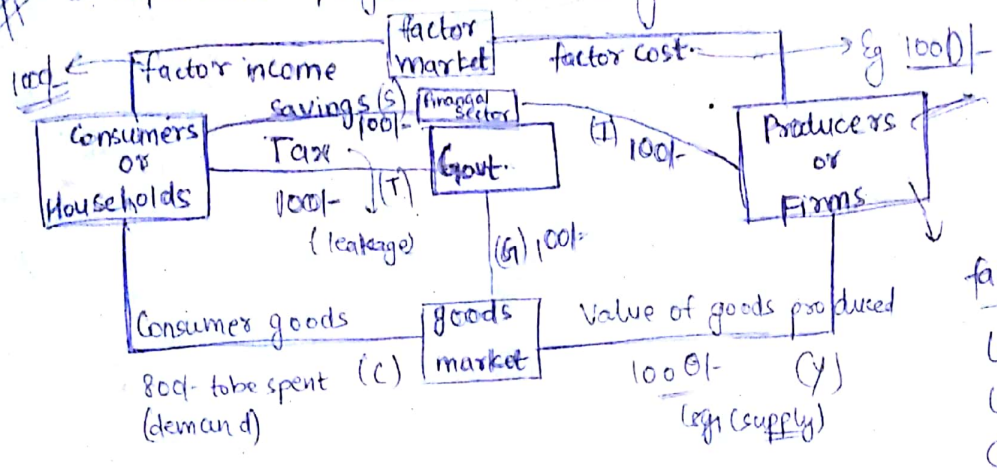
23/7/17

3 important players of Economy → factors are bought and sold



factors of production

Land - rate - 200/-
Labour - wage - 300/-
Capital - interest - 200/-
Entrepreneurship - profit → 300/-

all these 4 factors are owned by household sector.

* factor cost → the total cost incurred by all the factors of production

thus cost is same as the factor income

- Value of goods produced by producers → 1000/-

Then where is the profit?

Profit is already incurred in factor cost

Why did we incurred it in factor cost?

To make it equal to factor income and maintain balance.

- Consumer goods → demand by consumers to be consumed.

producer goods → kept by the producers for further studies and
(investment goods) replication.

- G > T in India since independence. (Deficit Budget)

government's expenditure is more than total tax income

where did this money come from?

from sources such as banks (central Bank etc printing money), RBI, world bank or other countries (borrowing from)

- leakages → S + T + M
  demand for foreign goods (import)

- Y = C + I + G
  1000 800 100 100
  ↳ this is equilibrium

- Y is always equal to C + S + T
  Y = C + S + T
  Identity.
  ↳ this is not necessarily equilibrium

- S = I ; T = G . . .

S + T = I + G → this condition needs to be satisfied for equilibrium.

Modification

S + T + M = I + G + X
↓ demand for foreign goods (import)
↓ export

If the economy is open.

Y = C + I + G + (X − M)
↳ original equilibrium equation including all the factors.

- Y ≤ C + I + G
  ↳ prosperity

Y ≥ C + I + G
↳ recession.

AD < AS
AS ≮ AD

AD → aggregate demand.
AS → aggregate supply.

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Equilibrium Income

$Y = C + S$ → Identity

$S = I$

$Y = C + I$ } Equilibrium

AS = AD

(limiting the analysis to two factors only (*no govt. or open market))

- the value of goods produced by producers is the net income of producer

i.e $\sum P \cdot Q$ = income
(price, quantity)

→ summation of all products (monetary value)

- the income is made by producers goes to consumers and then again is spent by consumers not the whole money is spent see the equations.

Keynesian Theory

Consumption Function

Consumption is a linear function of income but with a positive intercept

$C = a + bY$ (assuming the govt. doesn't exist)

(Positive intercept) — disposable personal income

$Y = C + S$ (always)

Suppose earning is 1 lakh /-

Tax = 10000/-

Left = 90000/- + Disposable personal income.

(if we assume govt. exists + $Y \longrightarrow Y - T$)

(we can spend this amount however we want)

- Economies and governments tend to sell their entities for disinvestment and privatisation.

earlier people thought that $C = f(r)$ (r: rate of interest)

but according Keynes, consumption is a function of income

$C = a + bY$

Properties

i) Marginal Propensity to consume (MPC) is a constant

ii) $0 < MPC < 1$

iii) Average propensity to consume (APC) is '0' at zero level of income and then it declines but will remain above MPC.

