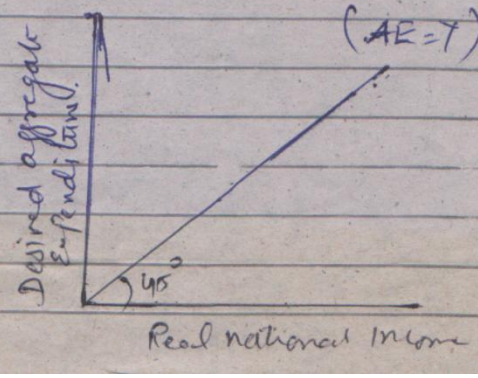
# Determinata of Equilibrium National Income.

## INCOME - EXPENDTURE APPROACH:

According to Keynesian approach, ~~when~~ the equilibrium level of GDP occurs where aggregate desired expenditur equals Total output.

Keynesian line which is labelled "45° line" ($AE = Y$) graphs the equilibrium conditions that aggregate desired expenditures equal national ~~income~~ output. Since in equilibrium the variable measured on the two axis must be equal, the line showing this equality is a 45° line. Anywhere along that line, the value of desired expenditures (along vertical axis) is equal to the value of national output (along horizonal axis).



Desired
~~Actual~~ aggregate expenditures are those which actually happens.

$$A.E = C + I + G + (X - M)$$

Where. $C$ = Consumers' expenditures.
$I$ = Firms' expenditure (Investments)
$G$ = Government expenditures.
$(X - M)$ = net exports - ~~Ex~~ net Foreign expenditures.

## Consumption and Saving Function.

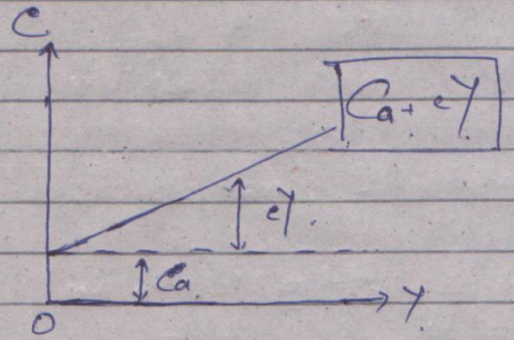
Consumption function shows relationship between Consumption and determinants of Consumption.

Determinants of Consumption are income, wealth, durable goods, Future expectation, Rate of interest, credit-facilities Rate of inflation, Sequence of earning, future objective extra. Despite income all other factors are considered as non income determinants.

$C = C_a + cY$

where $C_a$ = autonomous Consumption, it must be happend if at zero income. Non-income factors determine $C_a$.

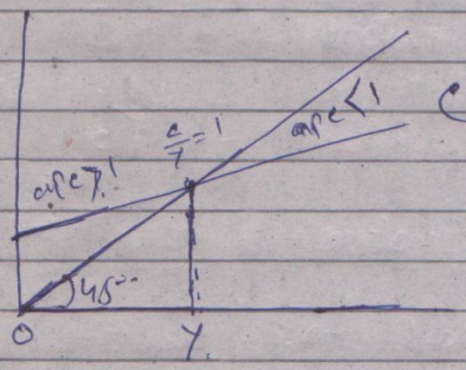
$cY$ = induced Consumption, which varies as income changes. i.e; rises as income rises and vice versa.




Average Propensity to Consume (apc)

apc shows tendency of Consumption of an individual at different income level $\Rightarrow$ $apc = \frac{C}{Y}$

Since Consumer dont increase There Consumption in the same Proportion as income changes, hence apc falls as income rises.



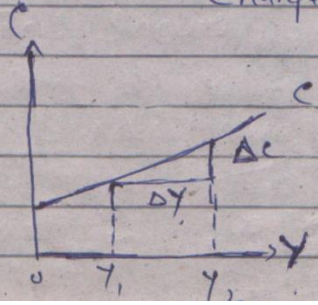

At 'Y' apc = 1 because C and Y are equal

Before 'Y' apc > 1 and beyond 'Y' apc < 1

## Marginal Propensity to Consume (mpc)

mpc shows Tendency of change in Consumption as income changes.

$$mpc = \frac{\text{change in Consumption}}{\text{change in income}} = \frac{\Delta C}{\Delta Y}$$




Hence, mpc shows the gradiant of the Consumption function. in 'C', mpc represent the value of 'C'

If mpc rises ~~steeper~~ Consumption function will be steeper and if mpc falls, Consumption function will be flatter.

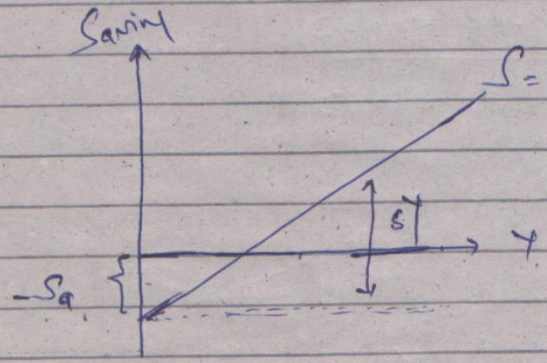
## Saving Function

In two sector model $Y = C + S$

$S = -Sa + sY$

$-Sa$ = autonomous Saving and it is negative equal to the value of autonomous Consumption.

$sY$ = induced Saving and it depends upon on income, as income rises induced Saving increases and vice versa.



Average Propensity to Save (aps): It shows tendency of saving at different income level $aps = \frac{\text{Saving}}{\text{Income}} = \frac{S}{Y}$

Marginal Propensity to Save (mps): It shows Tendency of change in saving as income changes $mps = \frac{\text{Change in Savings}}{\text{Change in income}} = \frac{\Delta S}{\Delta Y}$

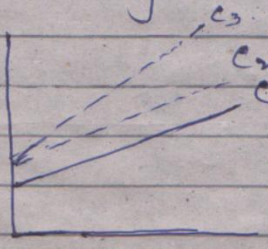
mps shows slope gradient of saving function and it is denoted by 's' in $sy$.

