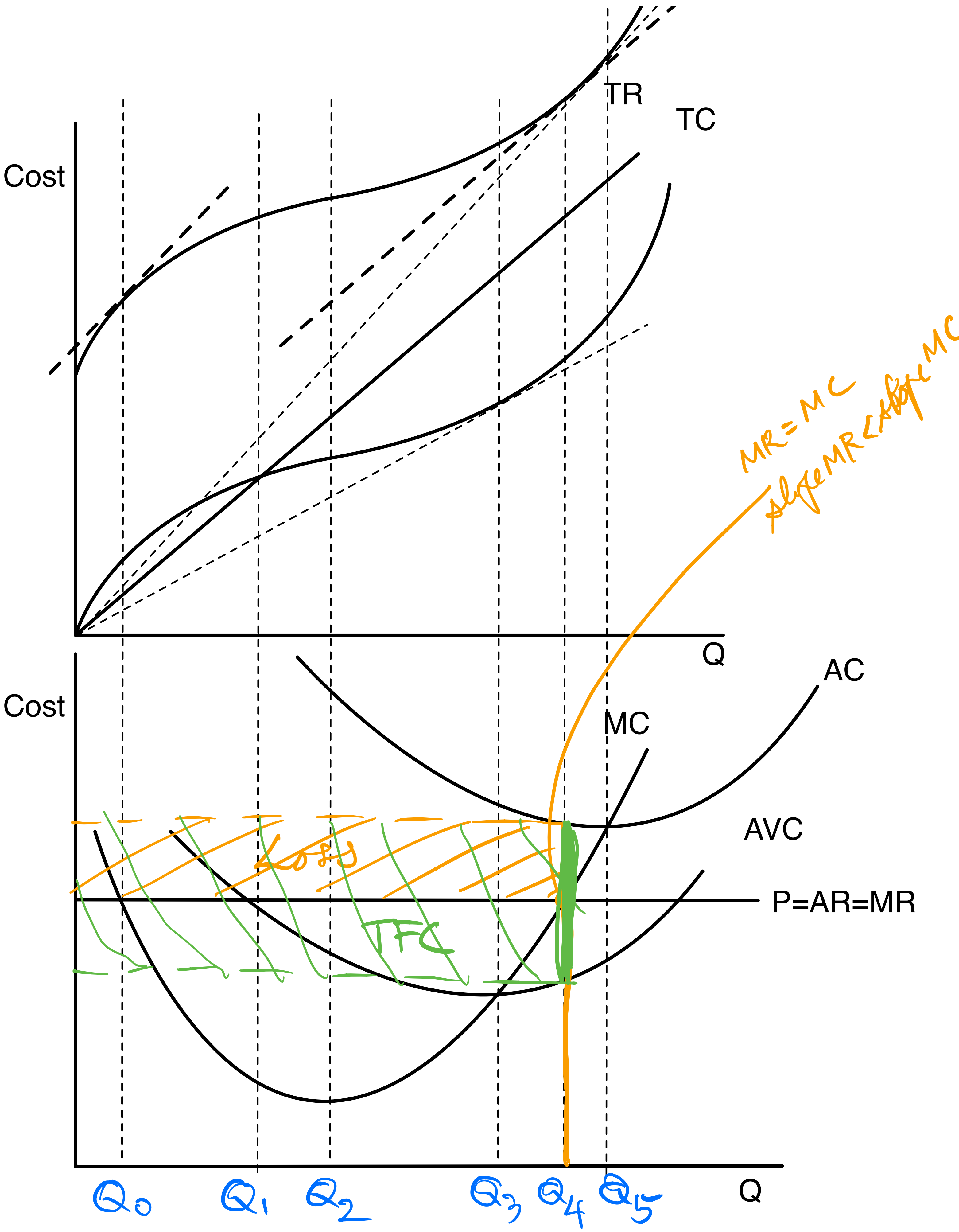
Before increase in Rent, Q_0 is the eq.
Higher rent doesnt change MC. so Q_0 remains the equilibrium. – but less profit.

Shut-Down Point in S.R.

