

Unit-2Simple Keynesian Model

Full employment is rare and government intervention is necessary.

In this theory equilibrium is generally reached before full employment.

Focused on short-run as in long run we are dead.

In short-run, amount of capital, size of population, labour force, technology do not change.

Due to all these being constant ^{output and income} employment is dependent on output.

Prices and wages are not flexible.

Perfect competition in product and labour market.

Cost increases with increasing production.

Effective Demand is when $ADF = ASF$.

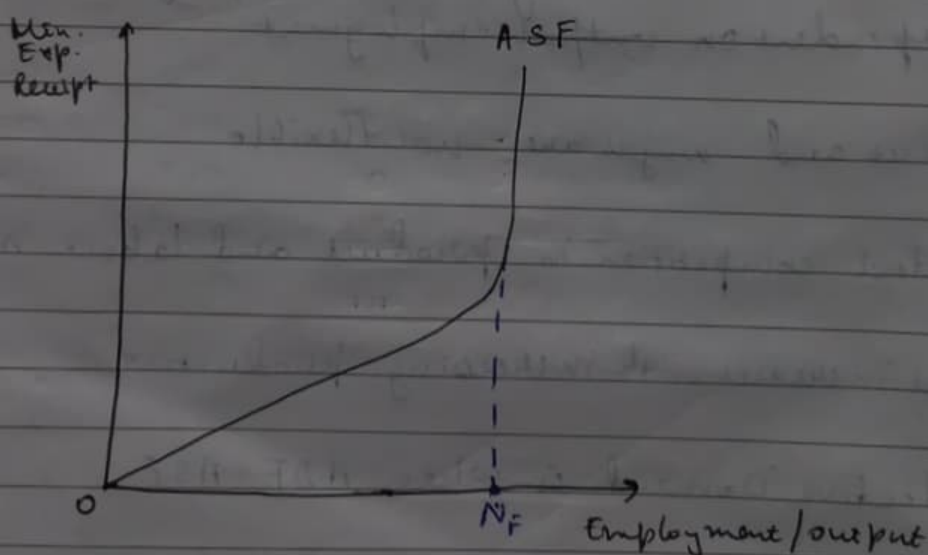
~~Agg~~

Aggregate Supply Function (ASF)

Minimum expected receipts to cover the cost of production.

When we add all individual supply functions we get aggregate supply function.

Level of Employment / output	Minimum Expected Receipts
10	400
20	600
30	700
40	800
50	900
50	1000



When we reach full employment the output stops increasing but prices keeps on rising as we can't increase supply anymore.

Aggregate Demand Function (ADF)

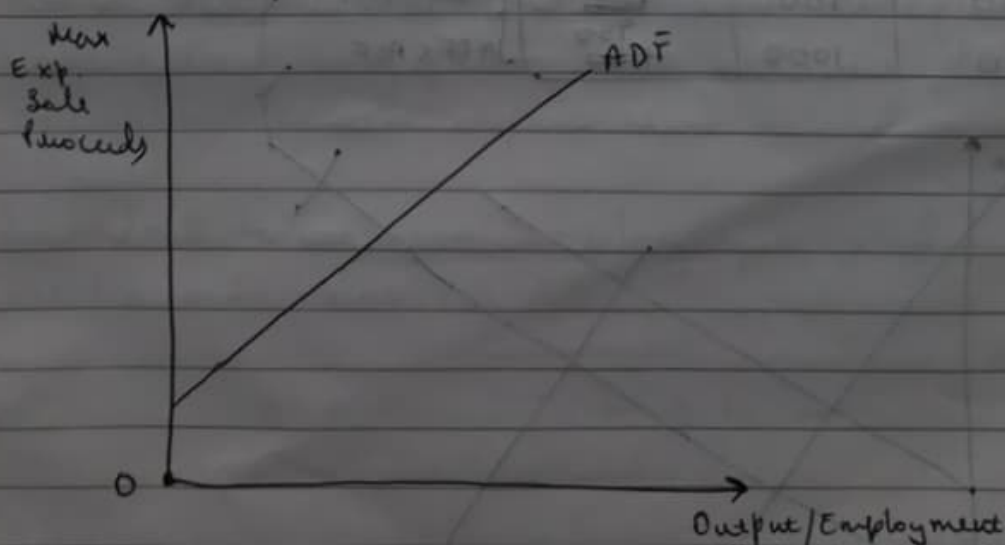
Sum of all individual demand functions

Maximum amount consumers are willing to pay

People willing to pay depends on income which depends on output and employment

ADF is a positive function, as output increases demand price increases

Level of Output	Maximum Expected Sale Proceeds
10	550
20	650
30	750
40	800
50	900 850
50	950



Does not start from ^{origin} 0 as at 0 level of income there are basic needs which leads to consumption

Determination of Equilibrium

$$ADF = ASF$$

$ASF = \text{Supply price/cost}$

$ADF = \text{demand price/revenue}$

$ASF = ADF$, Equilibrium level of output & employment

$ASF > ADF$, as supply is more ~~equilibrium~~ has a tendency to decrease output and employment

$ASF < ADF$, as supply is less output and employment will increase

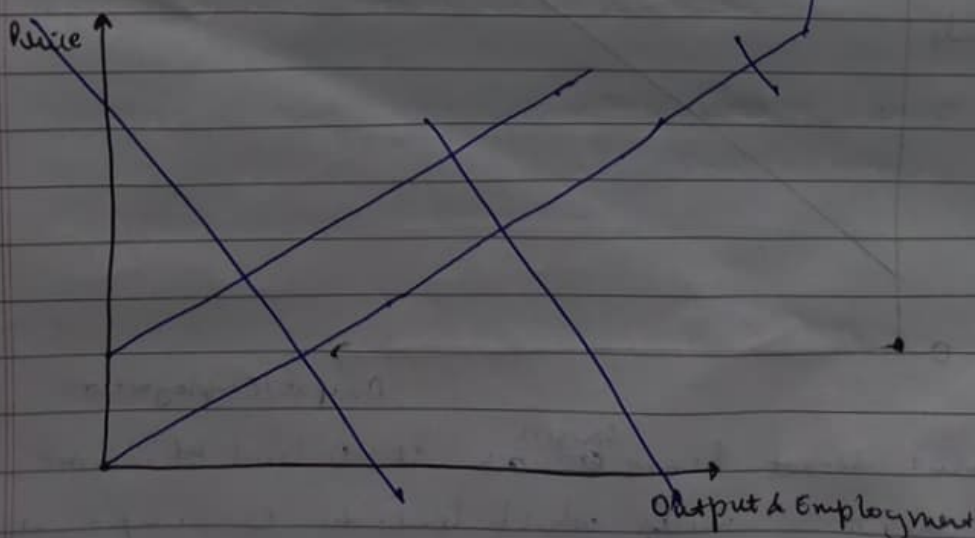
Level of Output	ASF	ADF
10	400	550
20	600	650
30	700	750
40	800	800
50	900	850
50	1000	750

