(N) Froyen chapter # 03

Classical Macroeconomics (I): Output and Employment.

Classical economics emerged as a revolution against a body of economic doctrines known as mercantilism. The revolution against the classical economics was processed by the Keynesian economics in 1936. Keynes used the term "classical" to refer to virtually all economists who had written on macroeconomics questions before 1936. More conventional terminology distinguishes btw two periods in the development of economic theory before 1936. The 1st termed "classical" is a period dominated by the work of adam Smith, David Ricardo, and John Stuart Mill. The 2nd, termed the "neoclassical" period had as its most prominent English representatives Alfred marshall and A.C. Pigau. Keynes believed that the macroeconomics theory of the two periods was homogeneous enough to be dealt with as a whole.

To classical economists the equilibrium output at the time was a point of full employment, or the point where Actual output is equal to Potential output. Equilibrium means when there is no tendency for a variable to move from that point. Classical economics says that only full employment points could be positions of even short-run equilibrium.

Absent full employment will mean that forces not in balance were acting to bring output to the full-employment level.

3.2.a Classical Revolution

Classical economics emerged as a revolution against a body of economic doctrines known as Mercantilism. Two tenets of mercantilism were

(1) Bullionism - a belief that the ~~world~~ wealth of Power of a nation were determined by its stocks of precious metals, and

(2) The belief in the need for State action to direct the development of a capitalist system.

Role that money had played in this system view was as a spur to the economic activity. In the short run, the Mercantilist argued, an increase in the quantity of money would lead to an increase in demand for commodities and would stimulate production and employment.

Two features of the classical analysis arose as part of the attack on mercantilism:

① Classical economics stressed the role of real as opposed to monetary factors in determining output and employment. Money had a role in the economy only as a means of exchange.

② Classical economists stressed the self-adjusting tendencies of the economy. Govt policies to ensure an adequate demand for output were considered by classical economists to be unnecessary and Generally harmfull.

We turn now to the model constructed by classical economists to support these positions.

3.3& Production

The production function summarizes the relationship b/w total inputs and total outputs assuming a given technology. For given level of inputs the PF shows the resulting level of output as is written as

