

Example :

$$C = 20 + \frac{3}{4}Y. \quad (\text{Consumption func}^n)$$

$$I = 20$$

$$\text{Equilibrium } Y = C + I$$

I is autonomous, independent of all the determinants & $I = 20$.

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

$$Y - \frac{3}{4}Y = 40.$$

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

$$Y = 160$$

I is the total planned investment.

Y is eq. income because $\text{income} = \text{expenditure}$

$$C = 20 + \frac{3}{4}(160) = 20 + 120 = 140$$

$$I = 20. \quad \text{Income} = \text{Expenditure}$$

$Y = C + I$ is same as saving = investment in planned sense.

$$S = -20 + \frac{1}{4}Y = 20 \quad (S = I).$$

$$Y = 160$$

Actual income may be greater than or less than the equilibrium income.

If income rises to 200.

$$\text{Then } C = 20 + \frac{3}{4} \times 200 = 20 + 150 = 170.$$

$$I = 20.$$

Total demand = Consumption demand + Investment demand

$$\text{Total demand} = 190.$$

$$\text{Total supply (income)} = 200.$$

$$Y > C + I \Rightarrow S > I$$

$$S = 30. \quad I = 20.$$

There is general overproduction in the economy.

Production is 200 but the desired output is 190, \therefore there is an increase in unplanned inventory of value 10.

If the producers keep on producing the previous amount of output then the inventories will get piled up if demand doesn't increase in the upcoming

years. The inventories will be piled up due to unplanned inventory investment every year due to the over production.

So, finally the producers will have to decrease their ~~in~~ production in order to attain equilibrium, as the demand is not rising. They will reduce the production upto the point that all that is produced is demanded.

When the producers produced 200, demand was 190, so they presume that if they will produce 190, then it will be eq. income i.e. demand will become equal to supply.

But when the producers will decrease the production from 200 to 190, assuming that, that amount will be demanded, then C being a ~~constant~~ stable funcⁿ of Y, it will not remain constant

$$C = 20 + \frac{3}{4} \times 190 = 162.5$$

$$Y = 190. \quad I = 20.$$

$$C + I = 182.5 = \text{Total demand.}$$

Still Supply > Demand but now the diff. is 7.5. 7.5 is the surplus production, it is the unplanned inventory investment, ∴ it will go in inventory.

Next time, the producers will presume that 182.5 will be demanded so they will produce 182.5

$$\therefore Y = 182.5$$

$$C = 20 + \frac{3}{4}(182.5) = 156.75$$

$$I = 20.$$

$$C + I = 176.75.$$

Still, $Y > C + I$ i.e. Supply > Demand but the difference is 5.75.

\therefore Producers will keep reducing the output until eq. income is reached. Gradually, the unplanned inventory investment or the diff. b/w supply & demand keeps decreasing & at some time it will become zero.

\therefore If income is greater than the eq. income, then production keeps on decreasing (i.e. supply) until eq. income is reached.

$$\text{If } Y = 120.$$

$$C = 20 + \frac{3}{4} \times 120 = 110.$$

$$I = 20.$$

$$\text{Demand} = C + I = 130 > Y (\text{Supply})$$

If the producer is keeps on producing 120 year by year then there will be unplanned decrease in inventory by 10 every year as the producers will have to clear ~~to~~ the inventory in order to meet the demand.

- ∴ The producers will realise that they should increase the production as their inventory is shrinking. The economy is showing signs of prosperity as demand > supply
∴ the producers will increase the production.

They will keep increasing the production until eq. income is reached. They will increase the income gradually in order to achieve demand = supply.

Initially demand = 130
Supply = 120.
 $y = 120$

∴ The producers will decide to increase the production to 130.

$$y = 130, \quad C = 20 + \frac{3}{4} \times 130 = 117.5$$

$$I = 20$$

$$C + I = 137.5, \quad C + I > y$$

But now the difference is 7.5.

The extra demand of 7.5 will be met by the inventories ∵ the inventories will decrease by 7.5.

∴ The ~~per~~ output will keep increasing gradually until it becomes equal to 160.

There are two phases of an economy:

- Prosperity:** when the income is less than the eq. income then it will increase gradually over the years to attain eq. income. ∵ The growth rate of output is +ve as the output is increasing.
∴ The economy is in the phase of prosperity.

Growth rate \Rightarrow +ve \Rightarrow Prosperity

- Recession:** when the income is greater than the eq. income then it will decrease gradually over the years to attain eq. income. ∵ The growth rate of output is -ve as the output is decreasing.
∴ The economy is in the phase of recession.

Growth rate \Rightarrow -ve \Rightarrow Recession.