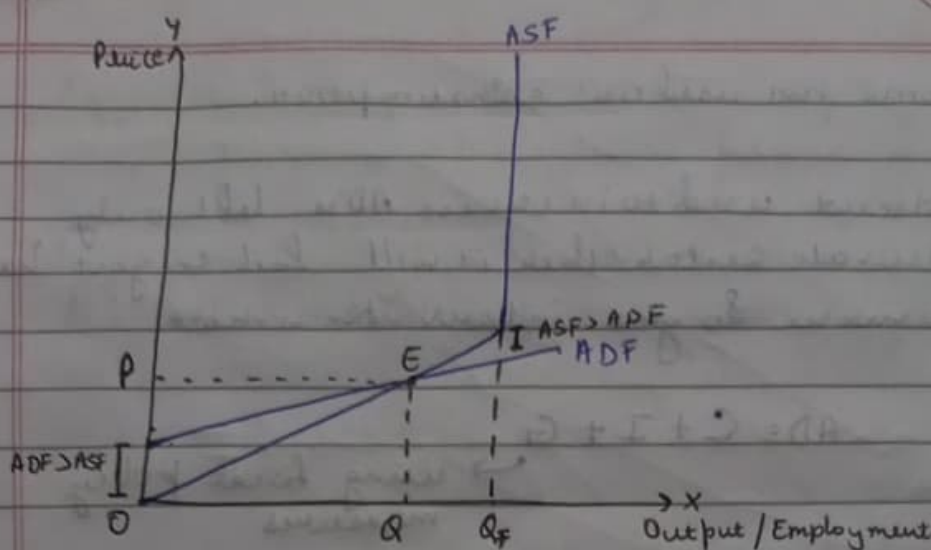
$ADF > ASF$

$ADF = ASF$

~~$ADF = ASF$~~

$ADF < ASF$





Shortage of Aggregate demand causes unemployment

As ADF is more than ASF it increases employment and output reaching equilibrium and once it surpasses it ADF is less than ASF due to which unemployment takes place and we reach back to equilibrium level.

Effective Demand is that aggregate demand price which becomes effective because it is equal to aggregate supply price and represent short-run equilibrium.

In order to increase employment and output we have to increase AD .

$$AD = \text{Consumption} + \text{Investment}$$

Increase in consumption is lower as compared to increase in income, so in order to increase AD main focus is on increase in investment from position

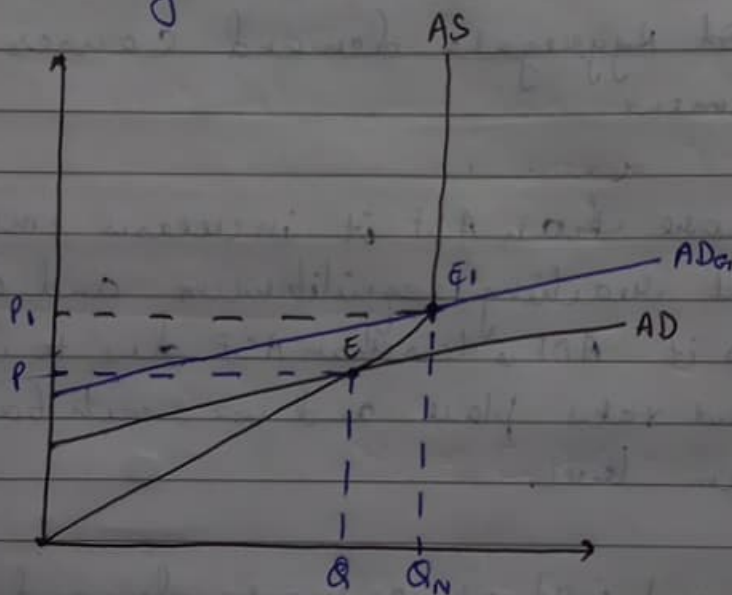
of income not used on consumption.

If investment used to increase AD is left only for private sector then it will fail so govt. has to intervene. So govt. intervention is must.

$$AD = C + I + G$$

→ using fiscal policy measures

Now using G we can achieve full employment



Now with increase of G , AD has shifted to AD_G which is at equilibrium at E_1 where we achieved full employment.

Aggregate supply is constant in short run as it depends on physical and technical conditions of production.

Investment is highly volatile and causes recession and depression.

Aggregate Supply is the total output produced in an economy at a given price in a given period.

Aggregate Demand is the total amount of demand for all finished goods and services produced in an economy at a specific price level in a given period.