NOTE: → aps and mps rises as income rises

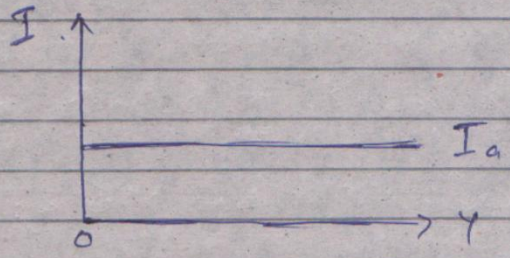
→ $apc + aps = 1$

∴ $mpc + mps = 1$

→ Consumption function may be shifted if there is any change occur in non-income factors and if mpc changes there is a Pivotal shift in Consumption function

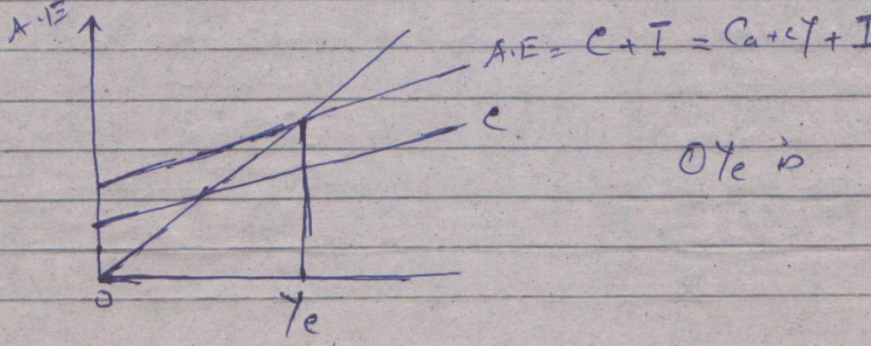


**Investment (I):** It is an addition to the capital stock of a firm, industry or an economy. In two sector model $\boxed{A.E = C + I}$ Investment may be induced or autonomous to keep our model simple, we assume that there is just autonomous investment, which will not be effected due to change in income, hence it is Parallel to X-axis.




An economy will be at equilibrium if

$$\boxed{Y = A.E = C + I}$$



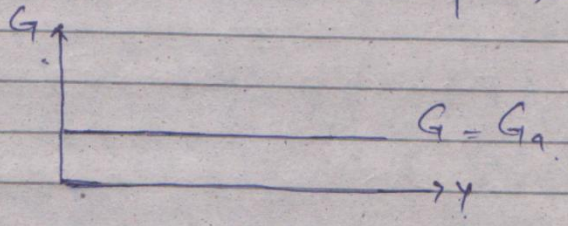

$OY_e$ is

3- Sector model is a closed economy with govt. intervention. Hence,

$$A.E = C + \bar{I} + G.$$

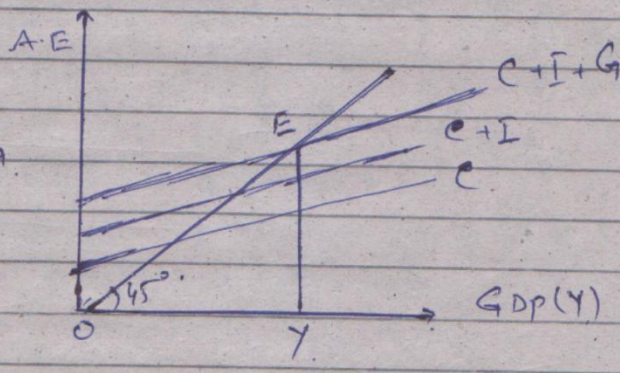
Where $\bar{G}$ stands for govt expenditure. It is assumed that G is autonomous, therefore,

$(G = G_a)$




Hence equilibrium GDP will be at Point E.

$C + I + G = C_a + cY + I_a + G_a$

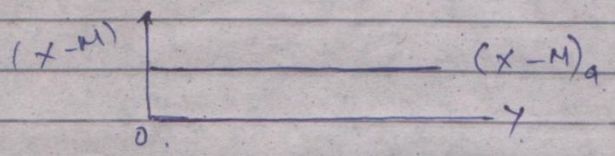



4- Sector Model is an open economy with govt. intervention hence

$$A.E = C + \bar{I} + G + (X - M)$$

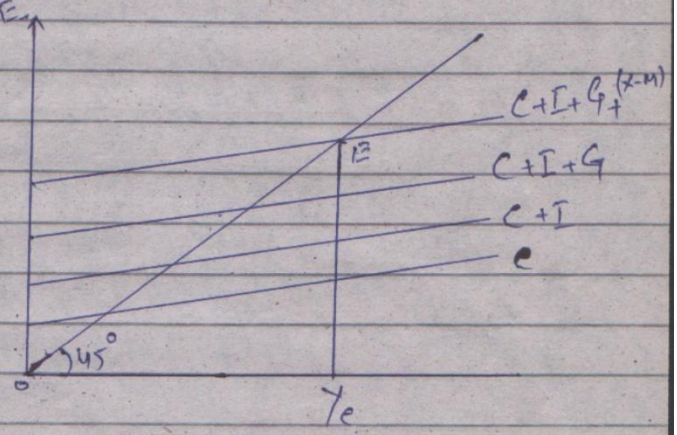
Where $(X - M)$ denotes net exports.

It is assumed once again that net exports are also autonomous therefore $(X-M) = (X-M)_a$




The equilibrium GDP will be at Point 'E'