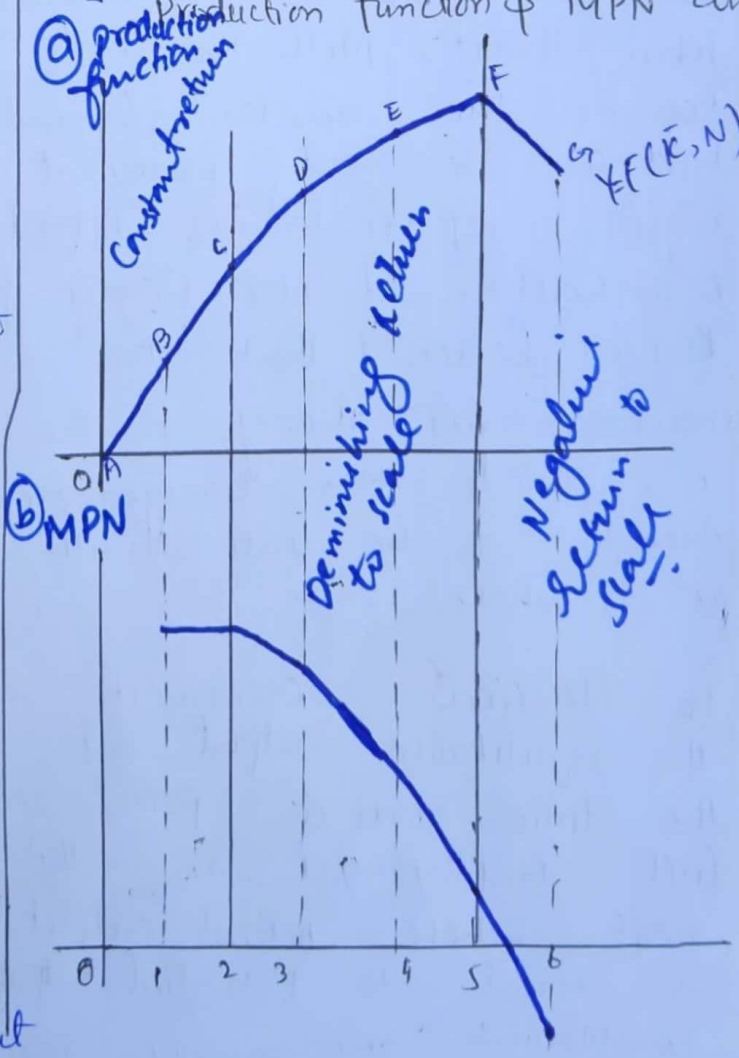
$$Y = F(\bar{K}, N)$$

in short run $\bar{K}, \bar{T}$ are constant. So only a variation in N can lead a change in output.

↳ The production function has several characteristics. At low levels of labor input, the function is a straight line. The slope of the line gives an increase in output for a given increment in labor input, so this straight line (constant slope) portion of production function exhibits a constant return to scale. However we consider situations where adding additional labor will result in increased total output, but where the size of the increase to output declines as more labor is employed (Diminishing return to scale). Negative return to scale occurs when additional labor inputs results in decreased total output. Firms will not operate on this portion of the production function because hiring additional labor results in a decrease in total output.

↳ The slope of production function is marginal product of labor (MPN) $\left(\frac{\Delta Y}{\Delta N}\right)$. Graphically

Production function & MPN curve



Employment

The classical labor market analysis is the assumption that the market works well. Firms and individual workers optimize. They have perfect information about relevent prices. There are no barriers to the adjustment of money wages; the market clears.

*) Labor Demand

The Purchasers of labor services are firms. In the classical model, firms are perfect competitors that choose their output to maximize profits. In the short run, output is varied solely by labor input, so that choice of the level of output and quantity of labor input are one decision. The PC firm will increase output untill $MC = MR$.

- MC: because labor is the sole variable factor of production, so the MC of each additional output is the marginal labor cost
- MR: Product Price.

So the marginal cost is equal to.

$$MC = \frac{W}{MPN}$$

- W → money wage
- MPN → marginal product of labor.

The condition of the Short-Run Profit maximization in the perfect competitive market is

$$P = MC$$

$$\& \; MC = \frac{W}{MPN}, \text{ So}$$

$$P = \frac{W}{MPN}$$

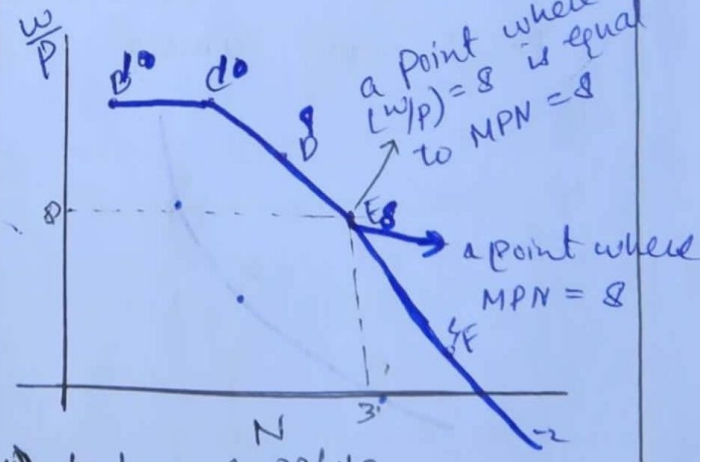
$$MPN = \frac{W}{P}, \text{ So}$$

The profit maximization condition above state that the firm will hire an additional labor till the point, where the additional output obtained by hiring one more worker (MP_N) is just equal to the real wage (W/P) paid to hire that worker.

