Keynesian Investment Function

↗ flow variable

- Investment is defined as addition to capital stock
- Related to capital
- capital is ~~net~~ cumulative net investment.

$$K_t = \sum_{i=1}^{t} I_t$$

K_t ← Capital stock in time t

I_t ← Net investment in time t

$$I_t = K_t - K_{t-1}$$

$$I_{n,t} = I_{g,t} - D$$

$I_{n,t}$ ← net Investment

$I_{g,t}$ ← Gross Investmen

D ← Depreciation (wear & Tear)

Types of Investment

- Business Fixed (Non-residential) investment
- Residential Investment
- Inventory Investment

- Guiding principle behind investment is profit.

Decision to Invest

- New investment is determined by marginal efficiency of capital (MEC) in conjuction with rate of intrest (r)

→ MEC is highest rate of return over cost expected from producing an additional unit of capital.

→ MEC refers to the rate of discount which makes the present value of expected net returns from a capital asset just equal to it's supply price.

MEC depends on
- Supply price / Replacement cost
- Prospective yields or expected returns from an income yielding assets

$$C_0 = \sum \frac{R_t}{(1+e)^t}$$

(C_0: supply price; R_t: prospective yield)

MEC $\geq$ Ri
↳ Profit

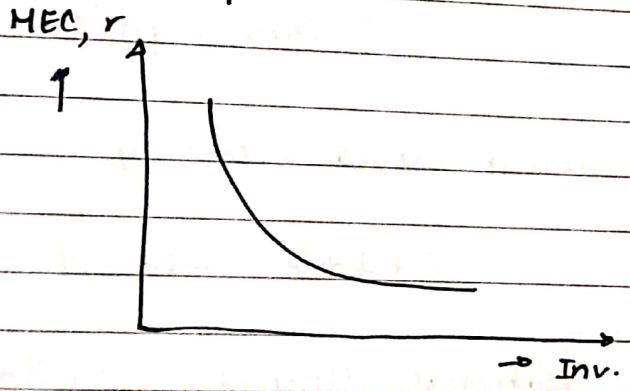
e → MEC

If $e > r$, new investment is profitable
$e < r$, new investment is non-profitable
$e = r$, investers are neutral.

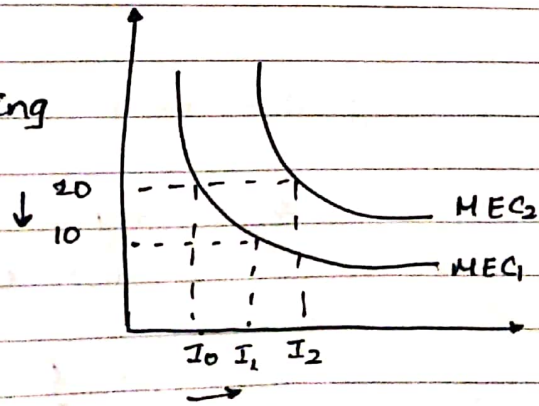
Supply Price : Sum of prospective yields discounted at MEC

Demand Price : Sum of propective yields discounted at current rate of intrests

- Demand price ↑, the lower R. I at which it is discontinued.
- RI ↓, More investment (Classical eco.)
- Kayne's says for more investment MEC must exceed rate of intrest
- MEC and r are determined ind. of each other
- MEC isn't same as marginal pdt. of capital which is concerned with immediate effect of additional capital.



- Company keeps investing till MEC = r
- As r↓, I↑



Case: r ↓ by 0.5%. r↓ by 5%.
I ↑ by 8%. I↑ by 2%.
↳ More sensitive
Steeper
↳ More elastic w.r.t r

Factors Influencing MEC

- → Infrastructure (Most. imp)
- → Governance
- → Capital equipment supply
- → Change in income
- → Production methods
- → Govt. policy
- → Nature of Demand
- → Business cycle

Introduction to Income Determination

$$Y \text{ (Income)} = C + S + T + (X - M)$$

(Net Export; C ↑ consumption)

$$Y = C + I + G + (X - M)$$

- G → Govt. Expenditure
- I → Investment
- C → Consumption

Assuming closed economy,

$$C + I + G = GDP = Y = C + S + T$$

∴ National Income, $C + I + G = GDP = C + S + T$

$$y - c = i + g \qquad y - c = s + t$$

$$\Rightarrow \quad i + g = s + t$$

$$\therefore \bar{i} = s + (t - g)$$

($t - g$ → unforseen changes)

$$i = \bar{I} + \Delta inv = s + t - g$$

($\bar{I}$ ↑ Planned Invest.; Δinv ↖ unplanned invest)

Tax

Tax revenue is a fn. of income (y)