$AD = \text{Aggregate Expenditure}$

$$AE = AD = C + I$$

$$C = a + bY$$

autonomous
consumption

i.e. the consumption
which takes place
at 0 level of income

Propensity to consume
i.e. slope of ~~consumption function~~
income exp. curve

measures change in consumption
due to change in income

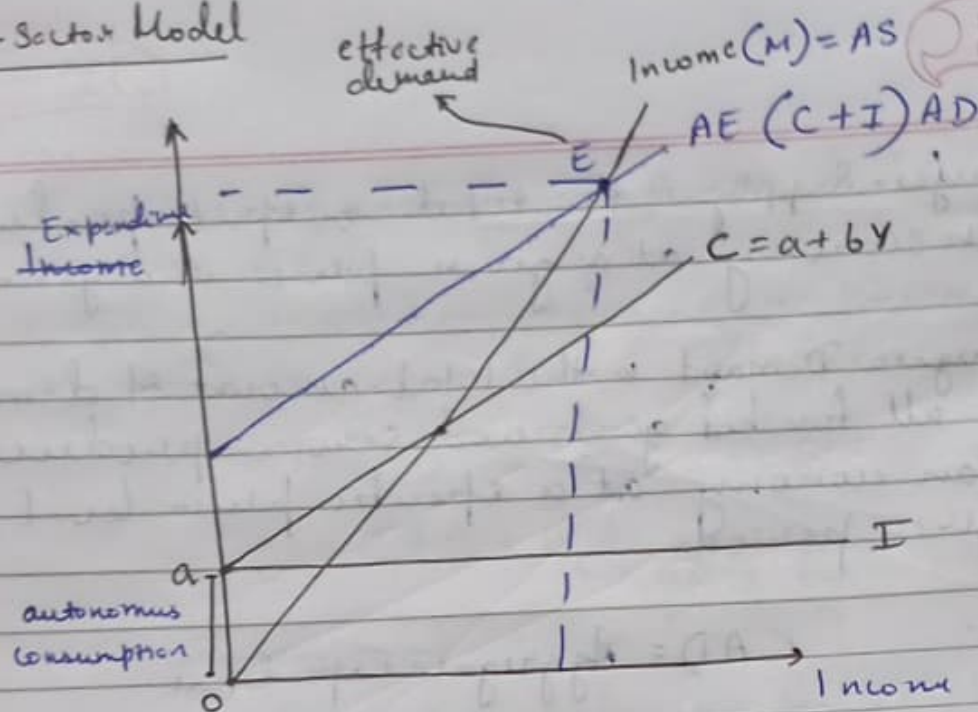
$$b = \frac{\Delta C}{\Delta Y}$$

M is income line

Investment (I) is autonomous of income i.e. does not get affected by change in income and only dependent on rate of interest, and efficiency of capital employed.

So in order to find Aggregate expenditure curve add Investment curve to consumption curve which will shift it vertically.

Two-Sector Model



National Income = National Product = AS = AD

Wages
 Rent
 Profit
 Interest

national product is combined value of all goods produced which is same as aggregate supply

national income will be either saved or consumed

$$Y = C + S = AS$$

$$AS = C + S$$

Not necessary that full employment exist at E

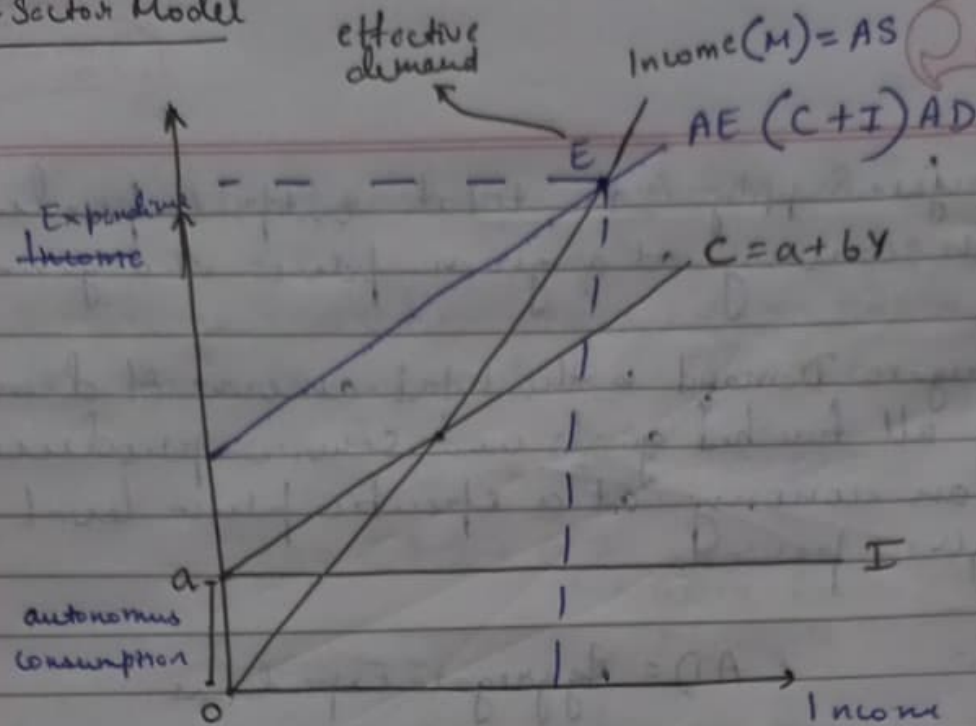
Saving is the difference b/w income and consumption expenditure (buying consumer goods and services)

$$S = Y - C$$

Investment is done out of savings

Investment is net addition to the stock of capital in a particular period.

Two-Sector Model



$$\text{National Income} = \text{National Product} = AS = AD$$

$\left\{ \begin{array}{l} \text{Wages} \\ \text{Rent} \\ \text{Profit} \\ \text{Interest} \end{array} \right\}$

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Classicals said $S=I$ at equilibrium
but Keynes said $S=I$ are always equal.

Ex-Ante Saving and Investment

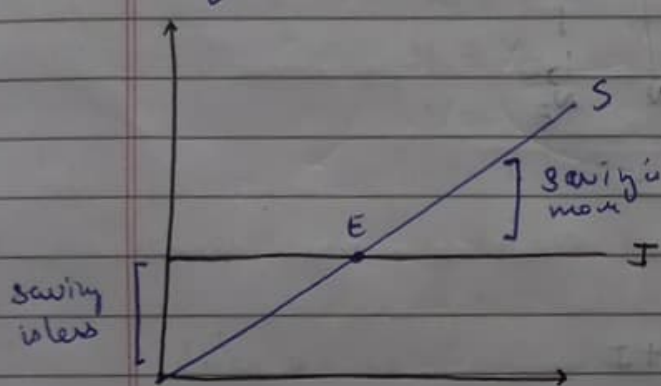
Ex-Post Saving and Investment

Also known as planned,
intended or desired
saving and investment

Actual investment
and saving taking
place.

They are equal at
equilibrium

They are always
equal



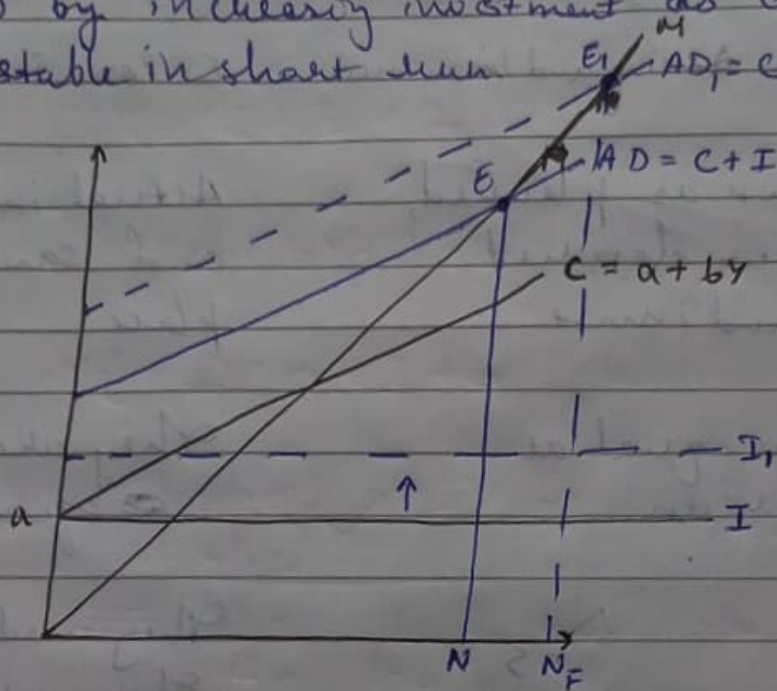
They used the concept
of inventories of
goods