↳ The implication is that the (N^D) labor demand depends inversly on the level of the real wage. the labor demand curve is downward sloping due to law of diminishing returns.

$$N^D = f\underset{-ive}{(W/P)}$$

→ Graphically, Labor demand curve



*) Labor Supply

labor services are supplied by individual workers. classical economics says that the individuals try to maximize utility. The level of utility depends both on real income and leisure. So, there always a trade-off btw these two-

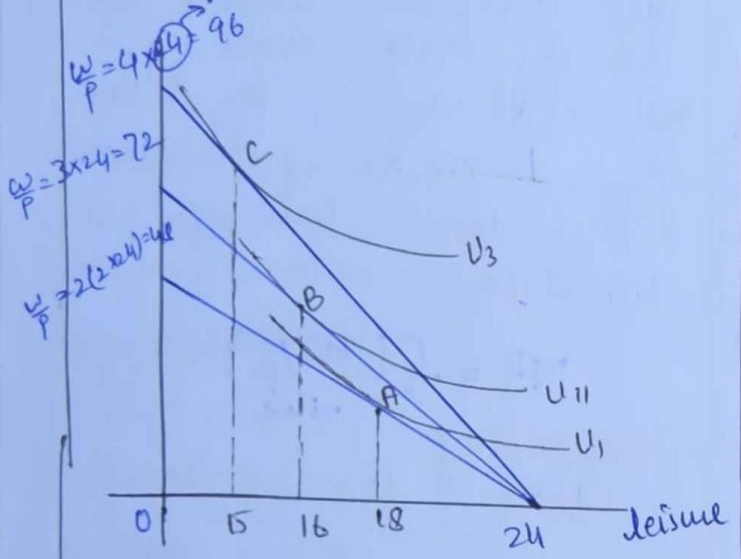
The labor will provide its services when

$$N^s = g(w/p)$$

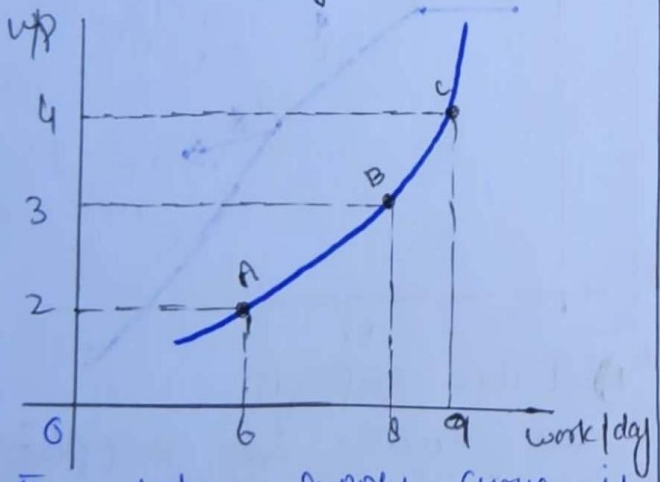
when the real wage increases the work hours also increases and the leisure time decreases, and vice versa. Graphically:

Individual labor supply Decision

a) Income - leisure tradeoff:



b) Labor supply curve:



i) The labor supply curve is finely sloped, more labor is assumed to be supplied at higher real wage rates (substitution effect)

ii) As the real wage increases, the worker is able to achieve a higher level of real income. At high levels of real income, leisure may become more desireable relative to further increment in income. With successive increases in the real wage, a point may be reached at which the worker chooses to supply less labor and consumes more leisure. At this point the income effect outweighs the substitution effect, the labor supply assumes a negative slope and bends back towards the vertical axis.

3.5 Equilibrium Output and Employment

So far, the following relationships have been derived:

$$Y = f(\bar{K}, N) \Rightarrow PF$$

$$N^d = f(w/p) \Rightarrow N^D \quad (-ive)$$

$$N^s = g(w/p) \Rightarrow N^S \quad (+ive)$$

These relationships, together with the equilibrium condition for the labor market, $N^s = N^d$ determine output, employment and real wage.