1st property

$C = a + bY$

a → autonomous consumption (the consumption done at zero level of income) (consumption isolated to income)

bY → induced consumption

$MPC = \frac{\Delta C}{\Delta Y}$ = slope of consumption function.

(MPC is a metric that quantifies induced consumption) thus must be constant for a given set of data (1st property)

- wealth is a stock
- income is a flow

hence not necessarily uniform ← (Want to sell it immediately but can be used in long run)

Eg	Y	0	40	80	120	160
	C	20	50	80	110	140
	S	-20	-10	0	10	20

} MPC constant

↳ (As savings → (-) Borrowing / withdrawing of past savings.

- MPC is constant for a small period of time only. On the long run the consumption pattern keeps changing.

Hence we don't get two/three values of b and hence we always get a linear function.

2nd property

- Explained

☆ in the long run c tends to equal to bY

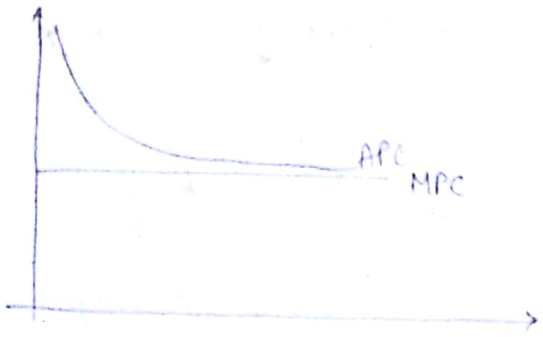
2nd property

$APC = \frac{\text{total consumption}}{\text{total income}}$

average propensity to consume

- observe how APC is declining from a to in the eg.

$$APC = \frac{a + bY}{Y} = \text{fraction of income consumed.}$$



* APC declines with increase in income.

hence it can be said that the fraction of income consumed declines with increase in income.

$MPC + MPS = 1$

$APC + APS = 1.$

↓

average propensity to save.

i.e. if APC ↕ + APS ↑ ie investment and savings increase.

- in the long run, APC becomes equal to MPC.

this means
* ⇒ every prosperous economy is bound to face recession time and time again

as the income ↑ + savings ↕ and unless this saving is invested into production, the demands will decline and thus the production will further decline and thus cycle will lead to depression

Eg USA keeps getting into depression.

A country has reached a limit of prosperity and has a ↑ce income, its

economy has started to decline.

if I becomes equal to S, there will be no such problem

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Income ↑ ⟶ Savings ↑ ⟶ demand ↓ ⟶ production ↓ ⟶ process

process ⟵ demand ↓ ⟵ chain reaction

↑ recession.

$Y = C + I$

C → Consumption

I → investment

Savings ⟶ Investment

Tax ⟶ Govt. Purchase

Import ⟶ Export

it is necessary if S ↑ = I ↑ for balance.

II). Investment function.

Investment ≠ Capital

Stock variable ⟵ wealth

(not easily renewable i.e. can be used immediately)

flow variable ⟵ income

(can take a lot of time to change).

(can be used immed...

I_t^g = $K_t - K_{t-1}$ (capital at the end of current year − capital at the end of previous year)

gross investment

I_t^n = I_t^g − (D) → depreciation

net investment

Eg: 50 crore for 500 rooms

50 crore ↑ I_t^g

200 rooms decapitated

net 300 rooms = 30 crore = I_t^n

- ~~$I_t^g > 0$ ⇒ economy ↑ as it may ↑ employment~~

- it may happen that $I_t^g > 0$ but $I_t^n < 0$

I_t^g ≥ 0

⇒ Hence I_t^g is always +ve.

I_t^n can be -ve

- $I_t^g > 0$ ⇒ employment ↑.

$I_t^n > 0$ ⇒ economy ↑ / employment ↑.

$I_t^g > 0$ / $I_t^n < 0$ ⇒ employment ↑ but economy ↓.