We can bring saving
and investment to
equilibrium by fluctuating
income as $\uparrow \text{income} \uparrow \text{saving}$
 $\downarrow \text{income} \downarrow \text{saving}$

if $S > I$, demand is
less, so inventory
will increase, so
if we add inventory
to investment so
it will become
equal.

if $S < I$ demand is
more inventory
will decrease,
so if we reduce
the decreased
amount of inventory
from investment
then also $S=I$

If we reach equilibrium before full employment we can reach full employment by increasing AD by increasing investment as consumption is stable in short run.



Investment Multiplier

$$Y = AS = C + S$$

$$Y = AS = AD = C + I$$

$$Y = C + I, \quad C = a + bY, \quad b = MPC = \frac{\Delta C}{\Delta Y}$$

MPS (Marginal Propensity to Save) calculates the change in saving due to change in income.

$$MPS = \frac{\Delta S}{\Delta Y}$$

When MPS is 0, MPC is 1 and vice versa.

$$MPS + MPC = 1$$

So equate $C = a + bY$ in Y we get

$$\text{Investment Multiplier (K)} = \frac{\Delta Y}{\Delta I} = \frac{1}{1-b} = \frac{1}{1-MPC} = \frac{1}{MPS}$$

It tells the measure an investment made will generate.

Value of multiplier is directly proportional to MPC and indirectly to MPS

Government Expenditure Multiplier

$$Y = C + I$$

$$Y = a + bY + I$$

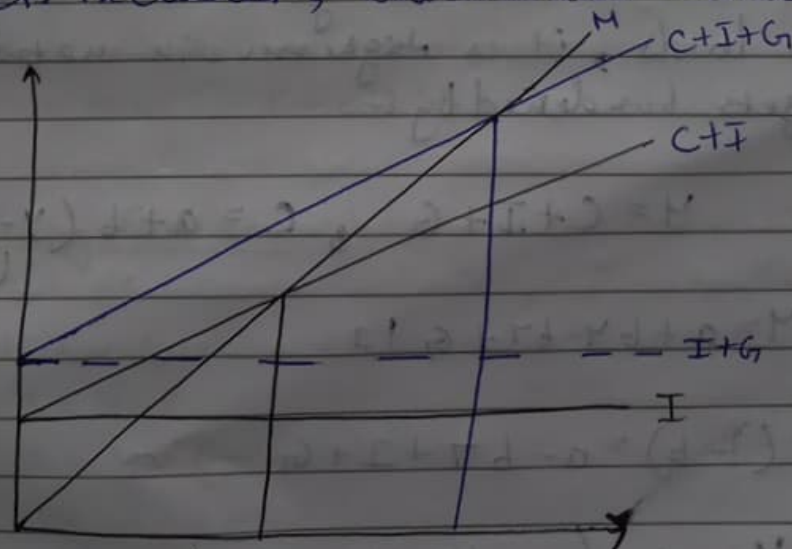
$$Y = \frac{1}{1-b} (a+I)$$

$$\frac{\Delta Y}{\Delta a} = \frac{1}{1-b}$$

(autonomous expenditure Multiplier)

It is same as investment multiplier

In three sector model Government expenditure gets included, which is also autonomous



In three sector model taxes are not introduced
So govt is doing expenditure using borrowings
which is obtained from savings of citizens.

$$Y = C + I + G$$

$$Y = a + bY + I + G$$

$$Y(1-b) = a + I + G$$

$$Y = \frac{1}{(1-b)} (a + I + G)$$

AG	$\frac{\Delta Y}{\Delta G} = \frac{1}{1-b}$	Govt. Expenditure
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All investment, govt and autonomous multiplier are same.

Tax Multiplier (Lump-Sum Tax)

lump-sum tax does not get affected by income levels, it is regressive in nature as poor gets burdened by it.