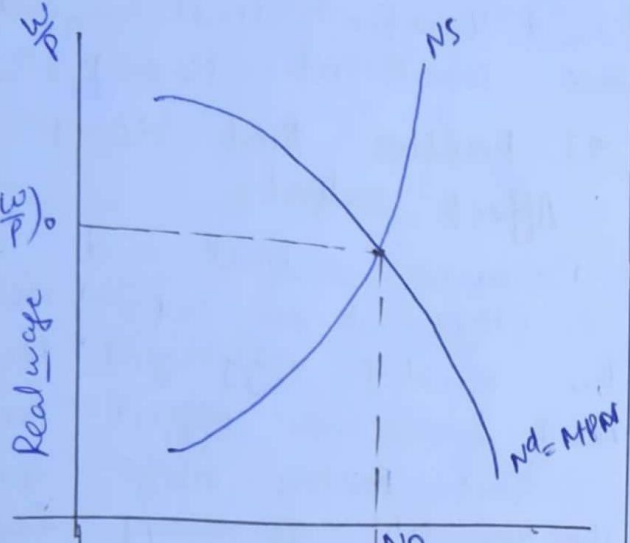
Equilibrium within the classical model is illustrated in figure below. Graph (a) shows the determination of equilibrium employment and Real wage (w/p) at the point when $N^s = N^d$. This equilibrium labor input level results in the equilibrium level of output (Y_0) given the

tion function, as shown in (b).

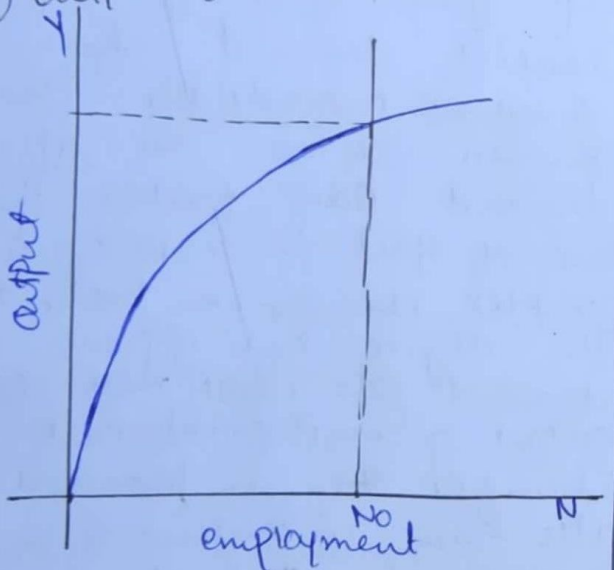
Graphically:

Classical output and Employment theory:

a) Labor market equilibrium



(b) output determination



The determinants of output and employment: the factors that determines output output and employment are those factors that determine the positions of N^s and N^d curves and the position of aggregate production function.

The production function is shifted by technical change that alters the amount of output forthcoming for given input levels. It also changes (shifts) as the capital stock changes overtime.

↳ With technical change the ND also changes, the NS will be shift to the right with the population growth, and will also change with the labor preferences regarding the labor leisure tradeoff.

The above all are the supply side factors so, in the classical model, the level of output and employment are determined solely by supply factors.

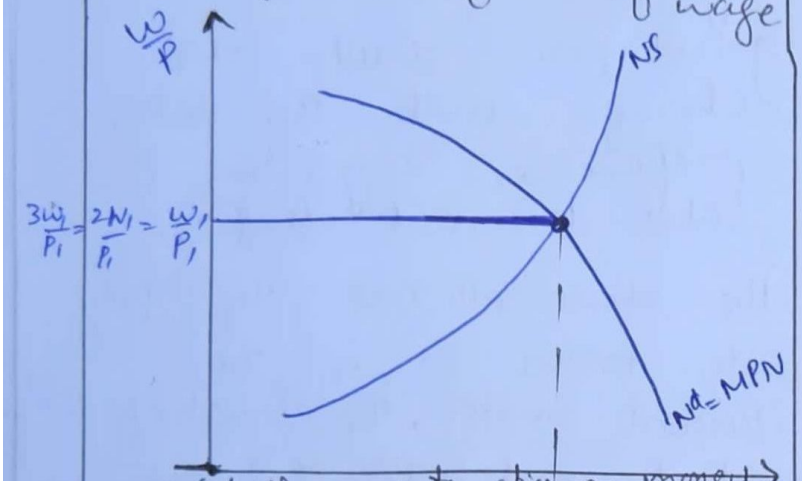
⇒ Labor market equilibrium and the money wages