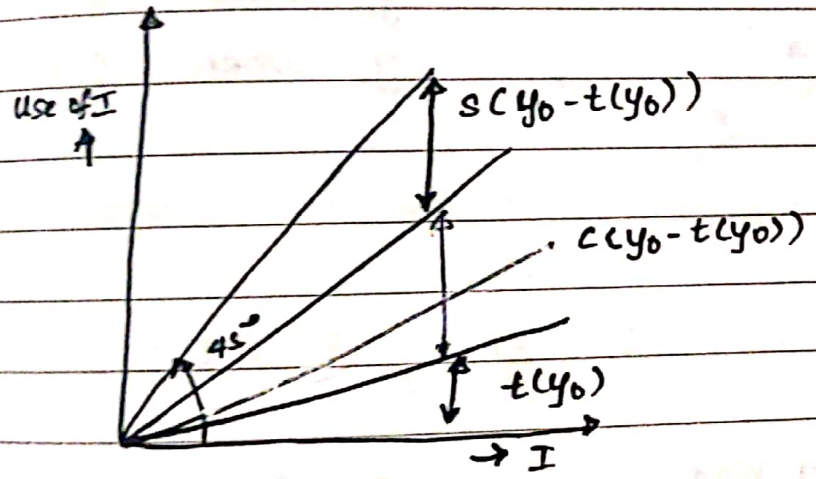
$t = t(y)$: $t' > 0$ $\quad \frac{dt}{dy} > 0$

Disposable income = $y - t(y)$

$C = C(y - t(y))$ $\quad C' > 0$ ← MPC

$S = S(y - t(y))$ $\quad S' > 0$ ← MPS

MPC + MPS = 1



Area under $t(y_0)$ is tax.

$\bar{I} + \Delta i + g = S + t$ ← Zero for eq.

$\bar{i} + \Delta i + g = S(y - t(y)) + t(y)$

$\bar{i} + g = S(y - t(y)) + t(y)$ (Eq. cond.)

If income increases,

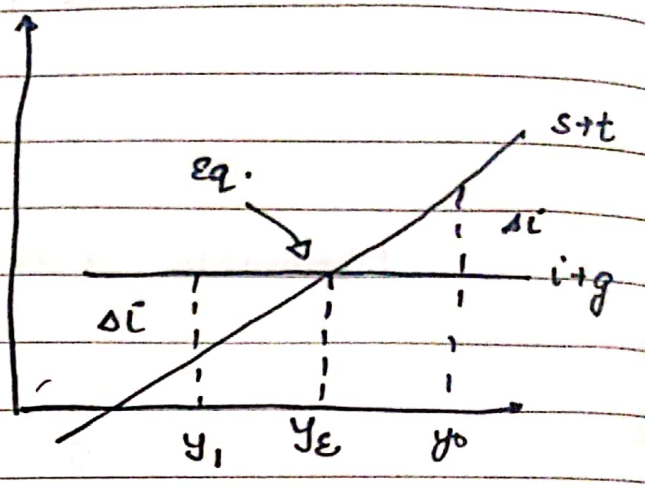
$S + t > i + g$

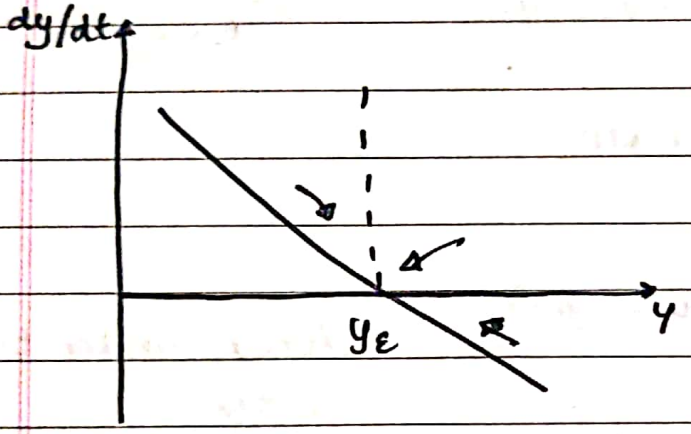
$(S + t) - (i + g) = \Delta i > 0$

$\Delta i > 0 \Rightarrow$ extra inventory. So producers will call back orders until $\Delta i = 0$

Determination of Eq. Income

(S+t) +vely slope, as both are fn. of y.





$y_e \rightarrow$ Eq. income
y_0 when $(s+t) > (i+g)$
y_1 when $(s+t) < (i+g)$

Consider $C = 20 + \frac{3Y}{4}$, $I = 20$

Eq. is reached when $S = I$

$$-20 + \frac{3Y}{4} = 20$$

$$\Rightarrow Y = 160$$

(OR) $Y = C + I \Rightarrow Y = 160$

Expenditure Multiplier

Following Keynesian model –

→ Vol. of investment expenditure
→ Consumption is a fn. of income and is linear
→ MPC is positive but less than unity
→ Economy is closed one.

$C = a + bY$ $\qquad I = I_0$

$$Y = C + I = a + bY + I_0$$
$$Y(1-b) = a + I_0$$
$$Y = \frac{a + I_0}{(1-b)}$$

Suppose investment changes to $I = I_0 + \Delta I$

$$\Rightarrow \Delta Y = \frac{\Delta I}{1-b}$$

$$\therefore \Delta Y = k(\Delta I)$$

(k ← Multiplier)

Multiplier is amt. by which eq. output changes when autonomous investment increases by 1 unit.