$$Y = C + I + G, \quad C = a + b(Y - T)$$

↳ disposable
income after
tax

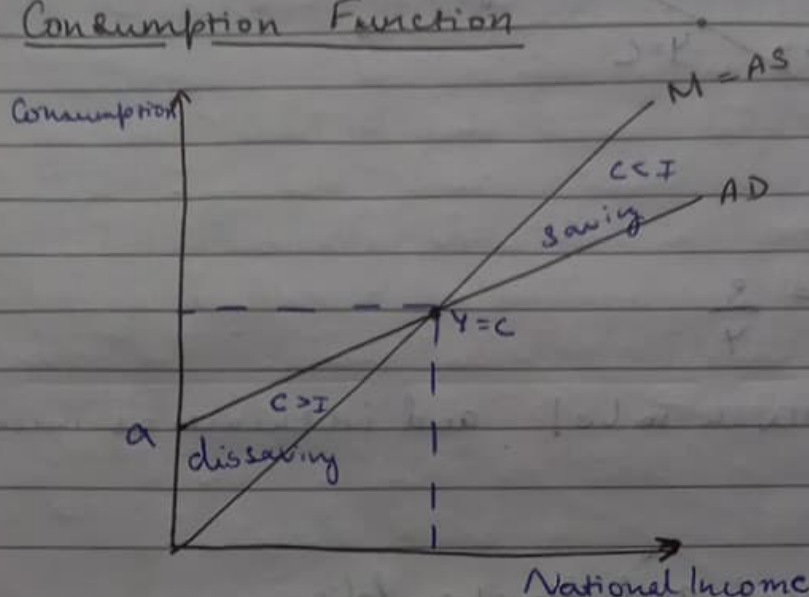
$$Y = a + bY - bT + I + G$$

$$Y(1-b) = a - bT + I + G$$

$$Y = \frac{1}{1-b} (a - bT + I + G)$$

$$\frac{\Delta Y}{\Delta T} = \frac{-b}{(1-b)} = -\frac{MPC}{(1-MPC)}$$

Consumption Function



$$APC = \frac{C}{Y} \text{ at a point}$$

$APC > 1$ before break-even point

$APC = 1$ at break-even point

$APC < 1$ after break even point

APC can never be zero

$$C = a + bY$$

Saving Function

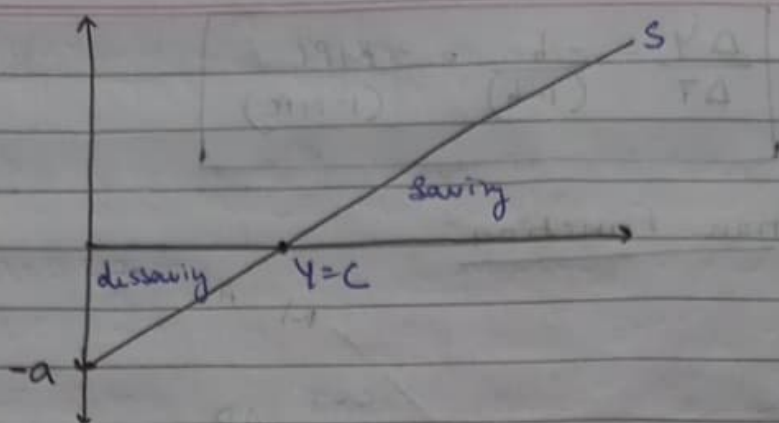
$$Y = C + S$$

$$S = Y - C$$

$$S = Y - (a + bY)$$

$$= Y - a - bY$$

$$S = -a + (1-b)Y$$



$$APS = \frac{S}{Y}$$

APS can never be 1 and increases as income increases

Effect of Fiscal and Monetary Policy

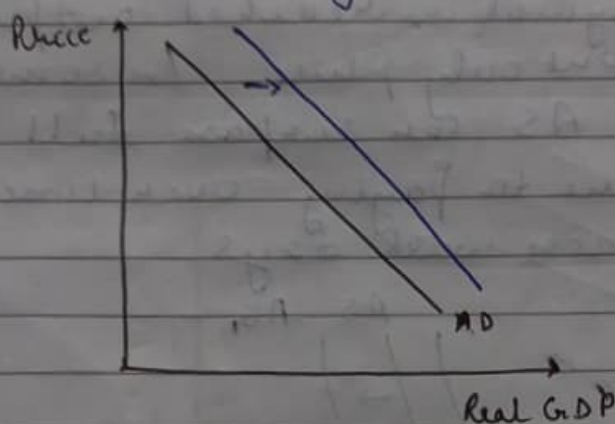
- Fiscal
- i) Tax Policy reduction increase income which increase AD and lead to increase in output which increases demand of money which increase interest rates which
 - ii) Govt. Spending increased causes rise in income which increases AD, output, demand of money and interest rates
 - iii) Increasing money supply increases AD & but decreases interest rates which also increase AD in short run, which further increase output and employment.

Aggregate Demand

It is a measurement of the total amount of demand for all finished goods and services.

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

AD is GDP in long run as it is adjusted for inflation.



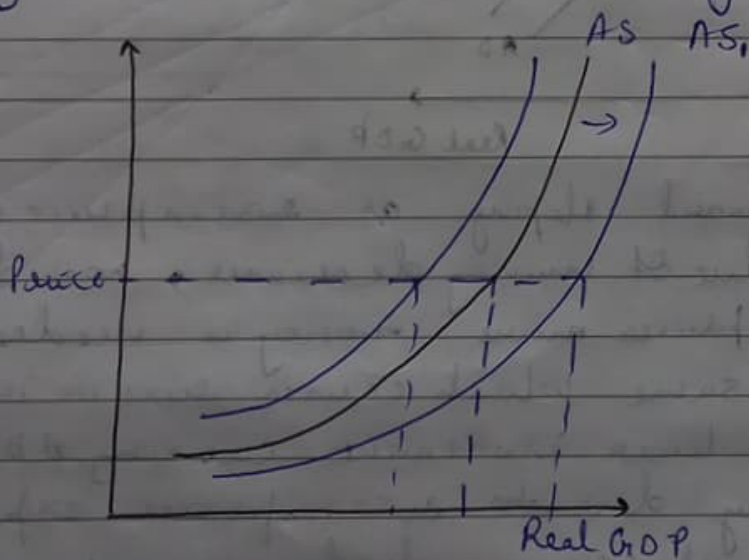
AD is downward sloping as rise in price due to which value of money decreases, now due to increased prices more money is needed but supply is same which causes rise in interest rate which will lower investments causing AD to reduce and finally due to rise in prices exports will fall which causes decline in net exports which will further reduce AD.

If there is decrease in G , T , I and money supply increases the AD will shift as price remains same just more output available.

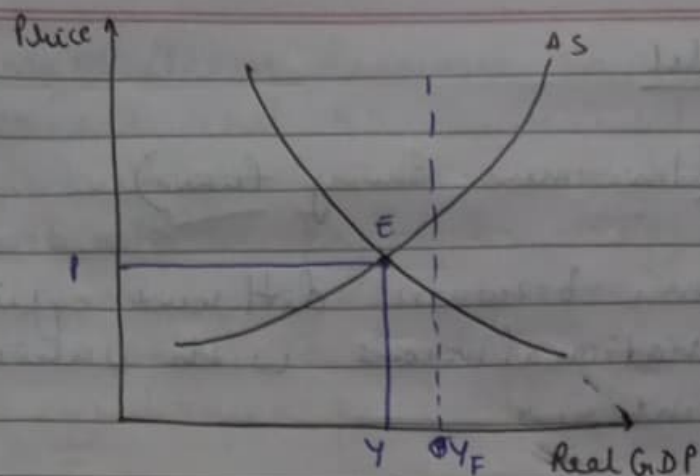
Aggregate Supply

Except price all factors remain constant

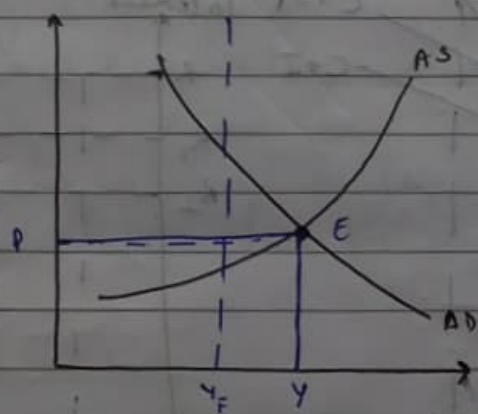
Initially economy can expand its production without facing much rise in unit cost of production, so price increases slowly. Then prices start rising with increase in output once full employment is reached output does not rise but only price. In some cases output AS can surpass full employment due to paying over-time, night shift or more work days.