$C+I+G+(X-M)$
$= C_a + cY + I_{oa} + G_a + (X-M)_a$

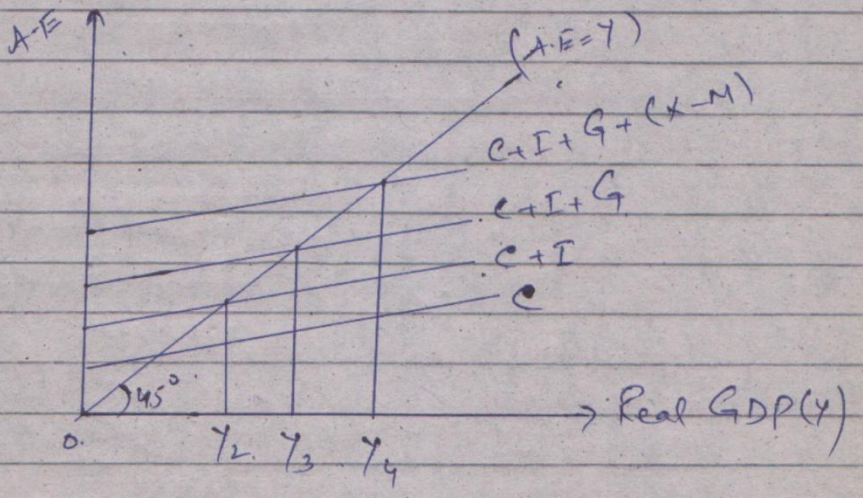



Equilibrium GDP in different Models

2-Sector Model
$= Y_2$

3-Sector Model
$= Y_2$

4-Sector Model
$= Y_4$

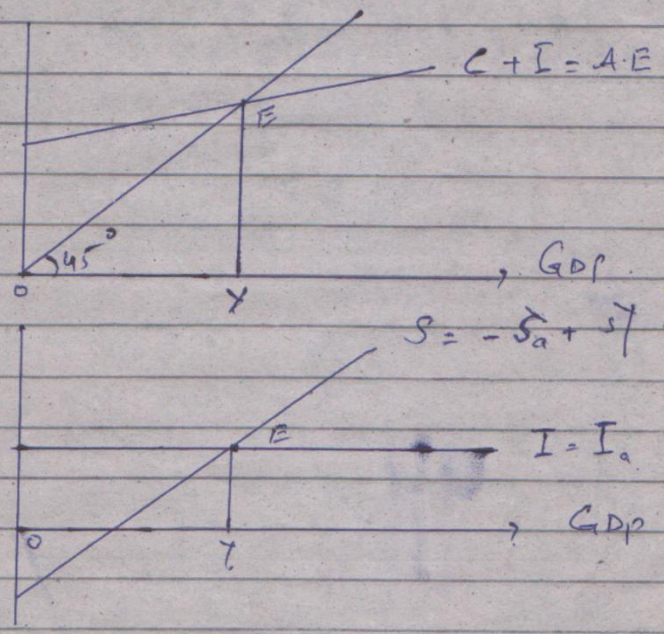


## Injection - Withdrawl approach

An equivalent equilibrium condition for $AE = Y$ for the determination of equilibrium GDP is that injections must equal withdrawls.

In 2-Sector Model, Savings are withdrawls where as Investments are injections. Economy will be at its equilibrium when $\boxed{S = I}$

hence, $C + S = C + I$

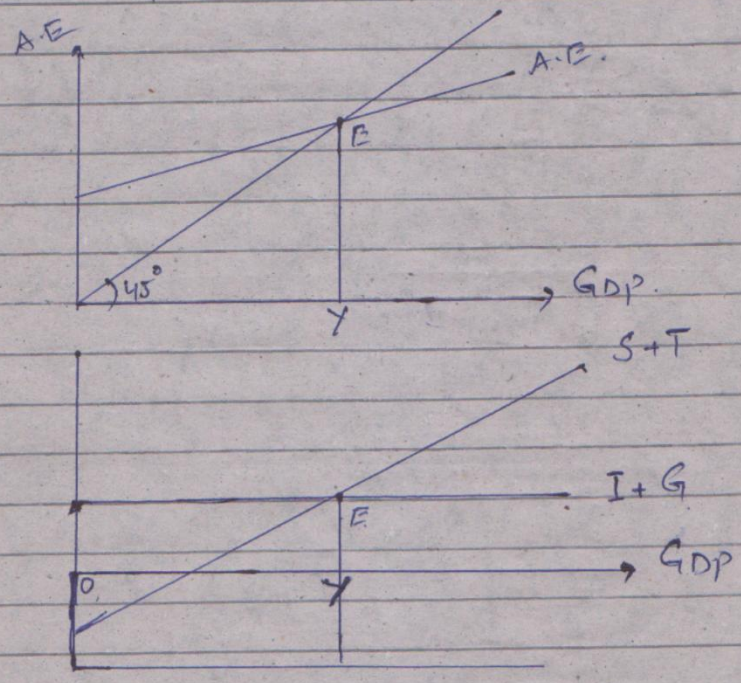


In 3-Sector Model, Govt is also engaged hence beside Savings, Taxes are another type of withdrawls, where as govt. spending is an injection alongwith investment. Economy will be at its equilibrium if

$$S + T = I + G$$

hence

$$\boxed{C + S + T = C + I + G}$$



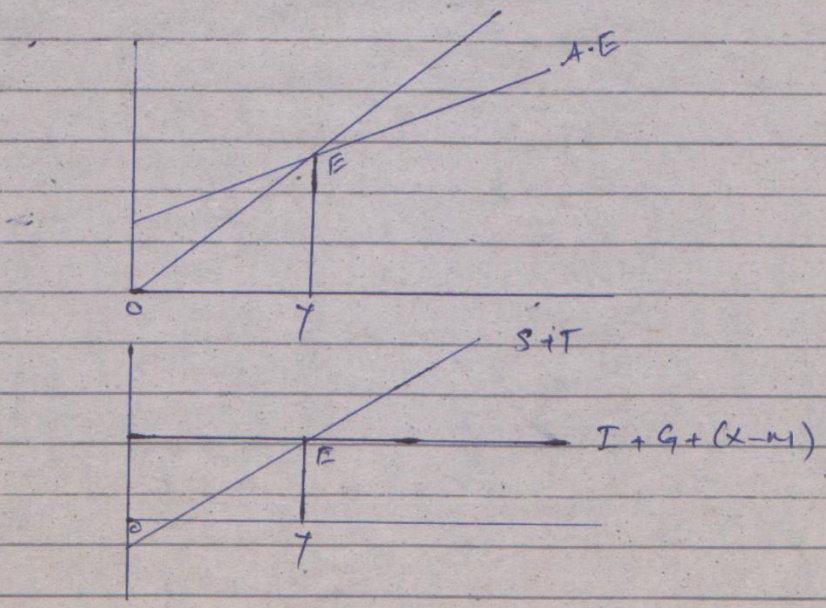
In 4-Sector model, there is an open economy with govt. Intervention. Hence in 4-Sector economy, withdrawls are Saving (S), Taxes (T) and imports (M), where as injections are Investment (I), Govt. spending (G) and exports (X).

The economy will be at its equilibrium if

$$S + T + M = I + G + X$$

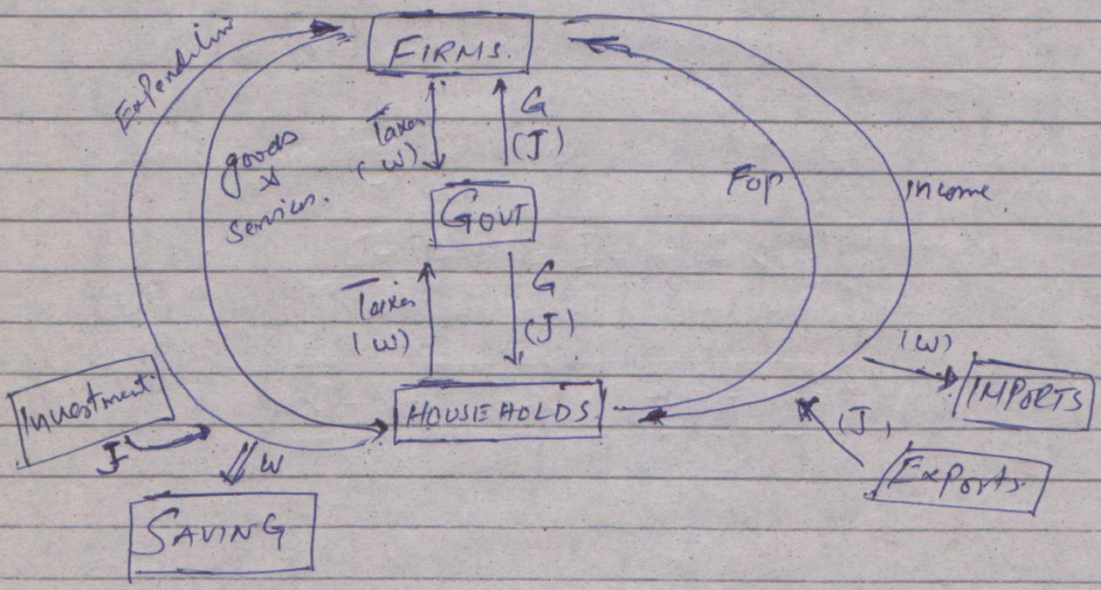
OR

$$C + S + T = C + I + G + (X - M)$$



In injection-withdrawl models, it is assumed that all investments, Govt. spending, and net exports are autonomous.