→ Larger the MPC, larger is multiplier.

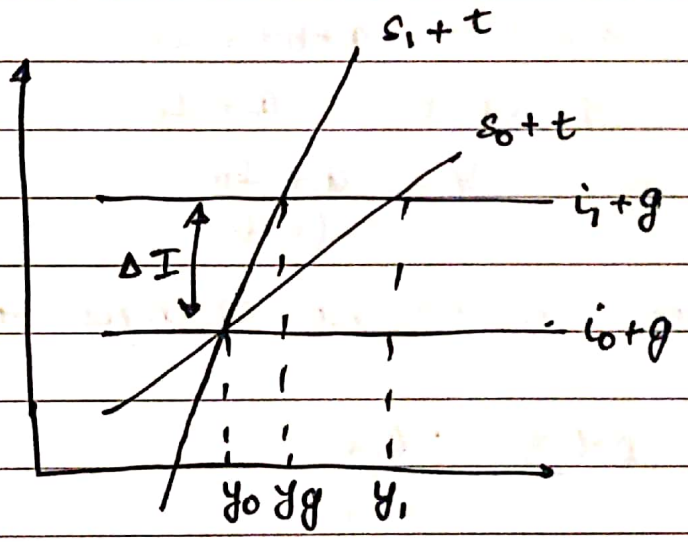
Consider ΔI increase in R-1,

Due to increase in income, demand increase, so production increase, which further gives rise to an increase in income.

$$\Delta D = \frac{1}{1-c} \Delta I = \Delta Y_0$$

c ↑ MPC

For $b < 1$, the successive terms in the series become progressively smaller.



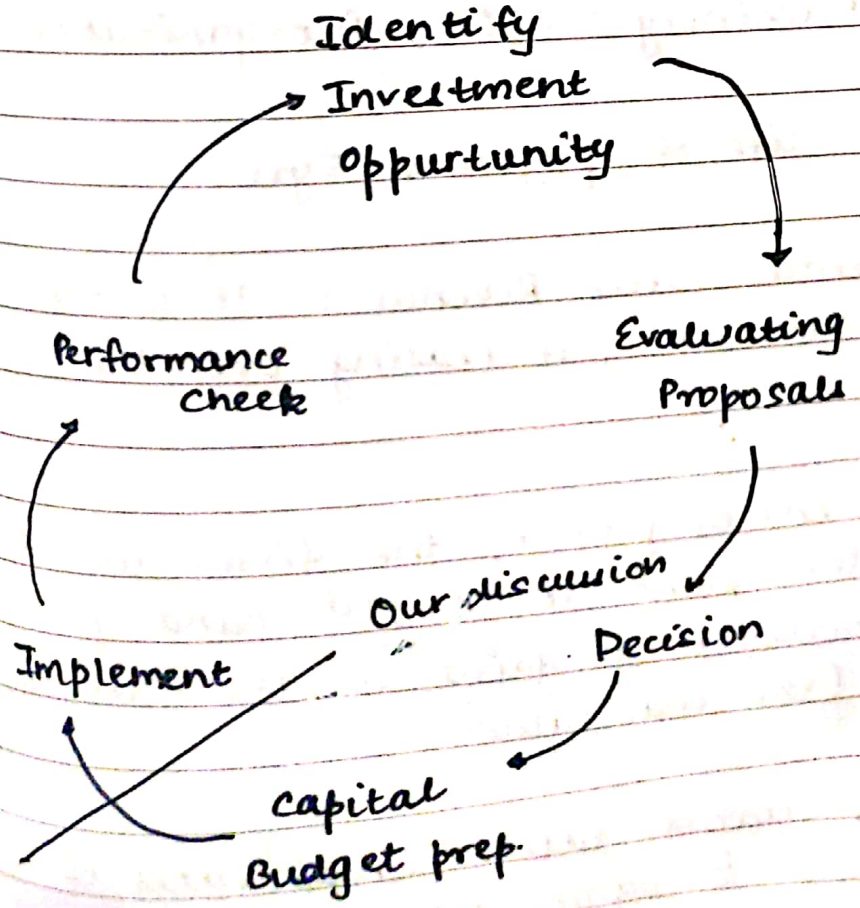
Capital Budgeting

Firms formal process for acquisition and investment of capital over a period of time

Budgeting of capital expenditure is an imp. factor in management of business

Types of capital Projects

- Purchase of Plant and machinery and equipment
- Expansion of production facilities
- Entering of ~~productio~~ new pdt - lines
- Decision to purchase or rent production facilities
- Research & Development.



Capital Budgeting Process

→ Net Cash Flows : Cash. In - Cash Out over the life of project.

The cash flow should be measured by firm, with and without the project.