In the classical model, we take into account the real wage not money wage. So, when the money wage doesn't increase with the prices so the $\frac{W}{P} < MPN$ then the firm will demand higher workers and the workers will supply less due to this the supply curve will shift to the left and the demand will shift to right creating the excess demand

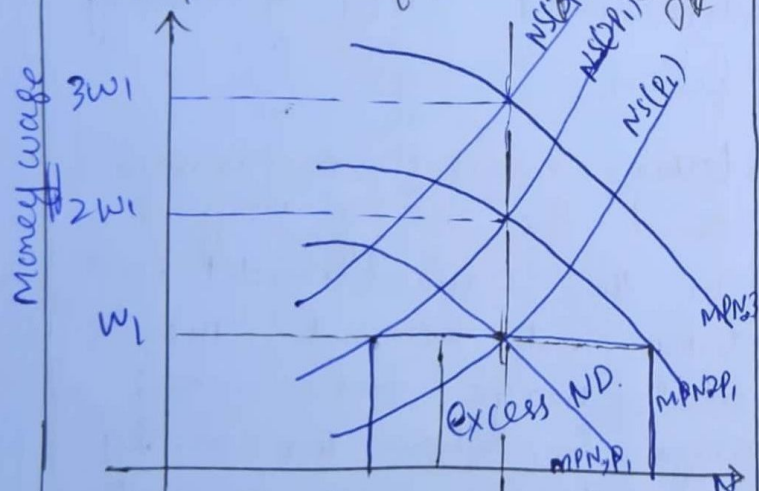
and the output will decrease from the Potential output. To bring back the system into equilibrium the wages and prices should increase at the same level.

→ Graphically:

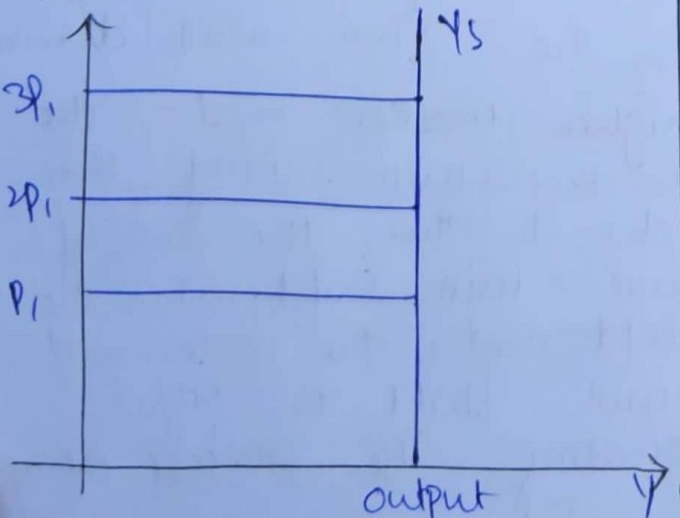
a) N^S & N^D as a function of real wage



b) N^S & N^D as a function of money wage



c) Classical aggregate supply curve.



The vertical aggregate curve reflect the fact that higher values of the price requires proportionately higher levels of the money wage for the labor market equilibrium. The real wage, employment and therefor level of output are same at P_1, $2P_1$, $3P_1$.

*) Factors that donot Affect output:

Because output and employment are supply determine the level of aggregate demand will have no effect on output. Factors such as the quantity of money, level of govt spending, and the level of demand for investment goods by the business sectors are all demand side factors. The case of govt taxes policy is complex, changes in taxes, to the degree that effect the demand side, will not effect output or employment. But Changes ~~in~~ in tax rates also have incentive or supply side ~~that~~ effects that ~~don't~~ matter for output and employment.

Conclusion: Two assumptions in this classical representation of the labor market are as follow.