Circular Flow Of Income




FOP: Land, Labour, Capital, entrepreneur

Income = wages, Rents, Interests, Profits.

J = injection

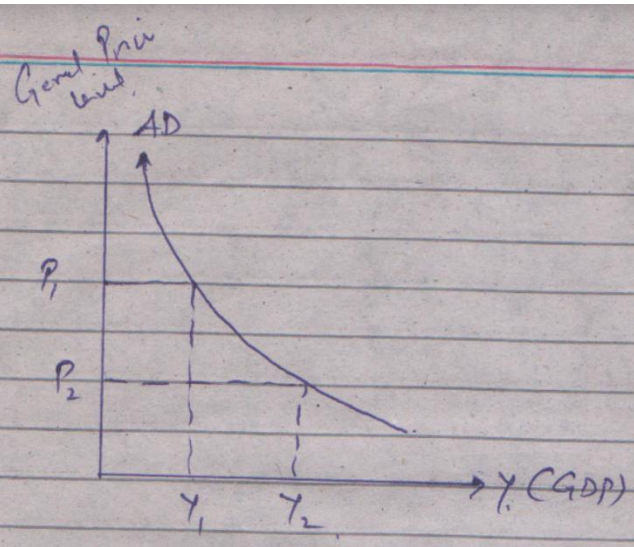
W = withdrawals

G = Govt. spending.

## Aggregate demand (AD) and aggregate Supply (AS)

According to Classical economist, an economy is at its equilibrium national income at that Point where **AD = AS**

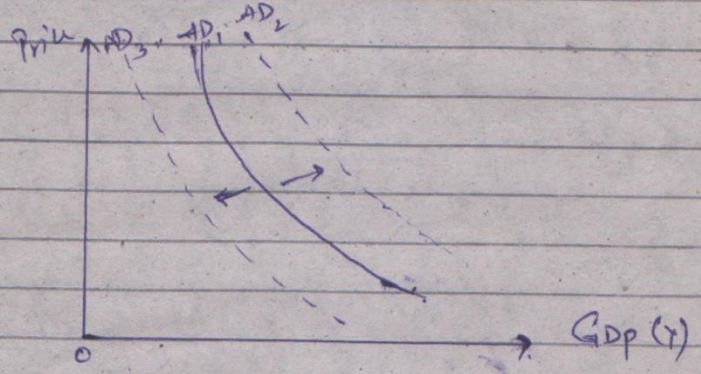
**Aggregate demand (AD)**: It shows Total desired Purchases of all nations' buyers at given prices and in Specified Period of Time. AD-Curve shows all such Combinations of the Price Level and national income that Yield equilibrium in the goods and asset market. AD-Curve is negatively sloped and shows an inverse relationship between general Price Level and desire Purchases of nations' buyers. General Price Level includes Prices of commodities, Rate of interest and Exchange Rate.




As Commodities' Prices fall, consumers tend to spend more and AD extends. Similarly if Rate of Interest falls, there is an increase in firm's desired expenditures. As Exchange rate falls, ~~goods~~ exports may be more competetive in international market and as a result exports Rise. An if Prices, Interest rate or/and exchange rate rises, there will be contraction in demand curve and we move along the demand curve.

Aggregate demand curve may be shifted

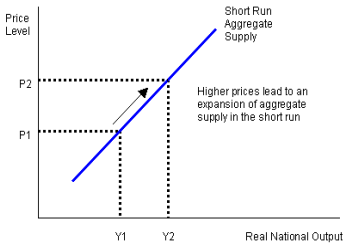
Rightwards or leftwards if there is a change occur in govt. spending, change in supply of money, Future expectation like business optimism or Pessimism, introduction of new Technology changes in Political and economic condition, change in Consumers' income etc




The ~~change~~ Shift in AD Curve is also called as demand shocks

# Aggregate supply

In economics, **aggregate supply (AS)** is the total supply of goods and services those firms in a national economy plan on selling during a specific time period. It is the total amount of goods and services that firms are willing to sell at a given price level in an economy.

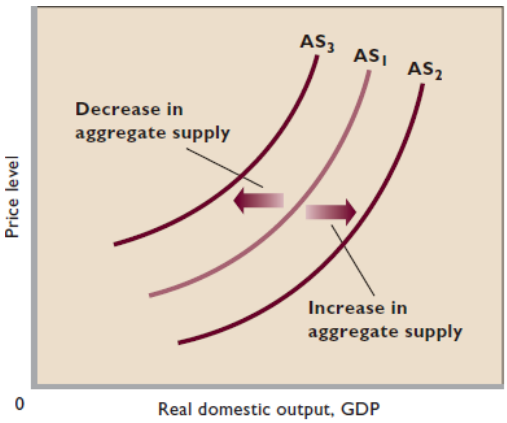



## Short-run Aggregate supply curve

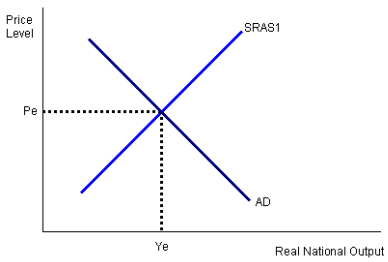
In the short-run, the aggregate supply curve is upward sloping. There are two main reasons why the quantity supplied increases as the price rises:

1. The AS curve is drawn using a nominal variable, such as the nominal wage rate. In the short-run, the nominal wage rate is fixed. As a result, an increasing price indicates higher profits that justify the expansion of output.
2. An alternate model explains that the **AS** curve increases because some nominal input prices are fixed in the short-run and as output rises, more production processes encounter bottlenecks. At low levels of demand, large numbers of production processes do not make full use of their fixed capital equipment. As a result, production can be increased without much diminishing return. The average price level does not have to rise much in order to justify increased production. In this case, the AS curve is flat.