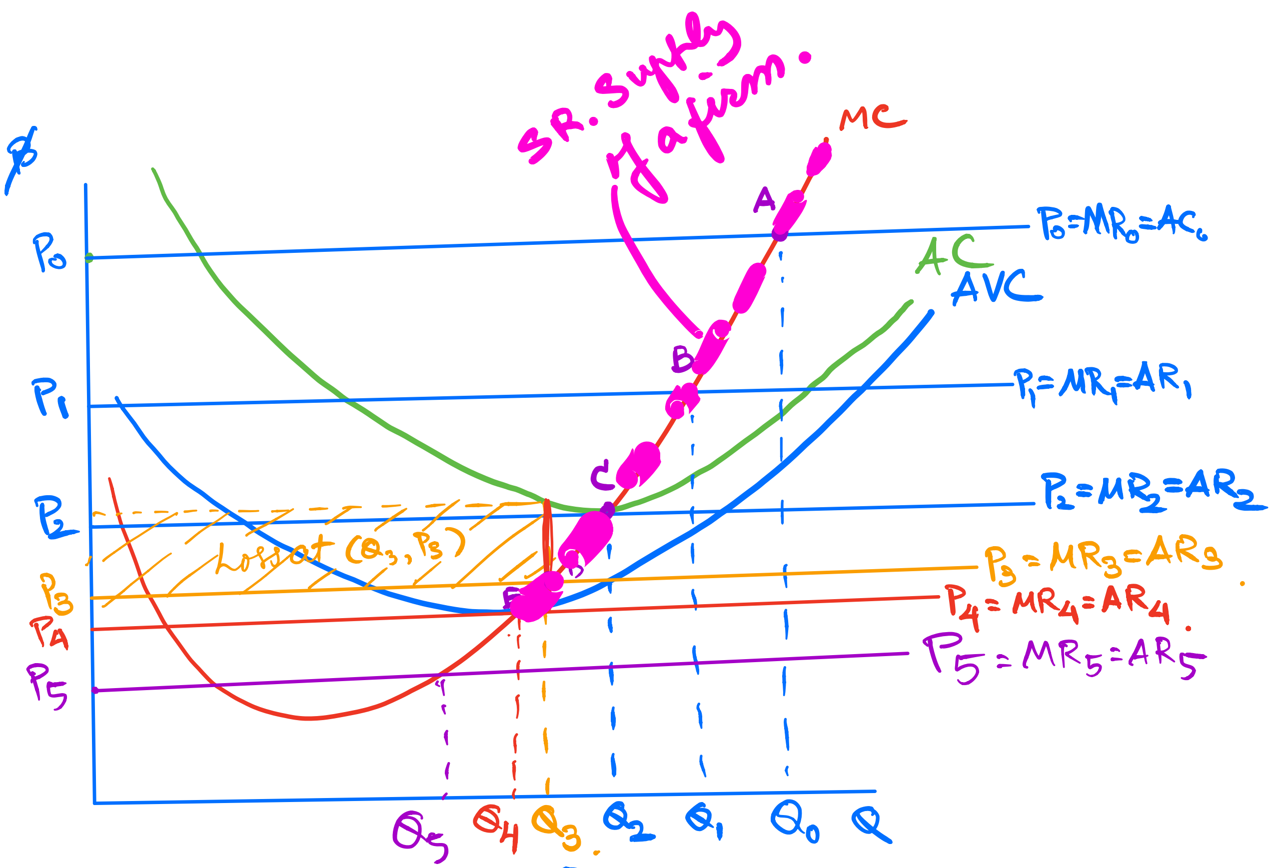
- In SR, even the firm is making a loss, the firm might still want to continue operating.

If shut-down — pays TFC.

$\therefore$ Continue if LOSS < TFC



Loss – but continue to produce at Q_4.
because Loss < TFC



Lower price ⇒ 1) Lower Q
2) Lower π.