→ After tax basis : net cash flow must be estimated on an after tax basis using the firm's marginal tax rate.

→ Depreciation: should be added, as it's a non-cash expense that can effect cash-flow through taxes.

Initial Capital : 15,000
(Machinery : 12500, Reorganization : 2500)

Consider life of project is 5yrs

Incremental Sales Revenue : It is the sales revenue, increasing over the year

At the end of project, the firm would sell the plant at a 2nd hand price and whatever it gains is the "salvage value" (the end value)

Flat depreciation rate : Equal rates of depression is same till the end of project

$5 \times x = 10000 \Rightarrow x = 2000$

Revenue	10,000	11,00	12,100	13,100	14641
Variable cost 50%	5000	5,500	6050	6655	7320
~~fixed cost~~					
Depreciation	2000	2000	2000	2000	2000
Fixed Cost	1500	1500	1500	1500	1500
Profits Before Taxes	1500	2000	2550	3155	3820
Income Tax (40% prof)	600	800	1020	1262	1528
			1530	1893	
Profit After Tax	900	1200	~~2000~~	~~1530~~	2292
Plus: Depreciation	2000	2000	2000	2000	2000
Net cash flow	2900	3200	3530	3893	4292
					2500
					1000
					7792

Salvage flow after 5yrs

Recovery of Working Capital (Emergency)

Net cash flow in 5years

From the revenue, whatever the company gets is called profit before taxes

Depreciation: It's a non-cash expense
If depreciation wasn't subtracted, the profit would have been 3500 (1st year) and tax would have been 40% of 3500 which is greater than 40% of 1500, thus it's subtracted and added back.

Evaluation of Project:

Traditional methods:

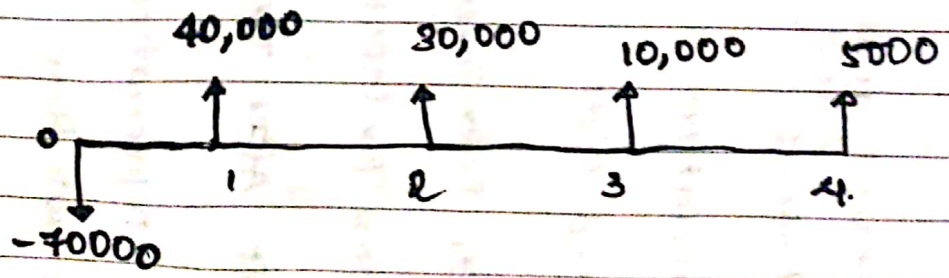
(1) Payback Period Method:

- Number of yrs req. to recover the original cash outlay invested in a projected

Net Cash flow
- ↳ Unequal: Calculated by adding up the cash net inflow until the total is equal to initial cash outlay
- ↳ Equal:

$$PBP = \frac{CO}{R}$$

CO → Initial investment
R → Equal stream



Payback Period: 2yrs

Decision Rule-

Accept : If a project is less than max. payback period set by management

Reject : If a project is more than the max. payback period set by management

Ranking Criteria : Shortest PBP ⟶ Longest PBP

Accounting Rate of Return (ARR):

$$ARR = \frac{\text{Avg. Net Income}}{\text{Avg. Investment}} * 100$$

Accept : AAR > Min Rate
Reject : AAR < Min Rate

Ranking : Highest AAR ⟶ Lower AAR

Average Net Income :

Net Income in any year is net cash flow - depreciation

$$\text{Avg Net Income} = \frac{\text{Sum of net cash flows}}{\text{no. of years}}$$

Avg. Investment

Value in year 1 + value at end of project) / 2

$$I_0 + I_n$$

Disadvantages:

→ Ignores time value of money
→ Based on book values, not cash flows and market values.

Modern / Discounting Method:

① Net Present Value

NPV = Present value of Expected Net Cash Inflows − Present Value of Cash Outflow

NPV > 0 (Accept)
NPV < 0 (Reject

$$NPV = -C_0 + \sum_{t=1}^{n} \frac{R_t}{(1+r)^t}$$

C_0 - Initial cash outflow
R_t - Estimated Net Cash Inflow at time t from the project
r - Discount Rate

② Internal Rate of Return (IRR):

Equates present value of expected net cash inflows and present value of cash outflow

$$C_0 = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t}$$

↑ Not known

R_t → Estimated Net Cash inflow i = IRR
C_0 → Initial Cash outflow

Decision Rules:

If $i > r$, accept
If $i < r$, reject

IRR doesn't depend on interest rate prevailing in market

Calculation IRR by Trial and Error

1. Begin by using an arbitrary r to calculate PV
2. If PV > $\hat{i}$ cost outlay, increase r and repeat
3. If PV < $\hat{i}$ cost outlay, decrease r and repeat
4. Repeat till PV = initial cost of project
5. Discount rate found is IRR

Example:
(-200, 100, 100, 100)

$$NPV = -C_0 + \sum \frac{C_t}{(1+i)^t}$$

$$= -200 + \frac{100}{1+i} + \frac{100}{(1+i)^2} + \frac{100}{(1+i)^3}$$

At NPV = 0, $i = 23.3\%$ ← IRR

Profitability Index (PI): Capital Reasoning.