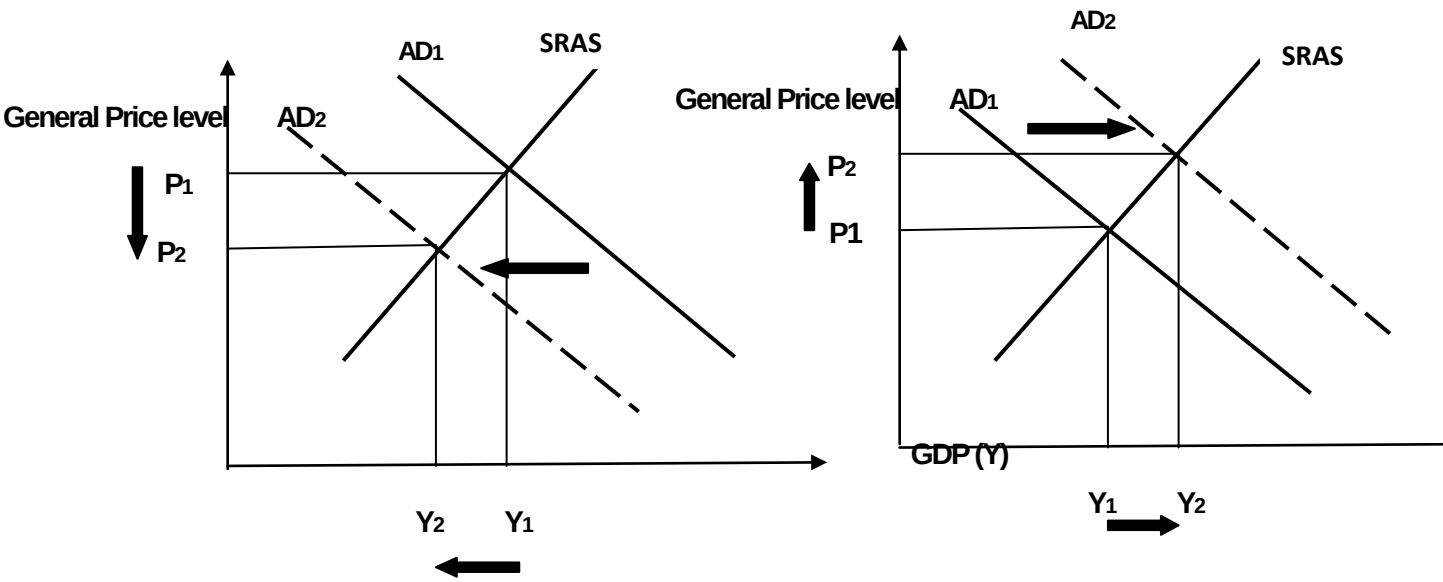
In the short run supply curve will shift if there is any change occurs in input prices, either these are domestic resources prices or are prices of imported resources. Secondly, if there is change in productivity, AS curve will be shifted. In case of an increase AS curve shifts rightwards and if there is a fall in productivity, it will be shifted leftwards. Thirdly, legal-institutional changes can shift AS curve, for instance, if government introduces taxes of regulate firms production, there is a possibility of leftward shift in AS curve. On the other hand if government reduces taxes or introduces subsidies or deregulate private sector or if make competition polices, AS curve shifts rightwards.



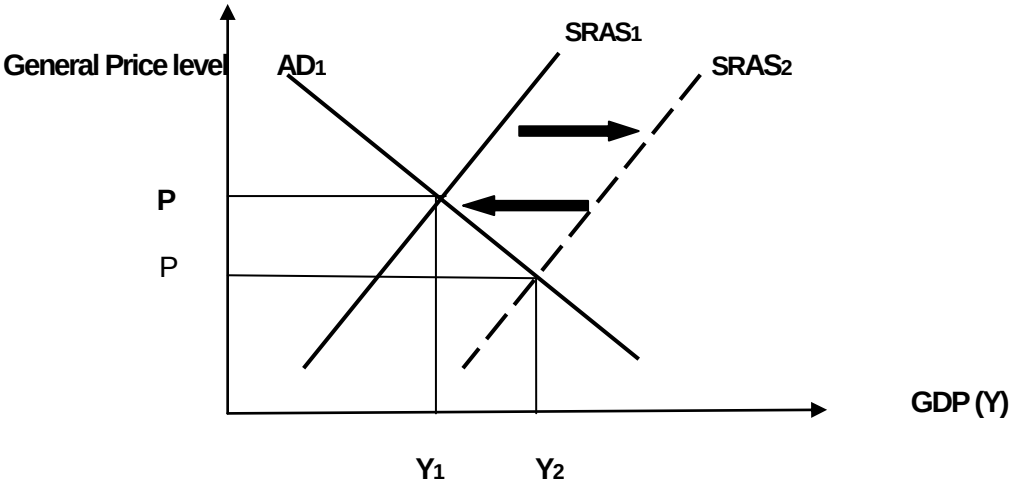

In the short run, an economy is at its equilibrium at that point where aggregate demand (AD) intersects short run aggregate supply curve. At equilibrium point 'Pe' is the general price level for 'Ye' real national output.




**The** equilibrium will be changed if there are 'demand shocks' or/and 'supply shocks'.

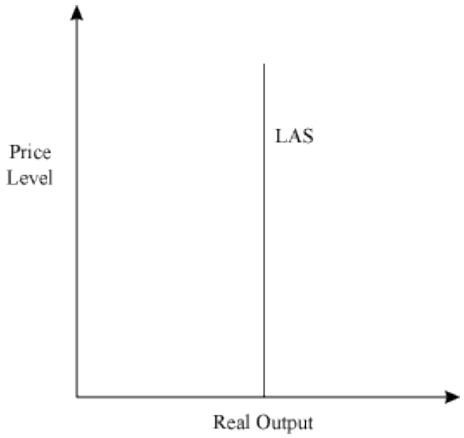



Due to unfavourable demand shock, AD curve shifts leftwards and shows a fall in general price level as well as equilibrium national income (deflationary effect). On the other hand due to favourable demand shocks demand curve shifts rightwards, which shows increase in general price level and the national income.




If SRAS curve shifts rightward, general price level falls and GDP rises, however if SRAS curve shifts leftwards, it will increase general price level but GDP falls.

**Long- run Aggregate supply curve:** In the long run all input resources are operating at their full potential therefore aggregate supply curve is perfectly inelastic (vertical) in the long run Fig (a). Any change in aggregate demand brings changes in price only Fig (b).