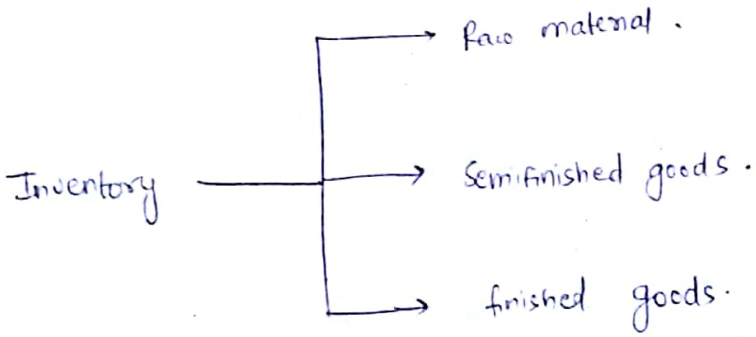
Types of Investment

1). Business fixed investment → Largest share of investment

2) Residential investment

3). Inventory investment

→ Inventory investment is a stock piling activity This is an investment only made when the first two kinds of investment are done.



7/8/17

Investment Function

$I = f(MEC, r)$

r → Rate of interest / cost of borrowing.

MEC → marginal efficiency of Capital.

↓

→ Annual rate of return over the Capital invested.

→ MEC is that discount rate which equalises the present value of the prospective yield. with the initial amount of capital invested.

prospective yield → annual return or revenue through various sources

life of project = 5 years
investment = 1000 crs. date — 2017

	R_1	R_2	R_3	R_4	R_5
2018	19	20	21	22	
(500	400	300	600	700) = Revenue net	

↳ can we directly compare this net revenue to our investment? No.

Take a reference year.

Equalize all money value to that of the reference year and then compare.

- We can be assured that the net revenue when brought down to 2017's value will be lesser than that of face values. This is because of a thing called 'time value of money'. These three things play an imp role in
  (i) inflation
  (ii) risk
  (iii) interest

- interest → new value after 1 year = (PV)(1+r)
  PV = present value
  (1+r) = interest factor (can be %. if × 100)

after two years = (PV)(1+r)(1+r) = (PV)(1+r)²

after n years = (PV)(1+r)ⁿ

(compound interest)

- inflation ⟶ money value decreases over time.
"It is better to buy today"

- deflation ⟶ money value increases over time.
It is better to buy later.

- if interest ⟶ 10 %. and inflation = 5 %.

then real interest rate = 10 − 5 = 5 %.

better to use real interest rate than nominal interest rate.

- Risk is calculated by international agencies. Factors include ease of doing business etc.

we can use Risk adjusted inflation adjusted rate of interest.

$$\sum_{t=1}^{n} \frac{R_t}{(1+i)^t} - \sum_{t=0}^{n} \frac{C_t}{(1+\gamma)^t} = 0$$

R_t: Revenue $R_1, R_2 \cdots R_n$ — prospective yield.

C_t: Cost

i: MEC — risk adjusted

γ: inflation adjusted rate of interest

for the previous eg

$$\frac{R_1}{(1+i)} + \frac{R_2}{(1+i)^2} + \cdots + \frac{R_5}{(1+i)^5} - C_0 = 0.$$

C_0: as we took 2017 as reference

$i > r$ ⟶ accept

$i < r$ ⟶ reject

$i = r$ ⟶ neutral.

i = return on investment (MEC)

r = cost of raising capital (Rist adjusted inflation adjusted rate of interest)

hence $I = f(i, r)$.

- $Y = C + I$

$C = f(Y)$ $\quad I = f(i, r)$

$S = f(Y)$

equilibrium ⇒ $S = I$

but both dont have same parameters = problem.

Q Explain why different states have different levels of industrialisation through investment func°

- r is uniform throughout the country but i changes state by state due to non uniform infrastructure, facilities, ease of business etc, & transportation means etc. Hence different states have different levels of industrialisation.

10/8/17

Equilibrium Income ⇒ $Y = C + S$ —— (identity)

$S = I$ —— equilibrium

$Y = C + I$ —— do.

Eg: $C = 20 + \frac{3}{4}y$ ⟷ $S = -20 + \frac{1}{4}Y$

$I = 20$ $\quad$ $I = 20$

$Y = C + I = 40 + \frac{3}{4}Y$ $\quad$ $S = I$

$\frac{1}{4}Y = 40$ $\quad$ $40 = \frac{1}{4}Y$

$Y_e = 160$ $\quad$ $Y_e = 160$

(estimated = Y_e)

(actual = Y_a)

let $Y_A = 200$

$C = 20 + \frac{3}{4}(200)$ ⟷ $S = -20 + \frac{1}{4}(200)$

$= 170$ $\quad$ $= 30$

$Y = C + I$

$I = 20$ $\quad$ as $\quad$ $I = 20$

$200 + 190$ $\quad$ $S + I$

Hence condition eq^n $\quad$ Hence not in eq^n

- planned inventory investment → making goods more than demand voluntarily

Eg: Maruti – 100000 cars
↑ maruti knew
demand – 90000 cars $\quad$ 10000 – inventory

unplanned inventory investment

Maruti 90000 cars
↑ maruti did not knew
demand 80000 cars $\quad$ 10000 – waste types