1. Perfectly flexible prices and wages.
2. Perfect information about market prices for all market participants.

Chapter No 4

Classical Macroeconomics (II)

Money, Prices, and Interest

In this chapter we will complete the discussion of the classical model. we will analyze the classical theory of aggregate price level determination, which brings in demand side of the model. Determination of the interest rate is also discussed. Next we consider policy conclusions - classical views on monetary and fiscal policy.

4.1 The Quantity theory of Money

Classical theory stating that the price level is proportional to the quantity of money.

Equation of exchange

The starting point for the classical quantity theory of money is the Equation of exchange.

$$MV = PT$$

M = money supply

V = velocity, P = price level.

T = level of transection.

Velocity of money is the average number of times each dollar is used in GDP transections.

↳ Another expression of the Equation of exchange focuses only on income transections.

$$MV = PY$$

In short-run the V and Y are assumed to be constant so

$$M\bar{V} = P\bar{Y} \rightarrow (i)$$

or $M \propto P$, so the equation (i) indicates the dependence of the price level on the supply of money. This is the basic result of quantity theory of money which determines the price level.

The cambridge approach to the quantity of money.

Cambridge approach is a version of the quantity theory of money that focuses on the demand for money.

$$Md = KPY$$

The cambridge economists such as Alfred marshall and A.C Pigou, also demonstrated a proportional relationship blw the quantity of money and the aggregate price level. Marshall's begin by focusing on the individuals decision on the optimal amount of money to hold. Some money will be held for transection purposes. But Pigou noted "currency held in the hand yields no income". So, on these criteria, how much money will it be optimal to hold?

Marshall assumed that

The demand for money would be a proportion of income. The Cambridge equation is written as

$$M^d = kPY.$$

M^d is assumed to be a proportion (k) of nominal income, the price level (P) times the level of real income (Y). So according to this Theory, the demand for money depends on the level of transections which is assumed to be stable in the short-run, in equilibrium

$$M = M^d = M^s, \text{ so}$$

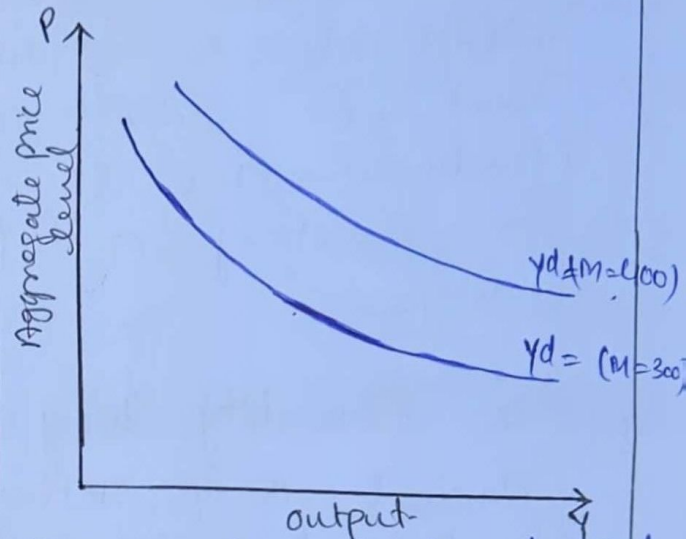
$$M = kP\bar{Y}$$

$$M = \frac{1}{k} P\bar{Y} \Rightarrow M\bar{V} = P\bar{Y}, \text{ so}$$

the cambridge version represents a step ~~forward~~ towards more modern monetary theories. The cambridge focus was on the quantity theory of money as demand for money.