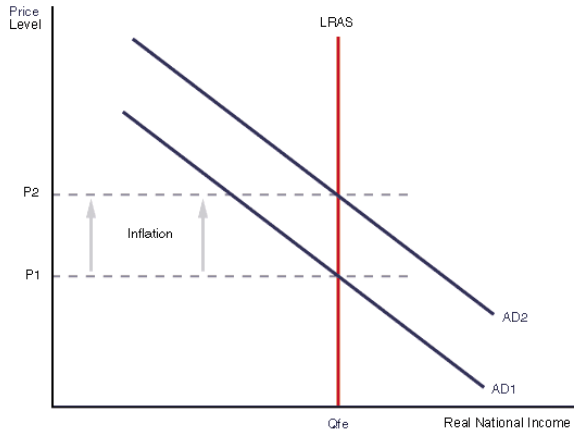
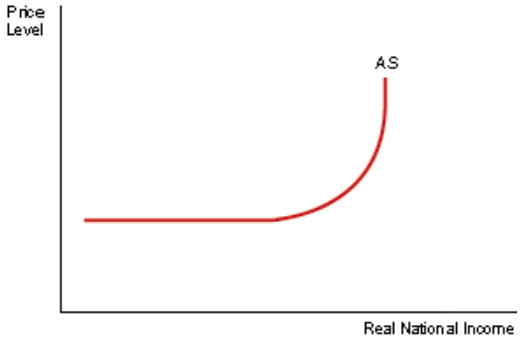




Fig (a) Fig (b)

In Keynesian model aggregate supply curve is of unique shape, Keynes believed that the long-run aggregate supply curve (LRAS) has three main segments through which a market will go through over a period of time. Keynes believed that at the beginning, the market will start out with an increased level of output with no increase in prices since there is lots of spare capacity in the economy it is perfectly elastic




Once the market moves through the early parts of the LRAS, the spare capacity will then be used up and output will go up at the same time. As a consequence, the costs of the factors of production will rise. After the middle section in the LRAS, employment will be full since output cannot be increased since all the factors of production are being utilized. At the last stage it is perfectly inelastic i.e. vertical supply curve.

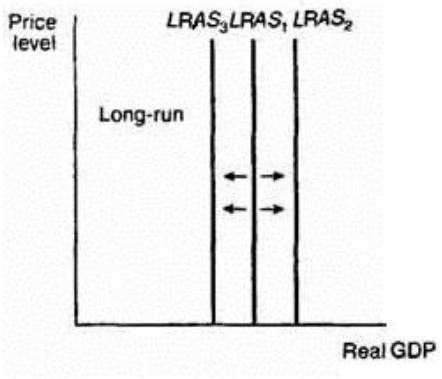
## Shifting the LRAS Curve Shifting the Curve

The long-run aggregate supply curve is constructed assuming all aggregate supply determinants remain unchanged. Should any of these determinants change, the long-run aggregate supply curve shifts to a new position. The long-run aggregate supply curve can either shift rightward (an increase in aggregate supply) or leftward (a decrease in aggregate supply).

The long-run aggregate supply curve is shifted due to changes by any (ceteris paribus) factor other than the price level. Two broad determinant categories include:

**Resource Quantity**: This determinant is the quantity of the resources--labor, capital, land, and entrepreneurship--that the economy has available for production. If the economy has more resources, then aggregate supply increases and the long-run aggregate supply curve shifts rightward. With fewer resources, aggregate supply decreases and the long-run aggregate supply curve shifts leftward. Specific determinants in this category include population growth, labor force participation, capital investment, and exploration.

**Resource Quality:** This determinant is the quality of resources, especially technology and education. If the quality of labor, capital, land, and entrepreneurship change, then aggregate supply changes and the long-run aggregate supply curve shifts. An improved quality increases aggregate supply, triggering a rightward shift of the long-run aggregate supply curve, and a decline in quality decreases aggregate supply, generating a leftward shift of the long-run aggregate supply curve.



## Multiplier (K)

It shows how much national income changes due to change in injection by $1.

Multiplier= $\frac{change\ in\ income}{change\ in\ injection} = \frac{\Delta Y}{\Delta J}$

Where 'J' stands for injections i.e. government spending, consumption, investment and/or exports.

Let's assume that there is a closed economy without any government intervention. Secondly, initial injection is $1000. Thirdly, marginal propensity to consume is given and it is 0.8. Fourthly, process will be completed in the specified period of time.

| Time | ΔY ($) | ΔC(0.8) ($) | $\Delta S(0.2)$ ($) |
|---|---|---|---|
| 1 | 1000 | 800 | 200 |
| 2 | 800 | 640 | 160 |
| 3 | 640 | 512 | 128 |
| 4 | 512 | 410 | 102 |
| 5 | 410 | 328 | 82 |
| 6 | 328 | - | - |
| Remaining rounds | 1982 | 1310 | 672 |

Since initial injection is $1000, hence it brings initial change in income of $1000. As spending of one is the incomes of other and in the model we assume that mpc is 0.8, therefore 80% of the changed income is spent which create income for others, whereas 20% 0f the income is saved which are drained out from the flow. Similarly, at the next stage a consumer or a group of consumer once again spends 80% of the income which is about $640 and the rest is saved. The process will go on unless the whole of the income is spent or saved. Now the overall change in income is many times more than the initial injection. It can be worked out by measuring the value of multiplier. In 2-sector model mpc determines the value of multiplier.

. K=$\frac{1}{1-mpc}$

In the above model mpc=0.8 hence value of multiplier is 5. Therefore change in income is $5000 (5 × $1000), where K=5 and J=$1000. The value of the multiplier also equal to the reciprocal of withdrawal i.e. K=$\frac{1}{withdrawl}$ , where withdrawals may be in terms of savings, taxes or/and imports.

**Limitations**: The working of the multiplier, as demonstrated above, actually represents an ideal. It contains several qualifications, which may not be found in practice. The factors which operate to reduce the multiplying effect are technically called "Leakages". The various limitations to the full working of the multiplier in this regard are as follows:

**firstly**, Keynes's concept of multiplier effect is based on the mpc assumed to be constant, so that the mps will necessarily be constant. Hence, Keynes ruled out the possibility of leakages. But in a dynamic economy, the mpc, or inversely the marginal propensity to save, is never constant. In fact, as income increases, the marginal propensity to save is likely to rise and, therefore, the value of the multiplier is likely to fall. **Secondly**, if a part of the newly-created income is spent on buying old stocks, shares and securities or on other financial investments, consumption will be less and the corresponding multiplier will be low. **Thirdly**, mpc is taken on average and it may vary from person to person and from time to time. **Leakages** or withdrawals slow down the process of multiplier and in our model we have ignored all other leakages except savings. However, in reality there is government intervention in terms of taxes as well as there is an existence of international trade where imposts are considerable withdrawals. Imports and taxes slow down the process of multiplier. **Another** important

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factor is the time lag, i.e. process must be completed in the specified period of time which is practically not possible; therefore outcomes are not according to expectations.