As all the factors are constant, so if due to any reason price per unit fall the AS will shift. It can be due to wages, prices of input, change in technology, taxes & subsidies.



If equilibrium takes place before full employment it is called inflationary recessionary gap, as demand and supply both are low.



If equilibrium takes place beyond full employment it is called inflationary gap, due to overtime or increase in workforce.

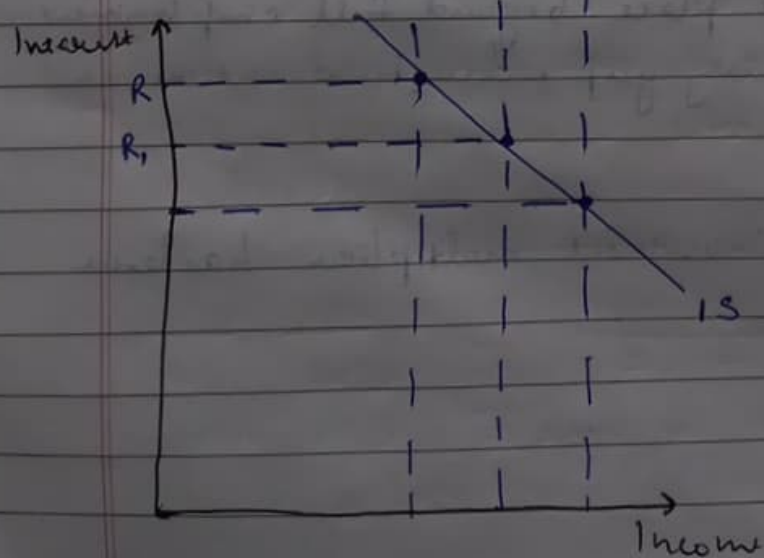
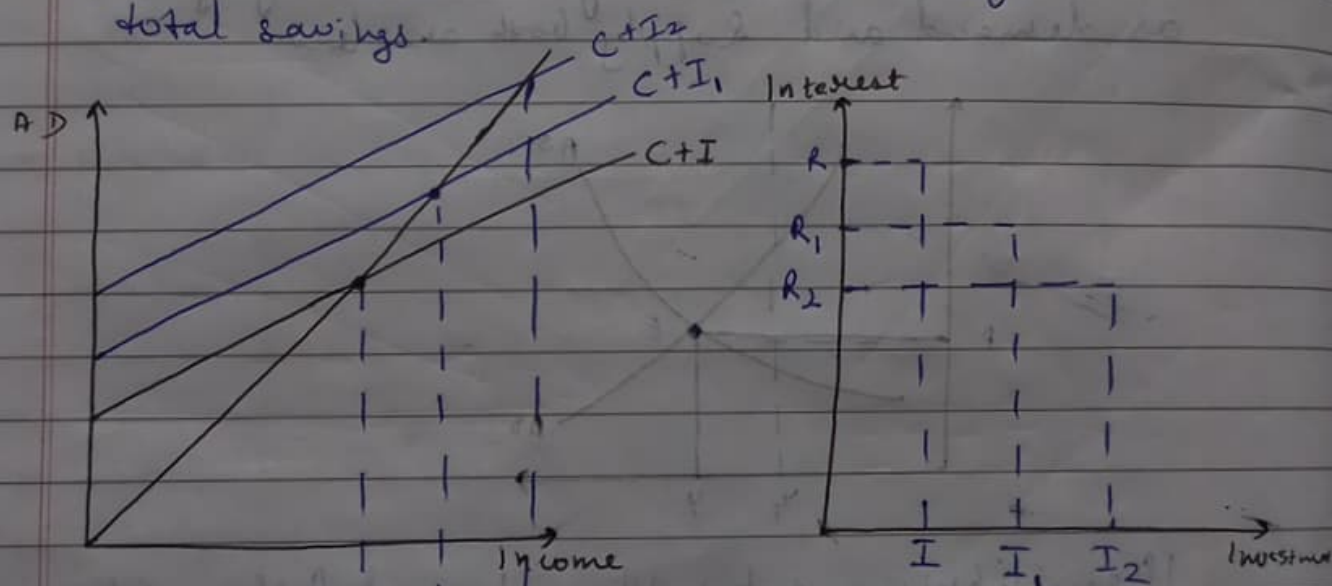
If price rises the investment multiplier has less impact.

IS-LM Model

IS curve (Investment-Saving Curve)

Tells relation between different equilibrium level of national income with various rates of interest

IS curve depicts the set of all level of interest rates where Total Investment is equal to total savings.



If rate of interest decreases so investment will increase and AD curve will shift upwards. This will give a point on Interest-Income which will be parallel to equilibrium level. With each reducing interest rate, investment will increase and plotting of each new new equilibrium pt. will draw IS curve.

Slope of IS curve (Steeptness)

If investment is highly elastic which means investment is highly responsive to change in rate of interest IS curve will be highly elastic (relatively flat).

Higher the value of multiplier, steeper the curve will be due to higher MPC.

Shift in IS curve

Due to any change in factors other than interest IS curve will shift.

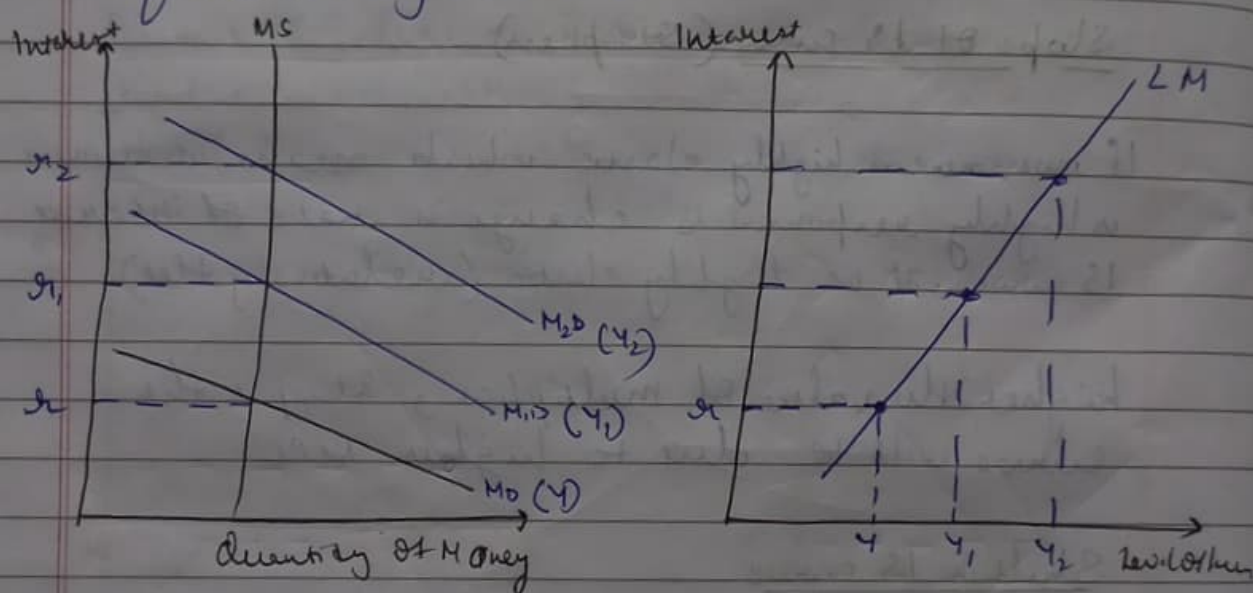
If autonomous consumption change then also shift occurs.