If there are two projects A, B. If we select A then we have to reject B and vice-versa. Then A, B are mutually exclusive

Smaller project may lead to smaller NPV than an alternate larger one, but the ratio of PV to initial cash of project maybe higher

Thus, in case of capital reasoning, firm should rank according to PI and choose

$$PI = \frac{\text{Total present value of net cash inflow}}{\text{Present value of cash outflow}}$$

Accept, $PI > 1$
Reject, $PI < 1$

In absence of capital rationing, firm will undertake all projects with +ve NPV and $PV > 1$

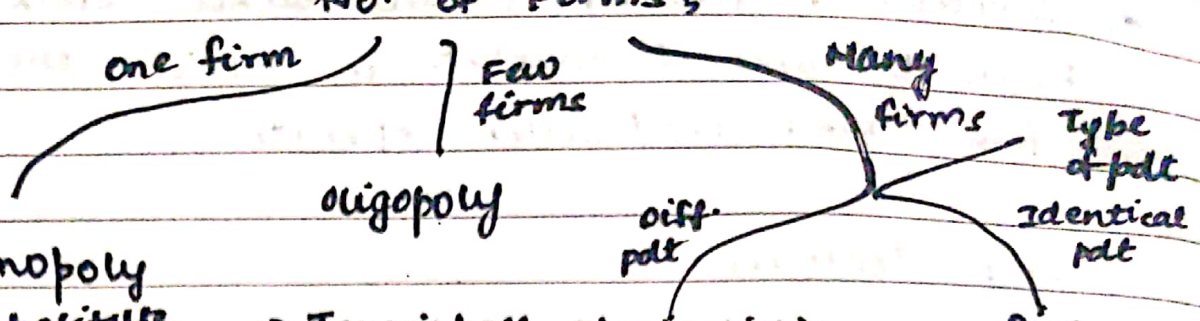
Market Structure

- Invisible institution (Goods Market, Stock Market)
- Refers to types of market in which the firms / producers / sellers operate

Imp. features

- No. of buyers and sellers
- Market share of largest firms
- Degree of freedom to determine price
  (Decided by industry (sum total of firms), based on supply and demand (or) decided by firm)
- Level and forms of competition
- Nature of costs
- Degree to which industry is vertically integrated
  Vertical integration explains the process by which diff stages of in production and distribution of a pdt are under the ownership and control of a single enterprise.
- Extent of product differentiation
- Ease of entry into and exit from market.
- Structure of buyers in the industry (including possibility of monopoly)
- Turnover of customers
  - How many customers are prepared to switch their suppliers when market cond. change

Four Types of Market Structure

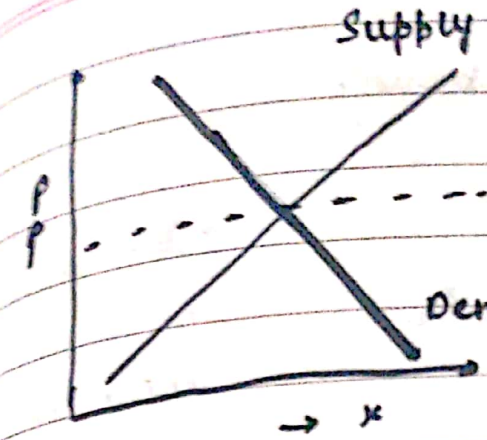


Monopoly (No substitute available)
- → Tennis ball
- → Crude Oil
- → Tap Water
- → Cable TV

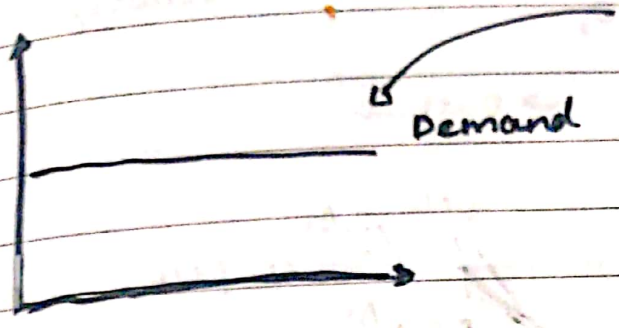
Monopolistic
- → Novels
- → Movies

Perfect
- → Wheat
- → Milk

Perfect Competition:
- → If info is not shared, (saanp nai!) then imperfect comp.
- → Degree of imperfection depends on degree of information shared
- → Monopolistic competition and perfect competition are two ends.
  - → Info is not shared
- → large no. of buyers and sellers of homogeneous pdts.
- → Complete absence of rivalary
- → Free entry & exit
- → Perfect knowledge abt market
- → Perfect mobility of factors and pdts.



The price is decided by industry based on the supply and demand



For a firm, AR = MR = Price

Eq. cond.