## Importance

In spite of the above limitations, the multiplier principle occupies a very important place not only in economic theory but also in shaping economic policy. It plays a vital role as an instrument of income building. It tells us how a small increase in investment can result in large increase in income. It is of special importance in the study and control of business cycles. It furnishes guidelines for appropriate income and employment policies. It also explains the expansion of public sector in modern times.

**Multiplier in 2-sector**

. K=$\frac{1}{mps}$ Where mps= marginal propensity to save

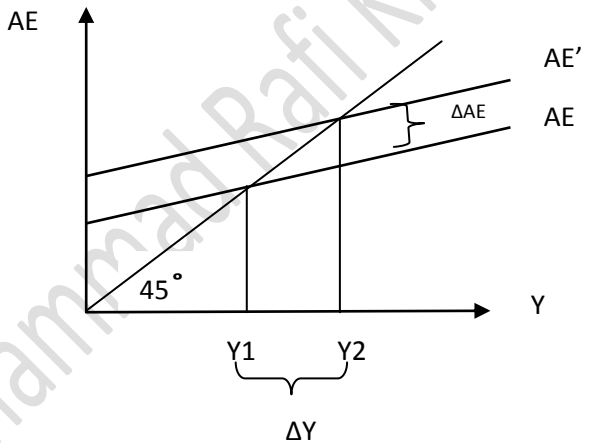
**Multiplier in 3-sector**

. K=$\frac{1}{mps+mrt}$ Where mrt= marginal rate of tax i.e. mrt== $\frac{change\ in\ rate\ of\ tax}{change\ in\ income}$

**Multiplier in 4-sector**

. K=$\frac{1}{mps+mrt+mpm}$ Where mpm= marginal propensity to imports i.e.

mpm== $\frac{change\ in\ imports}{change\ in\ incom}$




In the above diagram if aggregate expenditures are increased by ΔAE then national income increases by ΔY. therefore value of multiplier can be calculated by $\frac{\Delta Y}{\Delta AE}$.

Multiplier effect occurs due to change in autonomous expenditures which shifts expenditure function upwards and downwards. It may be positive or negative. It is positive if net injections are positive which shifts expenditure function upwards and as a result national income increases according to the value of multiplier with respect to the amount of injection.

However, if leakages exceed injections, multiplier will be negative which shifts expenditure function downwards and as a result national income decreases according to the negative value of multiplier with respect to change in withdrawals.

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**Paradox of thrift**

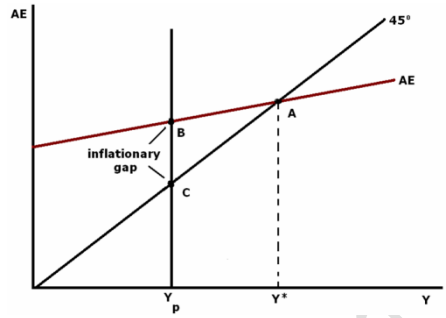
An economics concept that if everyone tries to save an increasingly larger portion of income, they would become poorer instead of richer. This is because the economy will slow down from reduction in demand and the very same people would lose their jobs. This theory, however, applies mainly to Keynesian economics where increased savings represent a diminishing circular flow of income.

The multiplier rule advocates this concept. For instance, as savings fall, mpc rises and it leads to increase in national income at relatively greater proportion and if mpc falls, value of multiplier will fall too and as a result there is relatively small increase in the national income. On the other hand if leakages exceeds then there may be a fall in national income.

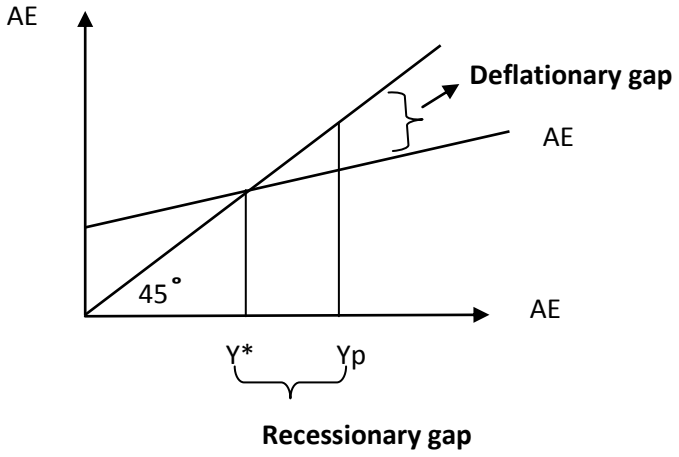
It is important to note that the paradox of thrift is a theory, not a fact, and is widely disputed by non-Keynesian economists. One of the main arguments against the paradox of thrift is that when people increase savings in a bank, the bank has more money to lend, which will generally decrease the interest rate and spur lending and spending.

## Inflationary and deflationary gaps

Inflationary gap occurs when actual income increases than the potential income i.e. *equilibrium GDP is greater than full-employment GDP*. It creates an inflationary pressure on the economy because aggregate expenditures are increased than the potential expenditures. For example in the following fig. potential income is at 'Yp' and potential expenditures must be at 'c', but, due to inflationary pressure income rises to Y* as A.E intersect 45 ° line at 'A'. It creates an inflationary gap of '**BC**'.




Deflationary gap occurs when actual income is below than the potential income i.e. *equilibrium GDP is below than the full-employment GDP*. It creates deflationary pressure because of fall in general price level and as a result potential aggregate expenditures fall than the potential aggregate expenditures. Due to deflationary gap, a recessionary gap is also developed(Y*Yp).



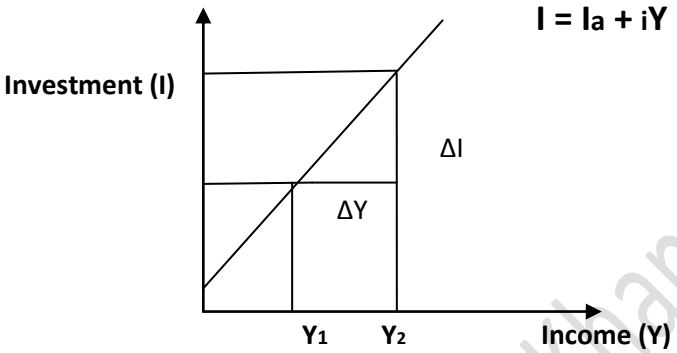
## Determinants of investment

**Income**: an increase in income leads to increase in demand for goods and services, therefore to produce more goods and services firms need to make more investment. The investment may be many times more than the actual change in demand (output) because of ***accelerator effect.***

## Accelerator Theory

In the determination of equilibrium national income it is assumed that there is just an autonomous investment and no induced investment. However, actually investment changes as there is a change in income or output. Accelerator shows the change in investment as income changes. Accelerator co-efficient determines the value of accelerator i.e. the change in investment due to change in income.

$$\text{A=}\frac{\textit{change in investment}}{\textit{change in icome}} \quad \text{or A=} \frac{\Delta I}{\Delta Y}$$




Thus an increase in rate of economic growth **(ΔY)** will have a corresponding larger increase in the level of investment **(ΔI).** This theory is based on the idea that consumer confidence and high demand for goods and services have a multiplying effect on the economy. Accelerator also work in reverse, for instance, if consumer confidence or aggregate demand take a hit due to poor planning or an economic downturn, companies will be unlikely to invest in new equipment or workers. As a result the negative impact on the investment is greater than the actual change in income.