Positive shift $\rightarrow$ rightward.

LM Curve

Liquidity of Money (Money Demand) $\rightarrow$ Real Income (Y)
 $\rightarrow$ Rate of Interest (r)

LM curve depicts the set of all level of income and interest rates at which money supply equals money demand.



As the income increases, rate of interest will increase to reduce money demand as income will rise so will rate of interest.

Steepness

More the change in income more the LM will be steeper.

Speculative demand should be less responsive to rate of interest.

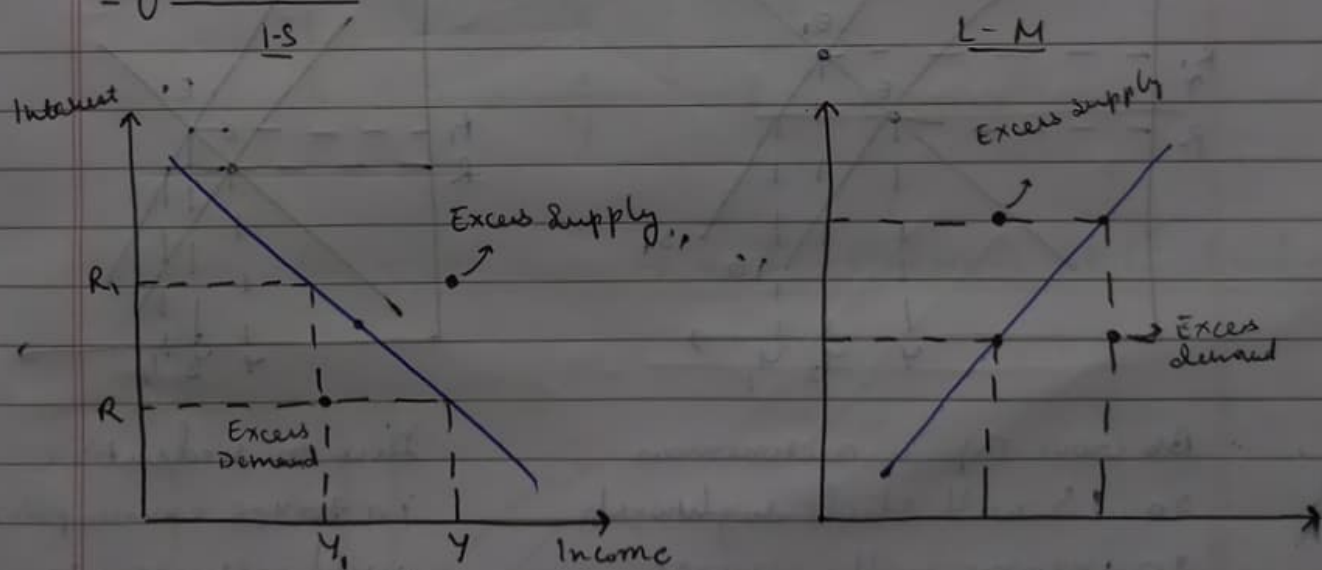
Shift

If money supply increases which was constant rate of interest will decrease and LM curve will shift downwards.

If money demand increase due to any reason with change in income rate will increase and curve will shift.

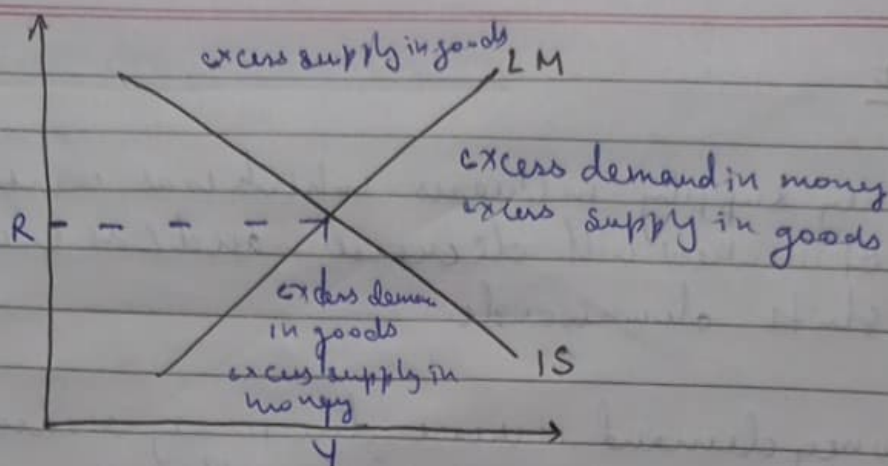
IS curve is downward sloping as investment will increase with ~~increase in~~ decrease in rate which will increase income.

Equilibrium



In I-S curve on right side there is excess supply in goods market and excess demand on left side.

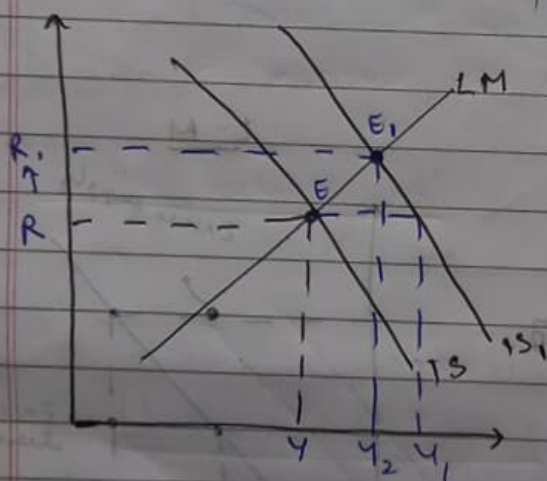
In L-M curve there is excess supply on left side and excess demand on right.