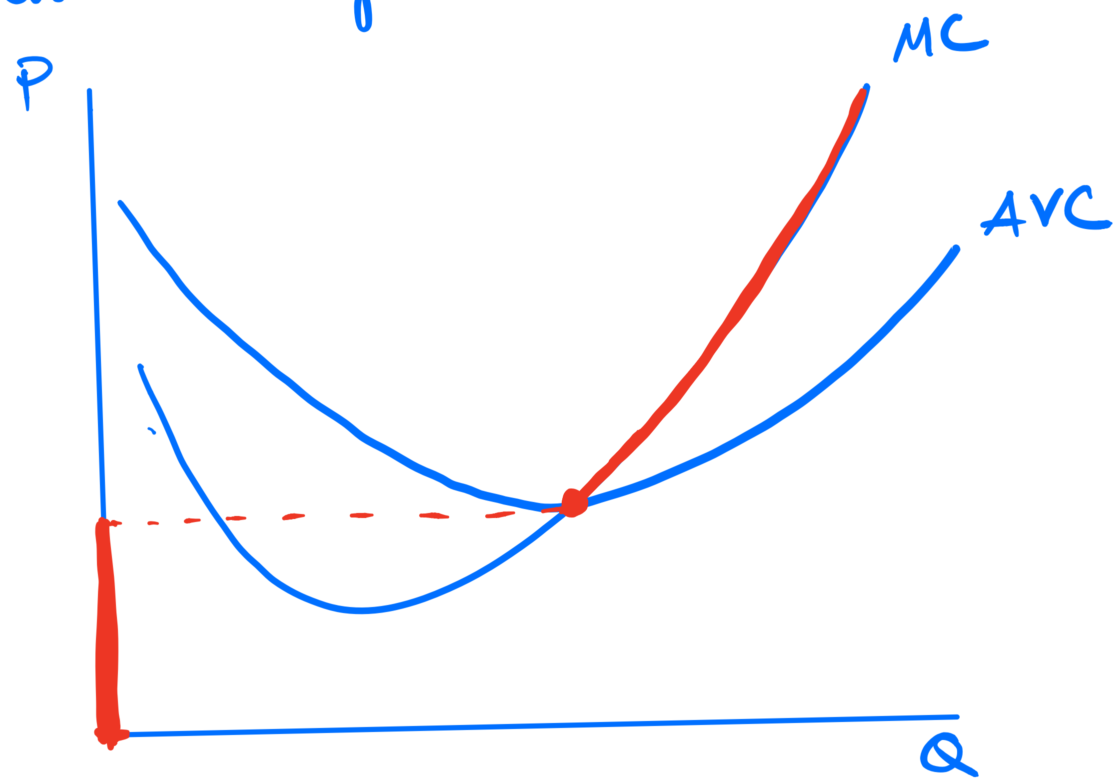
At Q_2, and price P_2 ⇒ Break-even - Profit = 0.

At Q_3, ——— P_3 ⇒ Loss < TFC ⇒ continue.