$Y_A'' = 190$ ⟶ after the producers came to know the demand was less

(iterty process)

$C = 20 + \frac{3}{4}(190)$

$= 20 + 147.5$

$= 167.5$

$Y_A' = C + I \Rightarrow 190 = 167.5 + 20 = 187.5$

supply > demand ⟶ recession (income decreasing overtime)

(unplanned increase in inventory)

if $Y_A''' = 120$

$C = 20 + \frac{3}{4}(120) = 110$ $\quad I = 20$

$Y_A \neq C + I$

↓ 120 ↓ 130

⤷ demand > supply ⟶ economic boom (income increasing)

(unplanned decrease in inventory)

- eq^m $Y = 160$

this shouldn't be stagnant

Y_{eqm} should ↑ as population ↑ and also economic growth!

$\Delta Y = \Delta C + \Delta I$

for equilibrium.

Investment Multiplier

for an economy to correct recession, it is necessary to increase autonomous investment which will increase income by multiplied times increased investment

$$I = a_1 + b_1 y$$

a_1 → autonomous investment

b_1 → marginal propensity to invest = $\frac{\Delta I}{\Delta y}$

the change should be in $a_1 \longrightarrow a_1'$

$$I_{new} = a_1' + b_1 y$$

this change is done by Government.

$$I_{old} = 20 + \frac{1}{2} y \qquad I_{new} = 30 + \frac{1}{2} y$$

$$\Delta I = 10$$

$$\Delta y = k \Delta I$$

- most of the government facing recessions are market driven economies i.e. an economy without government interference.

- $\overbrace{AD}^{\text{aggregate demand}} < \overbrace{AS}^{\text{aggregate supply}} \longrightarrow MEC \downarrow \longrightarrow$ Private produces fall back

  ↓ recession

  ↓ Government invests.

$I = \bar{a} + bY$

$\bar{a}$ → autonomous

bY → induced investment

in times of recession + bY decreases

→ a must increase (govt. intervention)

→ this leads to increase in Y which brings back the eq^{m}.

according to Keynes

$$\Delta Y = K \cdot \Delta I.$$

K → multiplier

1601- $Y_1 = C_1 + I_1$

$= a_1 + bY_1 + (I_1)$

2001- $Y_2 = C_2 + I_2$

$= a_1 + bY_2 + (I_2)$

this change is only due to autonomous investment by govt.

$$Y_2 - Y_1 = (bY_2 - bY_1) + (I_2 - I_1)$$

$$\Delta Y = b\Delta Y + \Delta I$$

$$\Delta Y (1 - b) = \Delta I$$

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

K → (>1) (as $|b| < 1$)

$1 - b$ → marginal propensity to consume $(\in (0,1))$

* higher MPC ⟶ higher K

- higher MPS ↑ ⟶ lower K

(MPS = 1 − MPC)

Implications

i) - better to invest in developing rather than developed because

$(MPC)_{developing} > (MPC)_{developed}$.

ii) ~~C~~ A closed economy has 3 demand functions

~~I~~

$C = a + by$

$I = a_1 + b_1 Y$ ⇒ $20 + 1/4\ Y$ → $30 + 1/4\ Y$ (+10) $\Delta I = 10$

$G = a_2 + b_2 Y$.

Same ΔY

$G_{original} = 10 + 1/8 (Y)$

$G_{new} = 20 + 1/8 (Y)$

$\Delta G = 10$. instead of ΔI to balance increase ΔY.

* automous investment / goverment purchase / consumption, all three lead to change in ΔY by K multiplying factor

K = 4. $\Delta Y = 40$ $\Delta \text{Demand} = 10$.

change in demand can be influenced by all three demands.

Hence, There can be as many multipliers as the number of demand functions.

- only one demand function has definite slope in case of $\rightarrow k = \frac{1}{1-b}$.

other two are exogenous.

Eg $\begin{cases} C = a + bY \\ I = a_1 \\ G = a_2 \end{cases}$

- if we take all three slope coefficients i.e. non zero slope coeff.