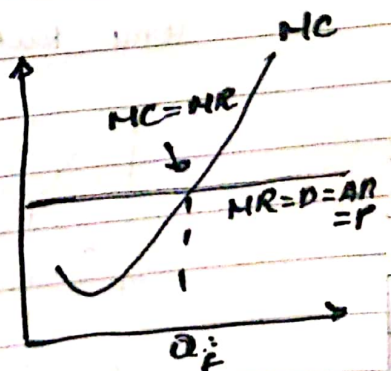
$\pi = (R - C)$ → maximised

R: Price per unit of pdt × Q

First order necessary cond.

$$\frac{d\pi}{dq} = \frac{dR}{dq} - \frac{dC}{dq} = 0$$

$$MR = MC$$

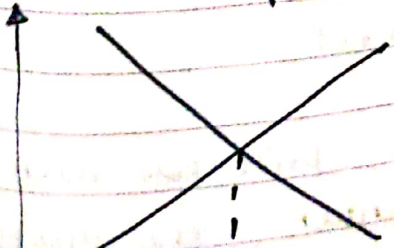


Individual firm

Second Order cond.

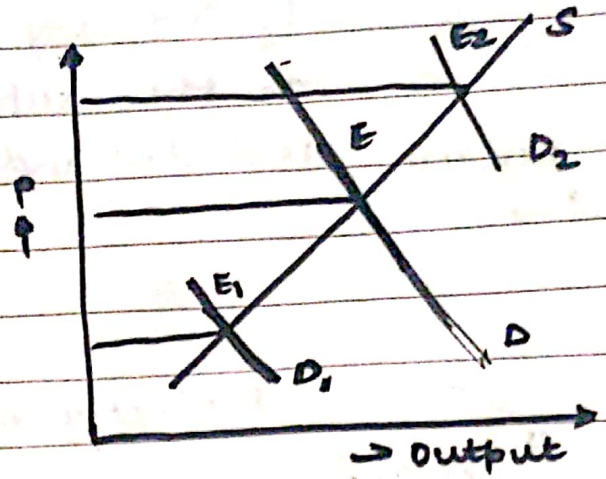
$$\frac{d\pi^2}{dq^2} < 0$$

Slope MC > slope MR



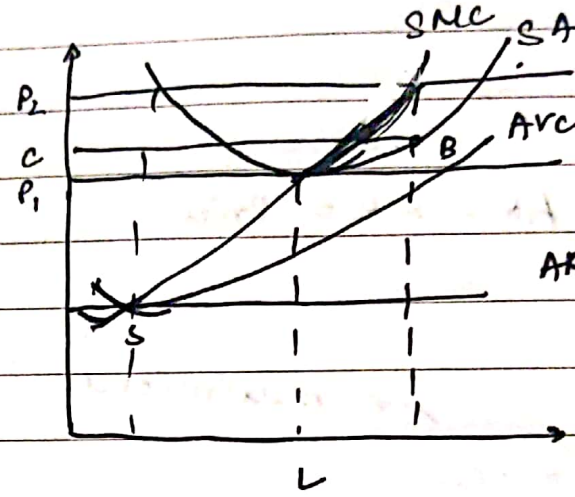
Perfectly Competitive Industry

Short - Run Equilibrium



→ In short run, no firm can enter or leave

Industry

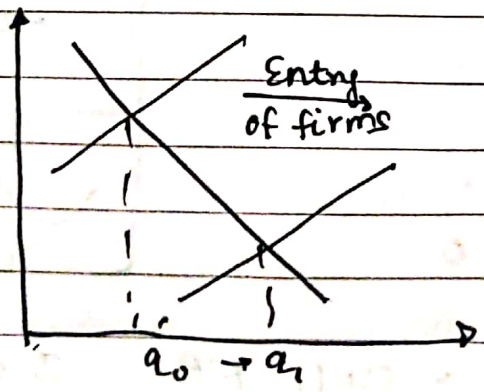


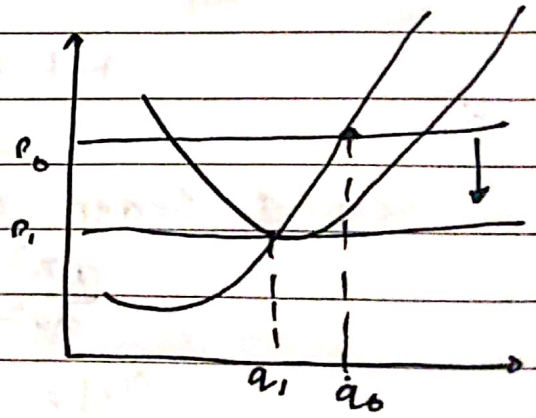
Firm

AR ≤ AVC (close business)

AR > AVC (keep it running)