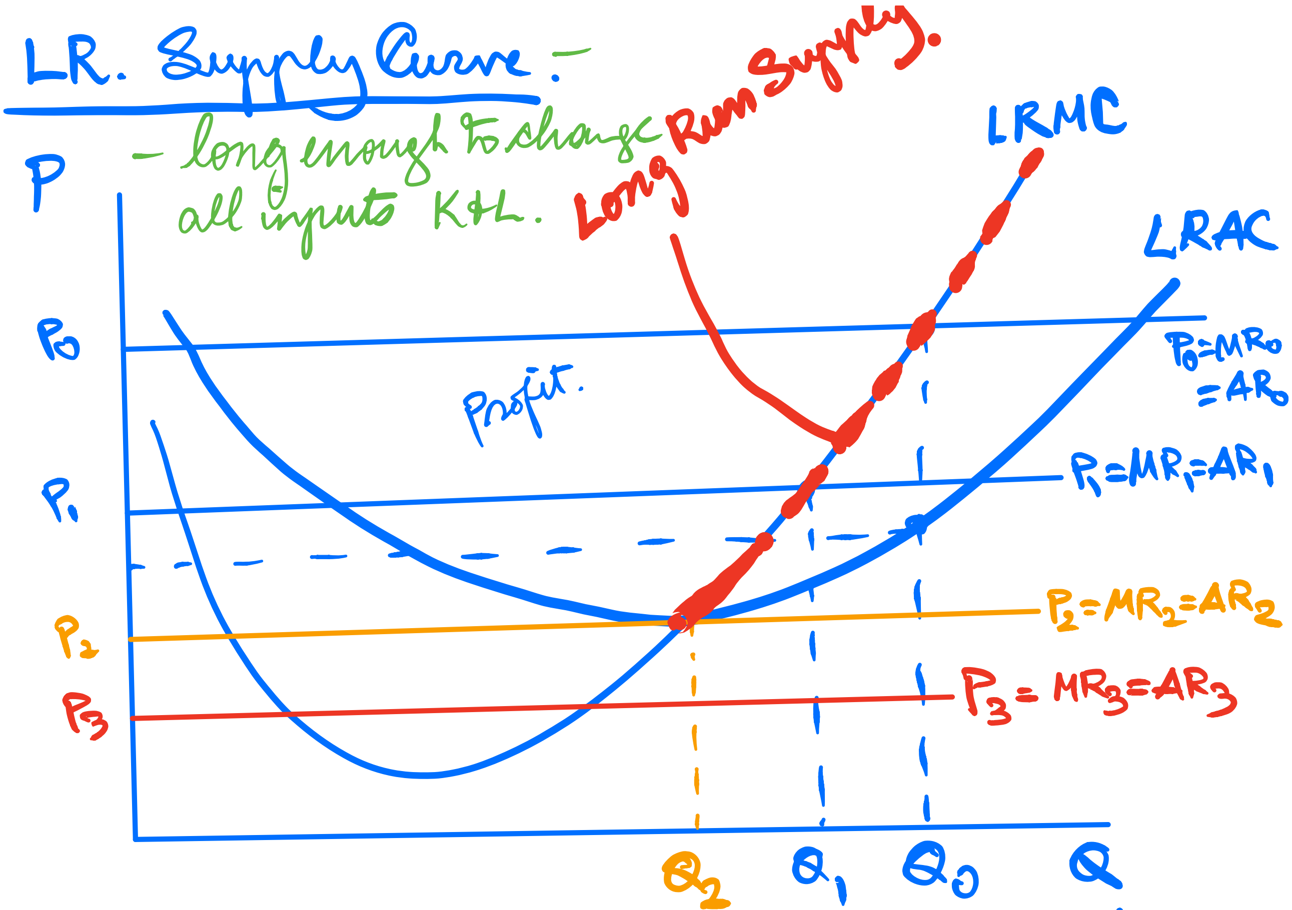
At Q_4 ——— P_4 ⇒ Loss = TFC ⇒ Shutdown point

At Q_5 ——— P_5 — Loss > TFC - Shut down.

S.R. Supply curve is MC from the minimum of AVC, and quantity supplied will be 0 for any price lower than min of AVC



LR. Supply Curve :-



Lower price ⇒ Lower Q and have lower profit

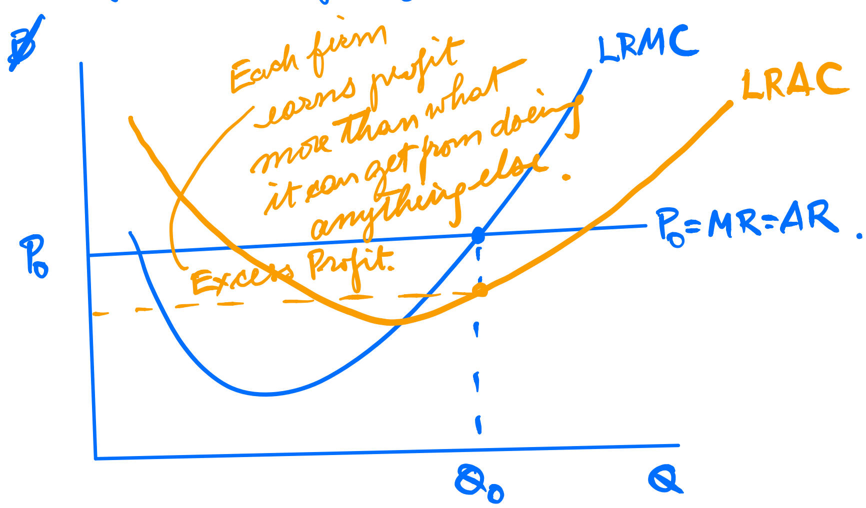
at P_2 and Q_2 – profit = 0

at P_3 and Q_3 – Loss – Shut down.