When Supply $>$ Demand \Rightarrow Recession

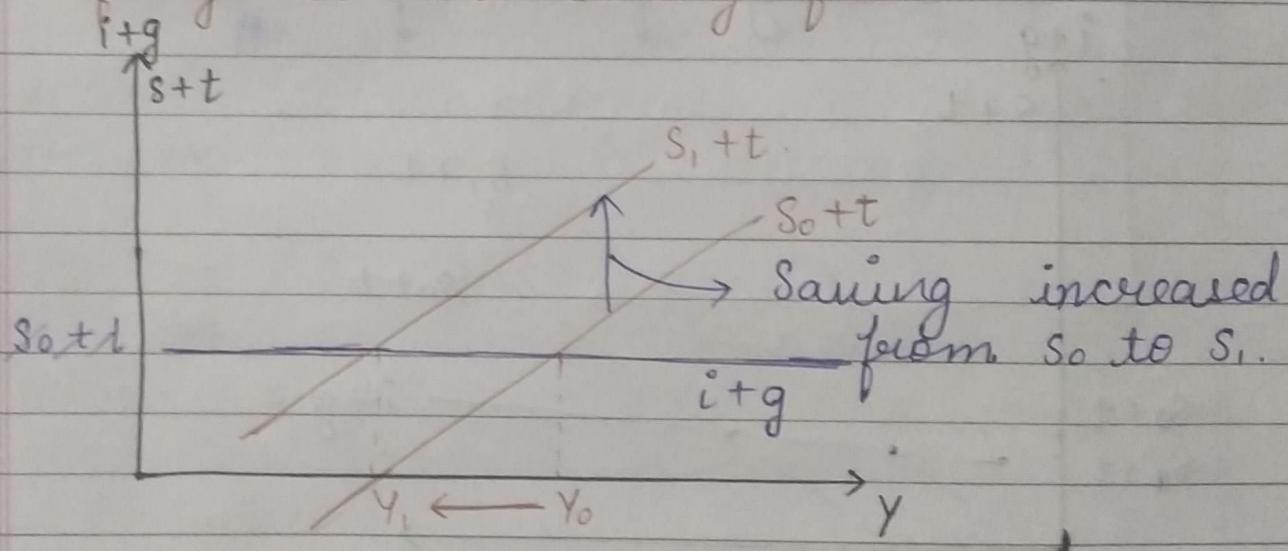
Supply $<$ Demand \Rightarrow Prosperity

∴ The Recession occurs because of deficiency of demand i.e. the amount of goods produced is greater than the amount demanded ∵ the output will gradually decrease.

∴ An economy doesn't always operate on eq. income but it always tends to attain eq. income.

Equilibrium income can be arrived at by the increase or decrease in inventories until change in inventories become zero.

Shifts in the saving function



for some reason, the saving curve of the economy has shifted i.e. the Marginal propensity to save has increased.

so the amount of saving for all values of income will increase.

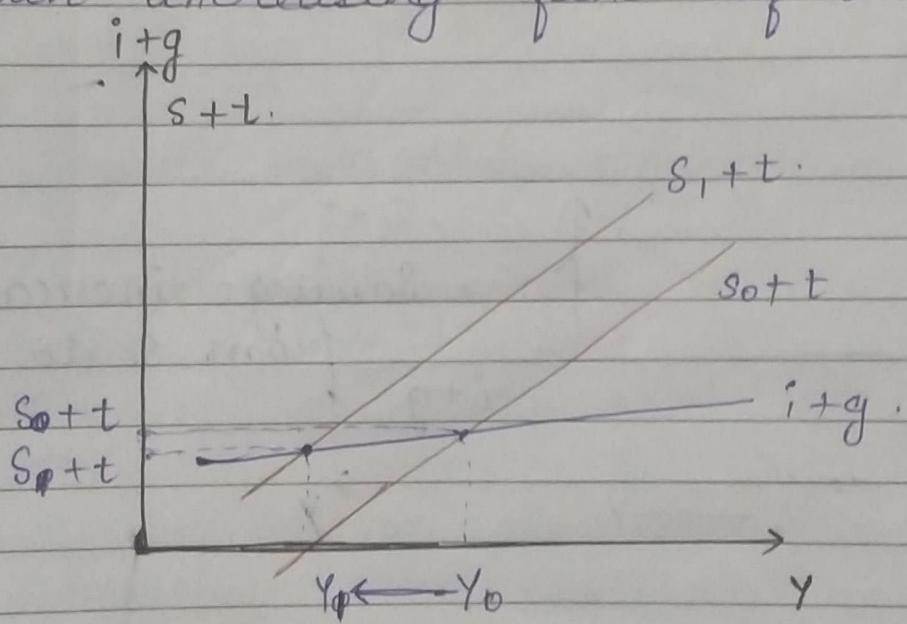
$i+g$ is independent of income.