Long Run

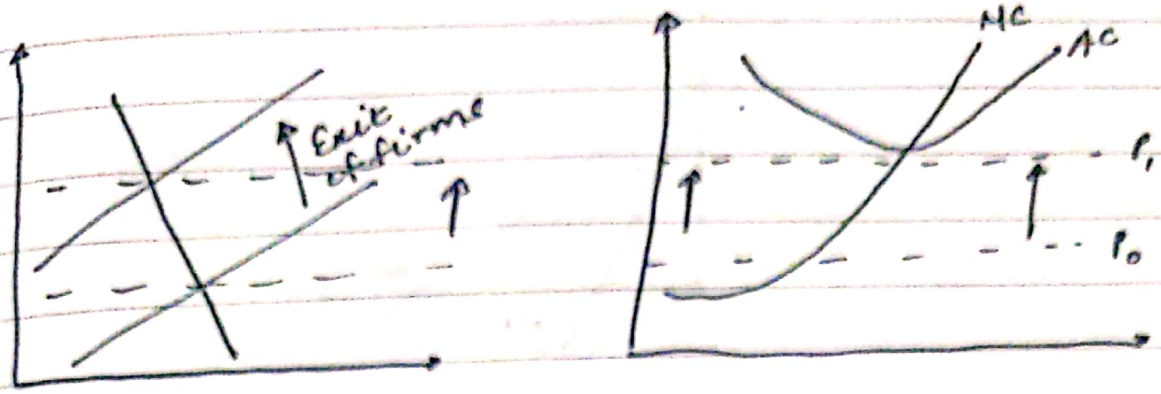




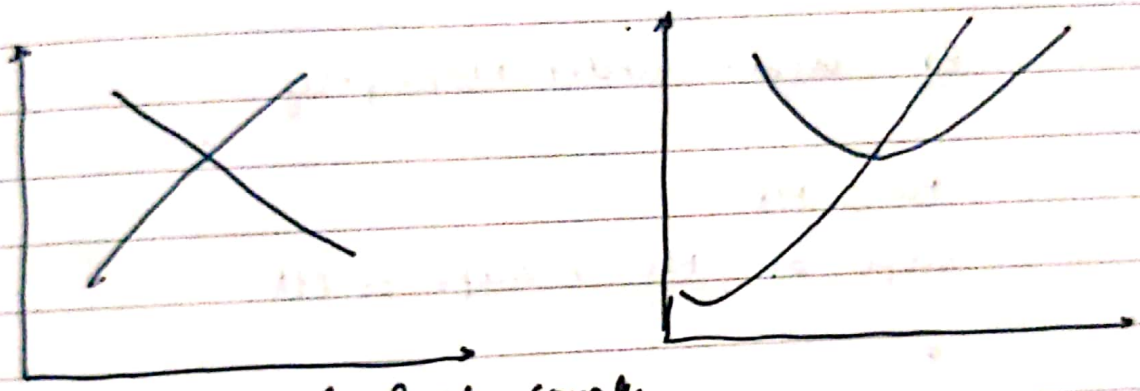
Abnormal profit

Consider for any reason, price has risen, so new firms will enter, the supply curve moves right, thus price falls and this continues while

Incase of long run, the firms finally reach to a case of "normal profits"



Short run losses, firms leave industry



Perfect comp.

Monopoly:

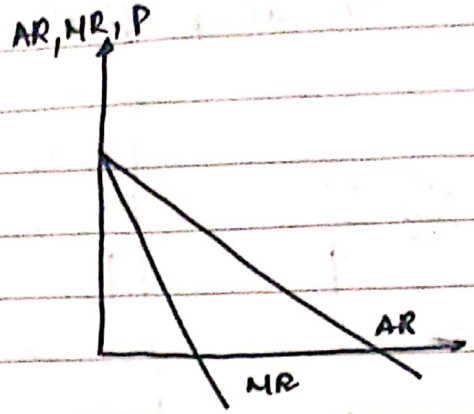
- Only one producer / seller of a pdt.
- Restricted Entry
- No substitutes

Eg :- Gillete Razor

Factors responsible for existence of monopoly

- Ownership over strategic raw material
- Patent right
- Natural monopoly
- limiting pricing policy