$C = a + bY$

$I = a_1 + b_1 Y$

$G = a_2 + b_2 Y$.

then $k = \frac{1}{1 - b - b_1 - b_2}$

$\Delta Y = k \Delta I$

$\Delta Y = k \Delta D_a$

and $0 < \sum_{i=0}^{2} b < 0.1$

hence k depends upon marginal propensity of consumption / investment / government purchase

- in case of a crisis, government can appeal its people to increase consumption as it is not feasible. Hence the on keynes suggests that it is the govt only that should interfere and invest (autonomous investment) which is independent of ~~other~~ income and other factors. Govt should invest in public utilities Eg (roads, infrastructure)

Period	ΔI	ΔC ($\Delta C = b\Delta Y$, $b = 3/4$)	ΔY	$\Sigma \Delta Y$
1	10000/-	—	10000/-	10000/-
2	—	7500/-	7500/-	17500/-
3	—	5600/-	5600/-	23100/-
4 times				
t	0	0	0	40000/-

If the change in investment is once-over type / temporary

$C = 20 + \frac{3}{4} Y$. $\quad I = 20$. $\quad \Delta C = b\,\Delta Y = \left(\frac{3}{4}\right)\Delta Y$

Period	C	I	ΔC	ΔI	Total spending $\gtreqless$ Total output	Y	ΔY	Planned I	Planned ↑ Unplanned ↓ Realised I
1 (equilibrium)	140	20	—	—	$160_{(Demand)} = 160$	160	—	20	= 20
2 (ineq^{m})	140	20	—	10 (*)	$170_{(demand)} > 160_{(supply)}$ (***)	160	—	30 >	20 (30−10) (***)
3.	140	20	7.5	(because change in I is once-over type)	$167.5 < 170$ (**) (supply)	160	10 (****)	20 <	22.5
4.	140	20	5.6.	—	$165.6 < 167.5$	160	7.5 (*****)	20 <	21.9
5	140	20	4.2	—	$164.2 < 165.6$	160.	5.6	20 <	21.4
t	140	20	0	0	$160 \simeq 160$	160	0	20 ≃	20 (eq^{m})

(* assume Govt of India invests 10 more. (**) $S_t = D_{t-1}$. (***) There is a decrease in inventory to meet the hike in demand hence up planned I = −10

(***) $\Delta Y_t = \Delta I_{t-1} \,/\, \Delta C_{t-1}$

$K = \frac{1}{1-3/4} = 4.$

$\Delta Y = 4 \cdot \Delta I$

$40 = 4 \cdot 10.$

then why is ΔY never 40? It is !!

40 is the net sum of all the ΔYs till time t from 0

i.e. $10 + 7.5 + 5.6 + \ldots$ ∞ times

$= 10\left(1 + \left(\frac{3}{4}\right) + (3/4)^2 + \ldots (3/4)^{\infty}\right)$

$= 10 \cdot \frac{1}{1-3/4} = \underline{40}.$

If the change in investment is permanent / continuous.

Period	C	I	ΔC ($3/4\ \Delta Y$)	ΔI	Total spending	≷ total output	Y	ΔY	Planned I	Realised / Unplanned I
1	140	20	—	—	160	= 160	160	— 20	= 20.	
2	140	20	—	10	170	> 160	160		30 > 20.	
3.	140	20	7.5	10	177.5	> 170	160	10	30 > 22.5	
4.	140	20	13.41	10	183.1	> 177.5	160	17.5	30 > 24.4	
⋮										
t	140	20	30	10	200	= 200	160	40	30 = 30.	

* Hence we can clearly see

If the change in investment is temporary, the impact on economy is also temporary. Whereas if the change in economy if permanent, the impact on economy is also permanent.

If ΔI is temporary	If ΔI is permanent
$\Delta Y_1 = \Delta I$	$\Delta Y_1 = \Delta I_1$
$\Delta Y_2 = \Delta C_1 = b\Delta I$	$\Delta Y_2 = \Delta I_1 + \Delta C_1 = (1+b)\Delta Y_1 = (1+b)$ $= \Delta I + b\Delta I$
$\Delta Y_3 = b^2 \Delta I$	$\Delta Y_3 = \Delta I + b(\Delta I + b\Delta I)$ $= \Delta I + b\Delta I + b^2\Delta I$
$\Delta Y_t = b^{t-1} \Delta I$	$\Delta Y_t = \Delta I + b\Delta I + b^2\Delta I + \cdots + b^{t-1}\Delta I$
(fall in income)	(gradual rise in income).