Ultimately, the income will decrease from y_0 to new eq. income y_1 .

Even when the saving curve shifts, at eq. $s+t$ becomes equal to $i+g$.

If $i+g$ is a funcⁿ of y then $(i+g)$ will be a positively sloped line.

We assume that i is autonomous investment i.e. independent of the income but now we consider i to be indogenized. i.e. i is also an increasing funcⁿ of income.



In this case, with higher income, investment is also rising.

The saving curve will sit the investment curve from below because saving curve

has a -ve intercept.

In the second case, change in Y will be much higher than the normal case.

In this case, even if the saving func' is increasing, personal saving is inc. but the saving at the eq. point has decreased from $S_0 + t$ to $S_1 + t$.

This is the Paradox of Thrift:
When an economy tries ~~it~~ to increase the savings & the private saving, at the new eq. point, the actual or total saving will decrease.

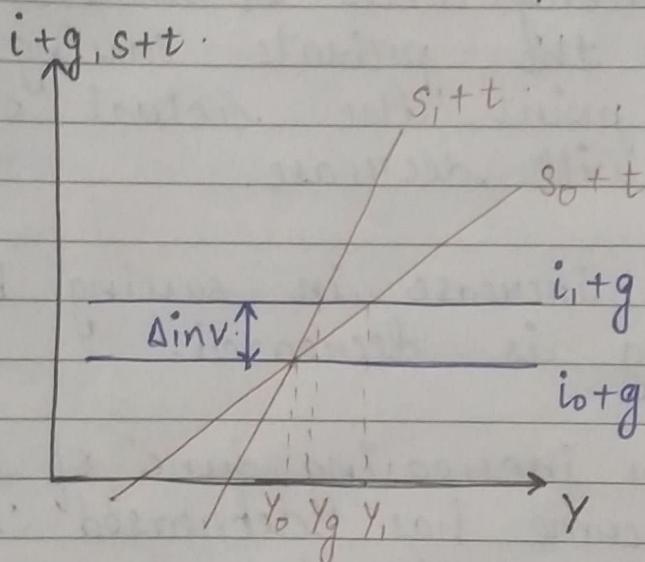
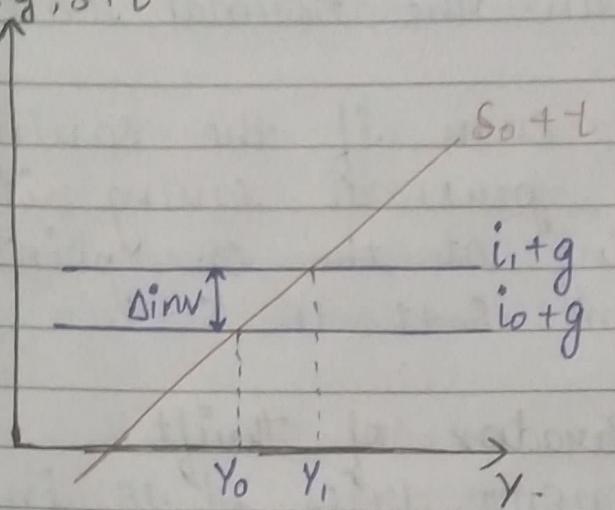
→ There is an increase in saving but at eq. saving is decreased.

If $i + g$ is an increasing func' of income & the eq. income has decreased ∵ the value of $i + g$ should also decrease. And as $i + g$ is decreasing ∵ at eq. $s + t$ decreases.

while in the case when i was autonomous consumption, upon decreasing income, there was no effect on i .

Expenditure Multiplier

Increase in the investment
 $i+g, s+t$



* Expenditure Multiplier

Following the simple Keynesian model, we take the following assumptions:

- i) the volume of investment expenditure is autonomous.
- ii) Consumption is a function of Income and consumption function is linear.
- iii) MPC is positive but less than unity.
- iv) The economy is a closed one.

Change in Autonomous Investment & Equilibrium Income.

- When autonomous investment is increased, then the income will rise more than the increase in investment.
- When there is increase in saving, there will be a decrease in income.
- But if the saving is unchanged & investment curve shifts i.e. investment is increased, then there will be an increase in income more than the increase in investment.

- An economy may attain eq. income not necessarily at full employment.
- If there is an increase in income, then there is an increase in consumption but not by as much as the change in income.
- The private investment which is induced by MEC given the rate of interest may not rise desirably especially when the economy is in recession.
- When the economy is in recession i.e. production of output is more than what is demanded & the income is greater than the eq. income, then the income is gradually decreased until eq. income is reached.
- If the eq. income has to be maintained always, then as the income rises, expenditure should also rise so that demand remains equal to supply.
- But as the income rises, average propensity to consume falls i.e. tendency to save increases & unless all the saving is converted to investment then the economy faces recession.