In L.R if the cost also includes the opp cost of each firm

opp cost = profit or earning each firm can get from the next best thing it can do.

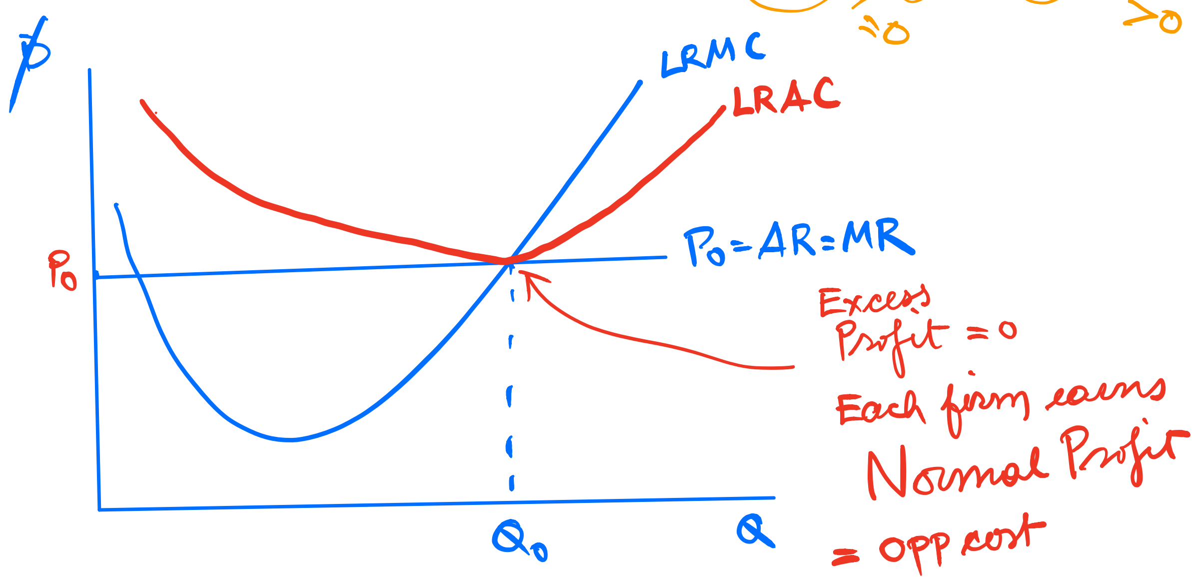
∴ Given a price P_0, if the firm receives positive profit ⇒ Excess Profit.



Eq at (Q_0, P_0) because

1) $MR(Q_0) = LRMC(Q_0)$

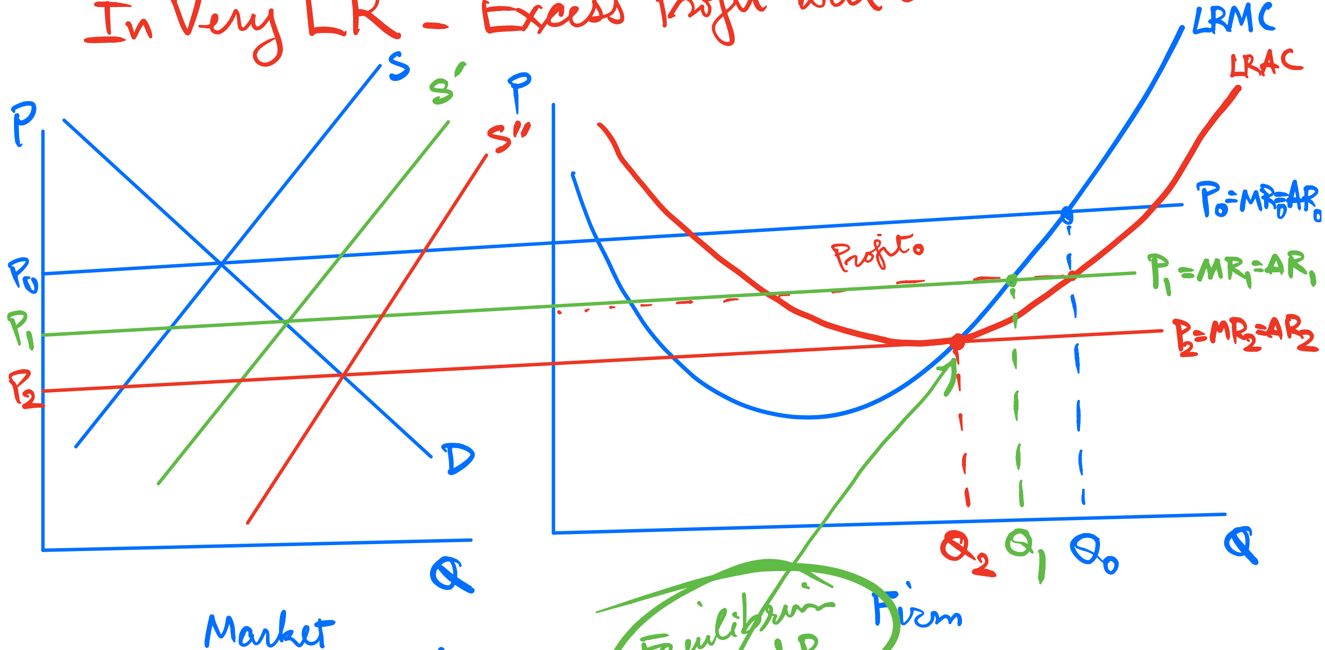
2) $\underbrace{\text{slope } MR(Q_0)}_{=0} < \underbrace{\text{slope } LRMC(Q_0)}_{>0}$