Effect of Fiscal and Monetary Policy

Fiscal Policy

1) Increase in Govt. Exp.



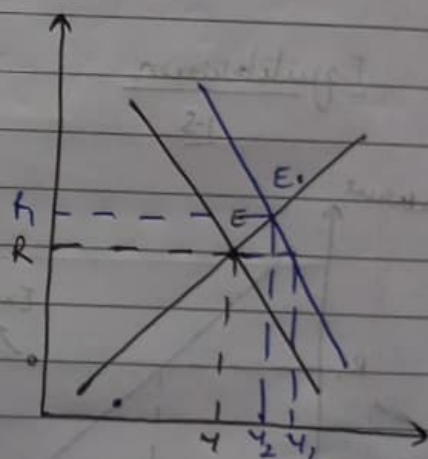
As Govt. Exp. is autonomous
so IS will shift rightwards
so income will increase

$$\text{by } \Delta Y = \frac{\Delta G}{1-MPC} \Rightarrow \Delta G = \Delta Y(1-MPC)$$

due to which money supply
will increase in money market
which will reduce interest rate
so income will increase but not
that much

This called crowding out effect

2) Reduction in Taxes



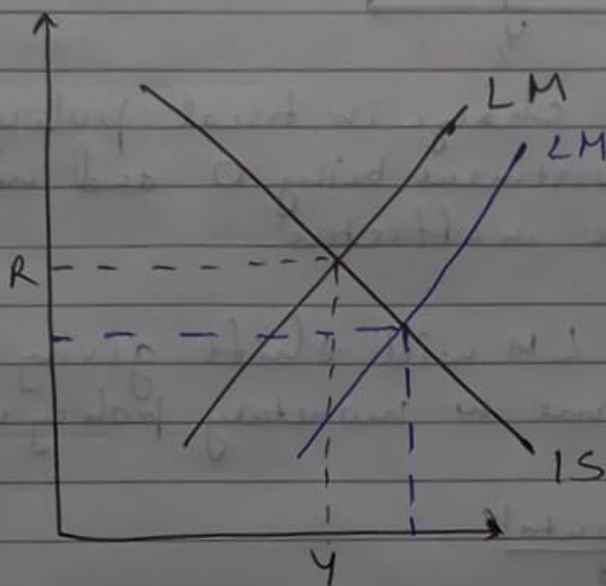
Due to reduction
in taxes consumption
will increase, so
IS will shift right,
also income will increase
by $\Delta Y = \frac{\Delta T \cdot MPC}{1-MPC}$

due to which interest
rate will rise and
income will not
increase
that much

Monetary Policy

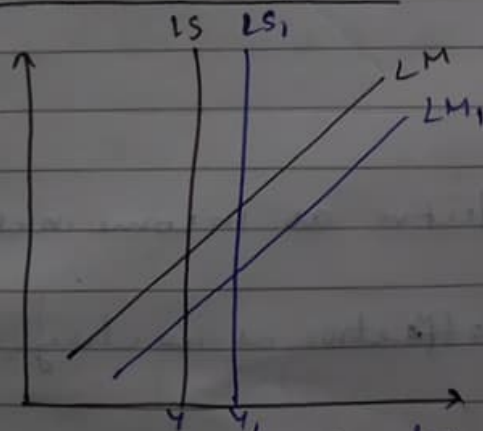
It affects money supply

Given the income level is same whether money demand decrease or supply increase LM will shift rightward.



Slopes of IS-LM curves and effectiveness of fiscal and monetary

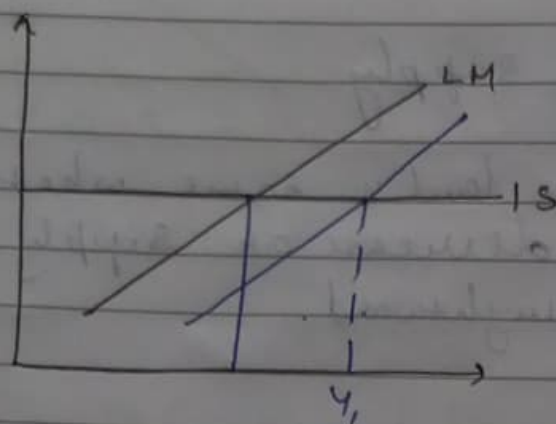
IS curve is vertical



Increase in govt expenditure will shift IS curve at new level of income

But change in monetary policy is not increasing income
So fiscal policy is effective, monetary policy is not

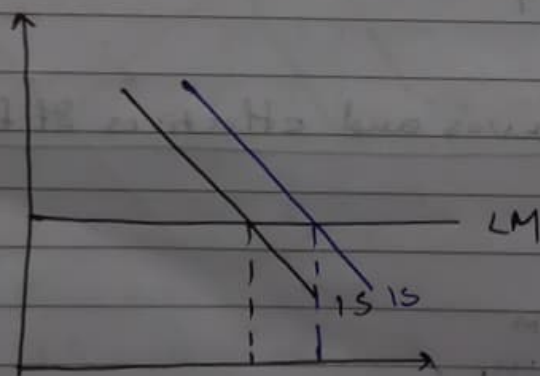
IS curve is horizontal



In this case change in fiscal policy will lead to investment being 0 and no change in curve, hence ineffective.

In this case LM will shift giving increased level of income so monetary policy is effective.

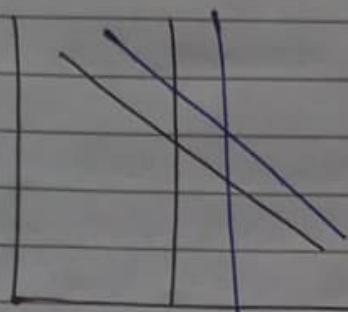
LM is horizontal



Fiscal policy highly effective as income increased

monetary policy is ineffective as no change

LM is vertical



No change in fiscal policy
Income increased in monetary policy

Derivation of IS-LM Curve Equation

Equilibrium level is when $AD = Y$

$$AD = C + I + G + (X - M) \quad , \quad C = a + bY$$

$$I = I - d_i$$

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

$$Y = a + bY + I - d_i + G + (X - M)$$

$$Y - bY = a + I - d_i + G + NX$$

$$Y(1-b) = \underbrace{a + I + G + NX - d_i}_{\text{autonomous exp}}$$

$$Y = \underbrace{\frac{1}{(1-b)}}_{\text{slope}} \left(\underbrace{\bar{A} - d_i}_{\text{Shift}} \right) \quad \text{IS eq}^n$$