- ∵ For an economy to attain eq. when income is increased, autonomous investment must rise. Induced investment cannot be expected to rise as it depends on its determinants. i.e. income, MEC, r, etc.
- Private investment is mainly induced investment, so the private investment may not rise.
- ∵ For an economy to overcome recession being on the growth part (increasing income) ~~then~~ then the autonomous investment should rise.
- And the ~~autonomous~~ change in autonomous investment leads to change in income which is multiplier * change in autonomous investment.
- Autonomous investment is that amount of ~~consumption~~ ^{investment} which is independent of income.
- Induced investment is that amount of investment which is dependent on income i.e. it is a func' of income.

Rise in income ~~which~~ is greater than the rise in autonomous investment.

autonomous investment is also a component of demand ~~i.e.~~ i.e. ~~auto~~ autonomous demand. ∵ as autonomous investment rises then demand is rising.

autonomous investment is made by the government regardless of income & profit & the investment is done in developing public utilities like roads, bridges, hospitals, etc.

$$Y = C + I + G$$

There are 3 types of demand, ∵ there can be 3 types of demand multipliers corresponding to ~~consu~~ autonomous consumption demand, autonomous investment demand & government expenditure.

Whenever there is rise in any 3 kinds of autonomous demand, then there will be rise in income which would be multiplier * change in autonomous demand.

Assumptions:

* Investment Multiplier

If there is increase in autonomous investment, the rise in income is multiplier times the original change in autonomous investment.

Consumption func' :

$$C = a + bY$$

$I = I_0$. (autonomous investment)
at equilibrium

$$Y = C + I = a + bY + I_0$$

$$Y - bY = a + I_0$$

$$Y = \frac{a + I_0}{1 - b}$$

$b \rightarrow$ Marginal propensity to consume.

Eq. is attained when planned expenditure becomes equal to the income.

$$\text{i.e. } Y = C + I$$

$$\text{or } S = I$$

$$Y = \frac{a + I_0}{1 - b}$$

$a + I_0 \rightarrow$ Total autonomous demand.

$$Y = \left(\frac{1}{1 - b} \right) (a + I_0).$$

$1 - b$ = Marginal propensity to save.

Suppose now investment changes,
 $I = I_0 + \Delta I$.

New eq. income becomes

$$Y_1 = a + bY + I_0 + \Delta I.$$

$$Y_1 = \frac{a + I_0 + \Delta I}{1 - b}$$

$$Y_1 > Y.$$

The change in eq. income.

$$\Delta Y = Y_1 - Y = \frac{a + I_0 + \Delta I}{1 - b} - \frac{a + I_0}{1 - b} = \frac{\Delta I}{1 - b}.$$

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

K is the value of the multiplier.

$$K = \frac{1}{1-b} = \frac{1}{MPS}$$

The amount of multiplier is the amount by which equilibrium output changes when autonomous investment increases by 1 unit.

$$K = \frac{\Delta Y}{\Delta I} \quad K \in [1, \infty)$$

Larger the MPC, i.e. smaller the MPS, the larger is the multiplier.

\therefore If MPC value is high, then the economy will grow faster because if there is an investment, then the income will rise by a greater value.

\therefore If the Indian economy wants the income to rise by 40 billion dollar & $MPC = 3/4$ then $K = 4$ \therefore the economy should realise an increase of 10 billion dollar in autonomous investment.

It is not necessary for the autonomous investment to rise by 10 billion dollar instead the total autonomous demand i.e. $a + I_0$ should rise by 10 billion dollar.

There can also be an increase in a by 5 billion dollar and an increase in I_o by 5.

$$\therefore \Delta C = 5, \Delta I = 5$$

$$\Delta C + \Delta I = 5 \quad \therefore \Delta Y = 40.$$

\therefore It is not necessary that autonomous investment must increase, even if there is rise in autonomous consumption or government purchase then also.

$$\Delta Y = \text{Multiplier} * \Delta \text{autonomous demand.}$$

$\therefore K \rightarrow$ Demand Multiplier.

(Consumption Multiplier, Investment multiplier, Government purchase multiplier)

The value of the multiplier should actually depend on marginal propensities.

The multiplier depends on the marginal propensity to consume only when all other demand components i.e. investment & government purchase are autonomous i.e. independent of income & only consumption is a func' of income.

But if investment or govt. purchase are func's of income then the multiplier value will depend on the marginal propensities of the different demands.

If $I = I_0 + b_1 Y$.
 then $b_1 \rightarrow$ Marginal propensity to invest. (slope of investment func').

$$K = \frac{1}{1 - b - b_1}$$

\therefore If all the demand func's have some the value of slope then the value of K will depend on the diff. slope values.

$$K = \frac{1}{1 - (\text{sum of marginal propensities})}$$