Equilibrium in LR — Long enough to change all inputs

and in Very LR — long enough that new firm can enter the market.

In Very LR — Excess Profit will attract new Comers.



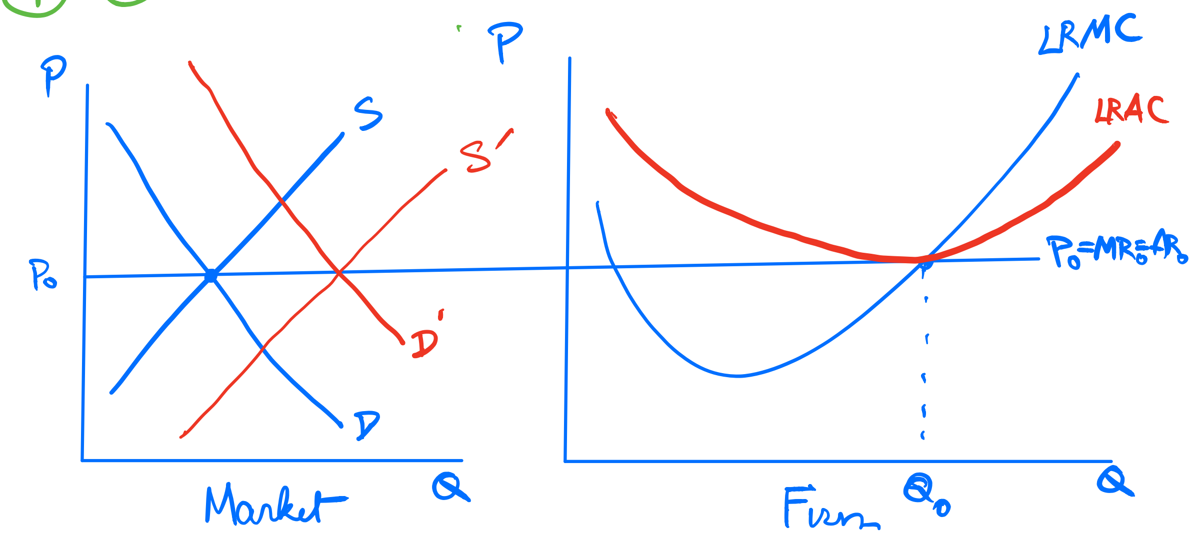
Equilibrium in Very LR

at P_0, Excess Profit

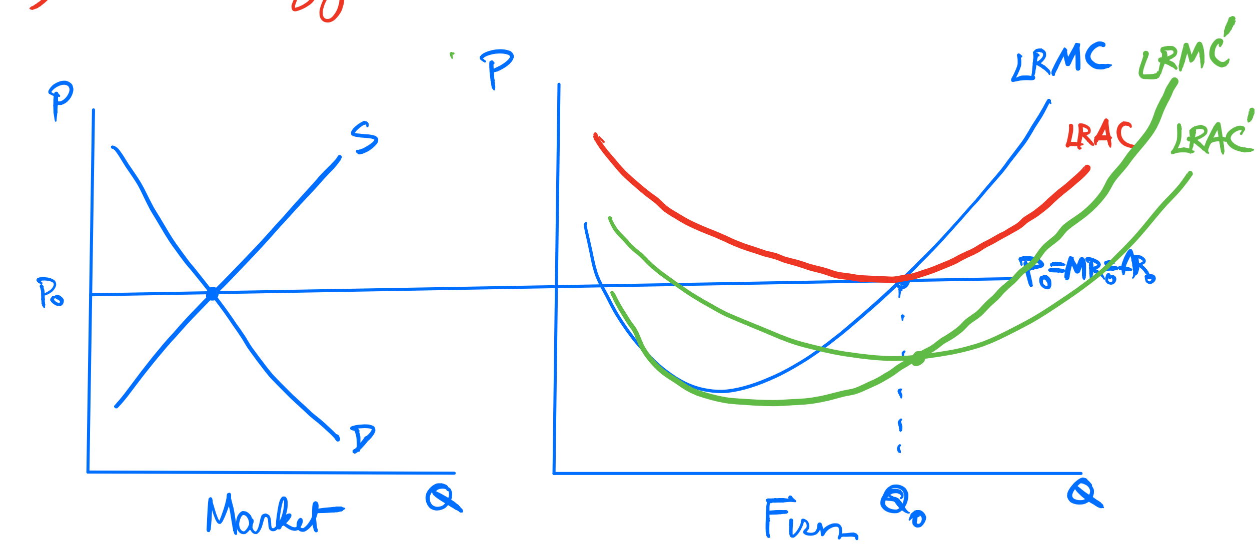
- Supply increases from S to S' — but profit is still > 0
- Supply will increase until S'' so that P is P_2 and each firm produces Q_2 where LRAC is min. and Excess profit = 0 ⇒ Normal Profit.

Applications.