Demand curve for a monopoly

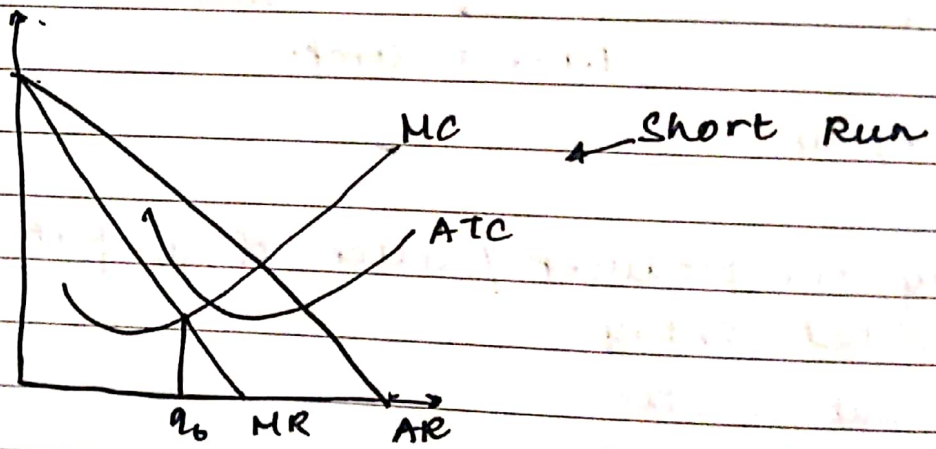


In monopoly, there is no diff b/w firm and industry

Eq. cond. under Monopoly

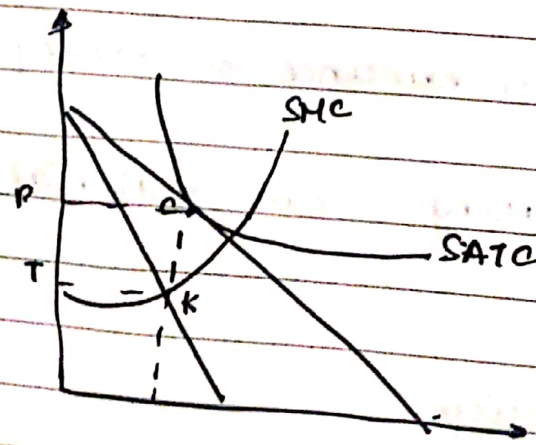
MC = MR

Slope of MC > Slope of MR

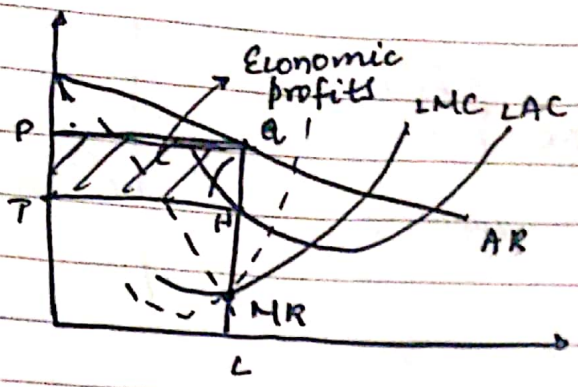


Close down

AR < AVC



Long Run



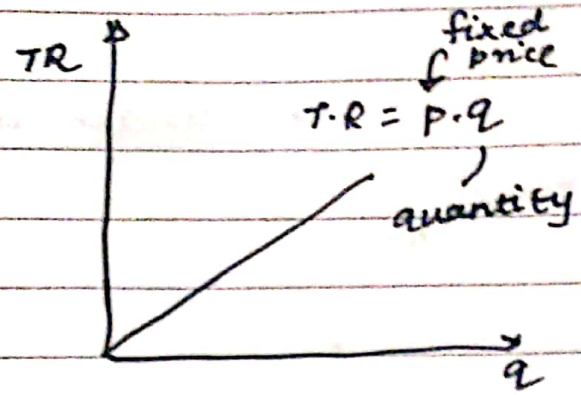
← Under utilize

Monopolists care of only about profits (super normal profits), it may overutilize, underutilize or perfectly utilize

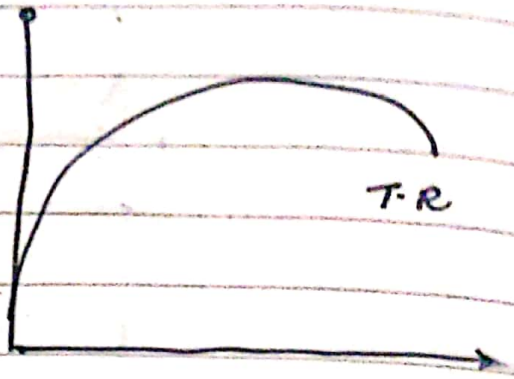
To the right of min. point of LAC → Over utilize

Characteristics	P. C	Monopoly
No. of sellers	Many	One
Substitutes	Only one pdt. type	No subs.
Barriers	No barriers	Impossible for others to enter
Pricing	P = MC = MR	P > MR P > MC
Profic	P = ATC in longrun ~~Zero~~ Efficient with zero economic profit	P > ATC Big profits

P.C



Monopoly



M.R = p

M.R = $p\left(1 - \frac{1}{e}\right)$

$e = \frac{dq}{dp} \cdot \frac{p}{q}$

A.R = p

A.R = p(q) ← p as a fn. of q

AR = MR = p

AR = p(q) > MR

π = TR − TC

$\pi = (p - ATC) \times q$

MR − SMC = 0

MR = p = MC

MR − MC = 0

MR = MC < p

Shoes come under monopolistic comp. as there are many producers and consumers choosing acc. to brand, qulaity, location, etc. and on basis of price only

Oligopoly - (Yippee, Maggi, Knorr, Patanjali)

Duopoly - (Pepsi, Coca-Cola)

↳ These two have largest share