The value of the accelerator depends on the 'capital-output' ratio; high the capital-output ratio greater will be the value of accelerator and vice versa. For example, if GDP rises by $10million due to which induced investment rises by $50millions then the value of accelerator is '5'. The value of accelerator is positive until GDP rises at the increasing rate. If GDP rises at the constant rate, no induced investment is made by the firms and they continue to buy same numbers of machines to expand their capacity to produce. On the other hand if GDP falls, value of accelerator will be negative. It can be explained with the help of following model where it is assumed that the

| Years | Consumes' demand | No. of machine at the start of period | No. of machines required | Replacement investment | Induced investment | Total investment |
|---|---|---|---|---|---|---|
| 1 | 800 | 8 | 8 | 1 | 0 | 1 |
| 2 | 1000 | 8 | 10 | 1 | 2 | 3 |
| 3 | 1600 | 10 | 16 | 1 | 6 | 7 |
| 4 | 1800 | 16 | 18 | 1 | 2 | 3 |
| 5 | 1800 | 18 | 18 | 1 | 0 | 1 |
| 6 | 1700 | 18 | 17 | 0 | 0 | 0 |

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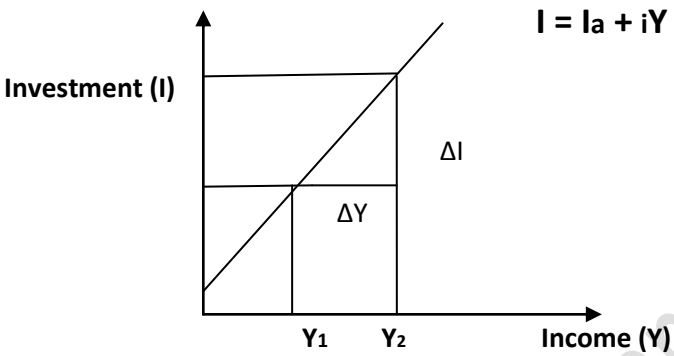
**Capital Output** ratio is one unit of capital (machine) can produce 100 units of the product. The replacement cost is given and constant that is 'one' machine per year.

In the above table, in year 1, consumer demand is 800 units. Since one machine can produced 100 units therefore, 8 machines are required which already exist. The replacement investment is one machine and there is no induced cost hence, total investment is just one machine. In the second year consumer demand increases by 200 units and to meet the demand firms need 10 machines whereas firms already have 7 machines (one machine is deducted as replacement cost). The overall investment is 3 machines, which is in greater proportion as compare to the change in consumers' demand (200% in investment with respect to 25% in consumers' demand). As there is a fall in growth rate of consumer demand as it can be seen in year 4, investment will fall and even fall to zero if there is a fall in consumer demand.




However certain factors are neglected here, for instance, an increase in consumer demand does not require a relatively larger change in investment all the time because existing machines may have spare capacity to meet some of the demand. Secondly, technological changes are ignored which can reduce capital output ratio.

**Technological changes:** to remain competitive firms will have to make more investment in new technology since rival firms have already opt new techniques and become more efficient and productive.

**Rate of interest:** since interest is the cost of capital, hence as rate of interest increases, cost of capital increases and firms expect a fall in profit margin. Therefore, firms are reluctant to make further investment. If rate of interest falls, profit will rise and firms may be encouraged to make investments.

**Business optimism:** if firms are optimistic about future i.e., they expect a rise in sales or improvement in economic conditions of the economy or successfully predict the change in demand, it will encourage investment. However, under pessimism investment may not be increased.

**Government policies**

If government makes favourable policies i.e. reduction in tax rates, subsidies, tax holidays, grants, reduction in rate of interest etc, it encourages investments. On the other hand if government policies are unfavourable, firms will be reluctant to make investment.

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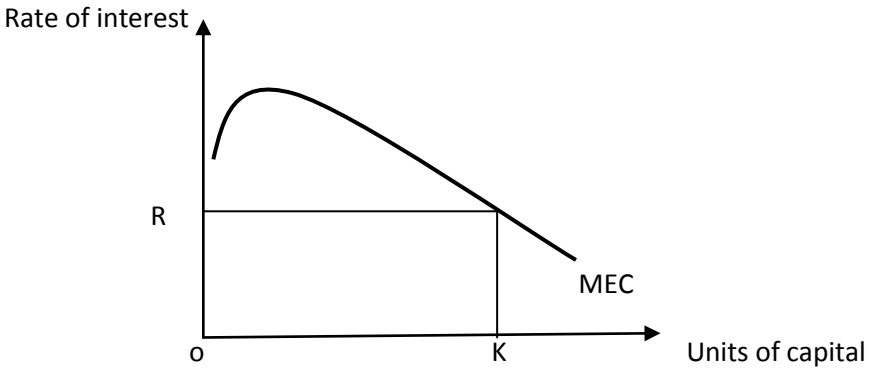
**Marginal efficiencies of capital (MEC)**

The Marginal efficiency of capital displays the expected rate of return from investment, in a particular given time. The marginal efficiency of capital is compared to the rate of interest. MEC determines the contribution of an additional unit of capital towards output.




The shape of the MEC curve in the short is because of law of diminishing marginal return, and in the long run it is because of return to scale. Although change in interest rate has an inverse effect on investment, however, firms make comparison between rate of interest and the MEC. For example, if interest rate increases but still MEC is above than the interest rate, firms are encouraged to invest. On the contrary, if interest rate falls but still MEC is below than the interest rate, firms usually do not make investment. A firm makes investment up to that point where MEC= rate of interest.

**Trade cycle under Keynesian Model**

According to Keynes, in an economy economic fluctuations take place due multiplier (K) and accelerator (**A) effects.** For example, as investment increases then there is a greater proportional increase in income due to positive multiplier effect. As income rises, now investment rises at the larger proportion according to the value of accelerator. As this process continues, the economy will be headed towards Boom. As economy approaches to boom, there might be fall in injections because all resources are near to full employment. It will have a negative impact on the national income due to negative multiplier effect. As income falls there is a fall in investment at relatively larger proportion according to the value of accelerator and as a result economy moves downwards to recession.

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