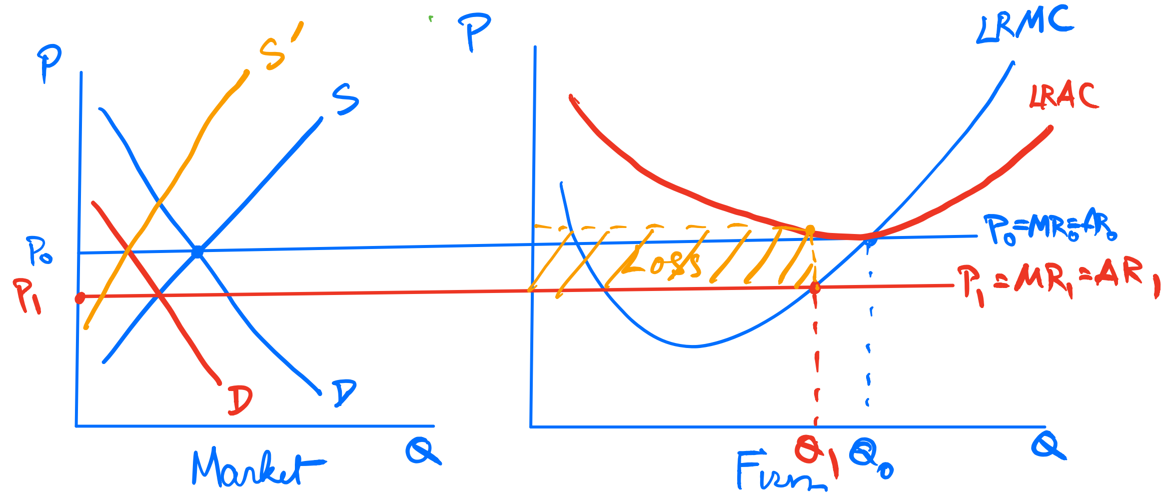
① D increases



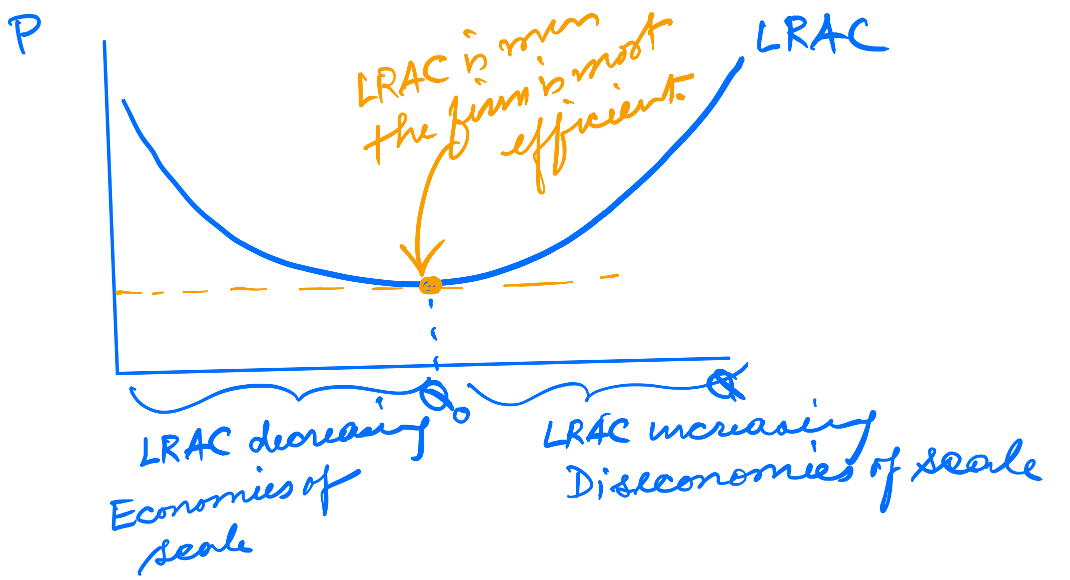
2) Technology Improves.



3) Demand Decreases.

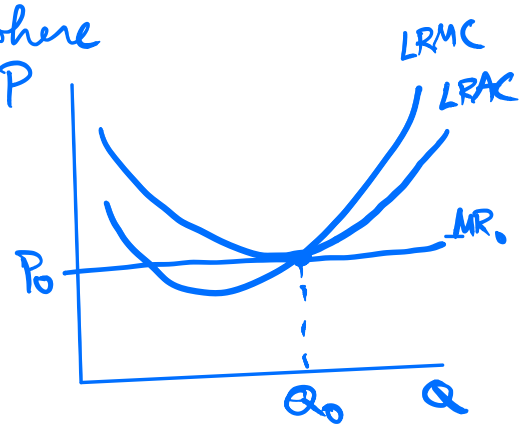


Price returns to P_0 where LRAC is min.



Perfect Competition in Very LR

The equilibrium will be where



1) $P_0 = LRMC = MR$.

and slope $MR <$ slope MC.

where LRAC is min.

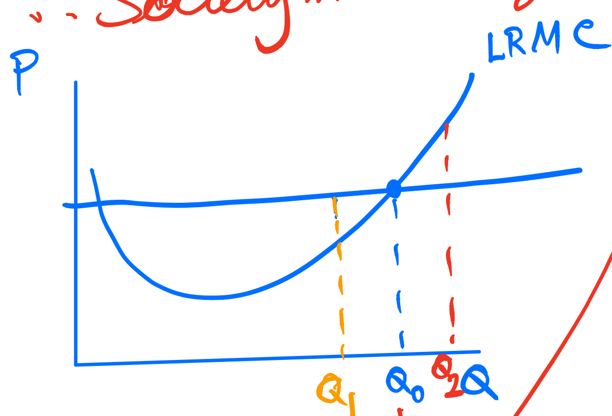
i.e. every firm produces at Q_0 where it is most efficient

2) $P_0 = LRMC(Q_0)$

P_0: Value of last unit ~~sold~~.

$LRMC$: Cost of producing the last unit.

$\therefore$ Society maximizes the Social Welfare.



Efficiency in the distribution of resources of society to maximize social welfare.