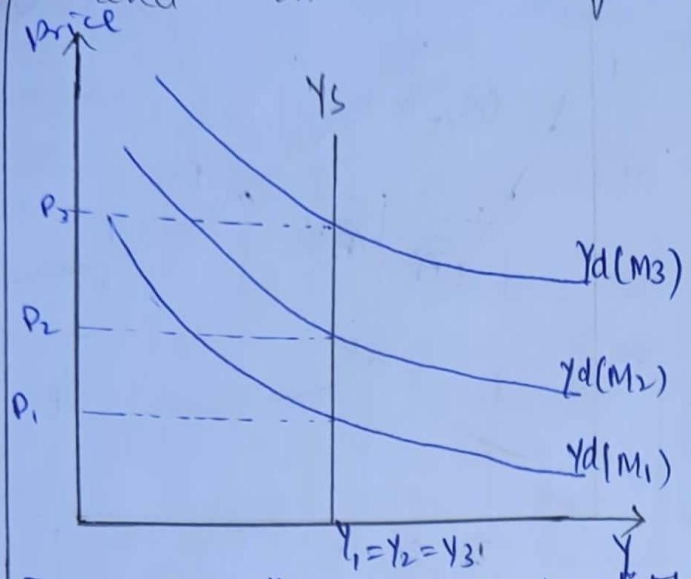
When the quantity of money is doubled and as transections are fixed, so there would be an excess supply of money with individuals, so they try to reduce their holdings to the optimal proportion of their income by putting this excess into alternative uses of consumption and investment. They increase their demand for commodities, which will put upward pressure on prices. If output is unchanged, as it would be in classical model, and k is constant, a new equilibrium is reached after the price level doubled. This was the link in the classical system b/w money & prices; an excess supply of money led to an increased demand for commodities and upward pressure on prices.

The classical Aggregate Demand curve -



As we have already read that an increase in the money supply will lead to no change in output in the classical model. So an increase in M^s will lead to increase in aggregate demand which interns leads to equiproportional increase in the price level to reach the equilibrium. So by increasing the supply of money will lead to a shift in the classical aggregate demand curve.

Aggregate supply and demand in classical system-



Increasing the money supply shifts the aggregate demand curve upward to the right. Because the supply curve is vertical, increases in demand donot effect the output, only the price level increases. Also note that for a given value of K (or V), a change in the quantity of money is the only factor that shifts the aggregate demand curve so aggregate demand varied only with the supply of money-

4.2 The classical theory of Interest rate:

In the classical system, the components of aggregate demand consumption, investment and Government spending play their explicit role in determining the interest rate

Here:

→ $I \propto \frac{1}{r}$

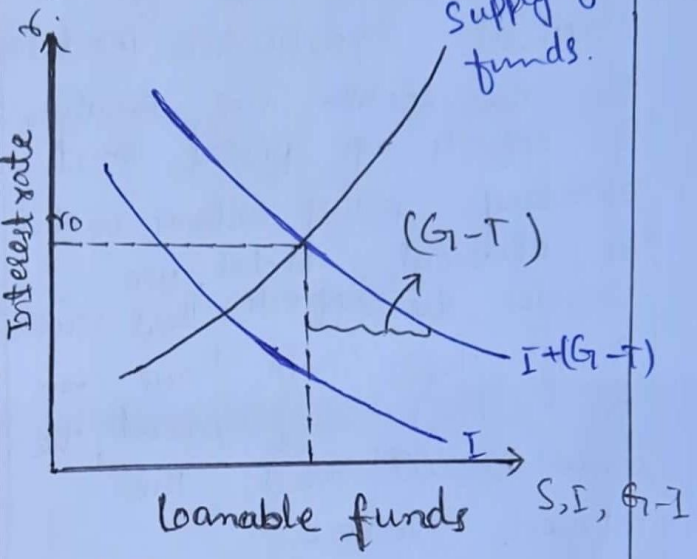
→ $S \propto r$

→ $I \propto \frac{1}{r}$

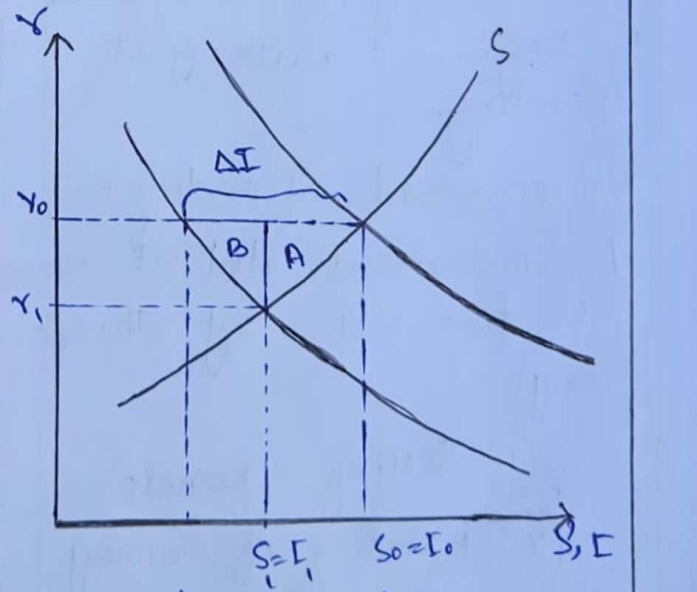
i) when the interest rate increases the Investment decreases and vice versa.

ii) Saving is directly proportional to interest ~~rate~~ rate.

Interest rate determination graphically:



Autonomous decline in Investment Demand (due to war. etc)



An autonomous decline in investment shifts the investment schedule to the left, the distance ΔI, the equilibrium becomes r_1. As r ↓

There is an interest-rate induced increase in investment distance (B). There is also an interest rate induced decline in saving, which is equal to increase in consumption - distance (A). The interest rate-induced increase in consumption and investment just balance the autonomous decline in investment.

4.3 Policy implications of the classical equilibrium Model:

In this section we analyze the effects of fiscal and monetary policy actions within the classical model. we consider the effects that various policy shifts will have on output employment, the price level and the interest rate.

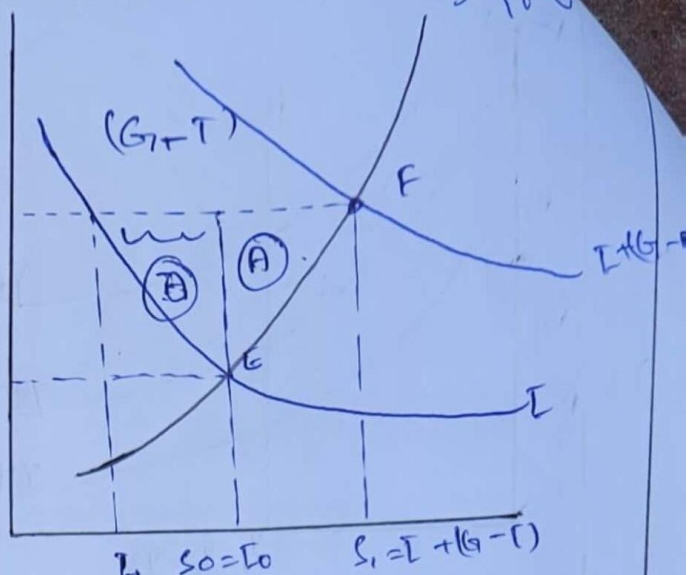
i) Fiscal Policy: In considering the classical view of the fiscal policy, it is convient to begin with govt spending.

⇒ Government spending:

A Government deficit can be financed by three ways.

(1) Selling bonds.
(2) Printing of money.
(3) Taxation.

(1) Selling of bonds:



At equilibrium point E, the ro equates the supply of loanable funds, S, with the demand of loanable funds, I. Adding govt deficits, shifts the demand for funds to right. The equilibrium interest rate rises to r_1. The increase in interest rate declines the investment from I_0 to I_1, a distance (B) by private sector, and an increase in saving, which is an equal decline in consumption from S_0 to S_1, a distance (A). The decline in investment and consumption just balances the increase in govt spending.

" It is the crowding out that keeps aggregate demand from increasing when Govt spending increases. Because the aggregate demand is not changed, increases in the govt expenditure financed by bonds dont effect the price level.

) Printing of money:

Because in the previous one the quantity of money was unchanged, the aggregate demand and prices where unchange. Here, the money supply changes the price level proportionately. we have previously analyzed the way an increase in money supply shifts the aggregate demand curve upward along the aggregate supply curve, raising the price level.

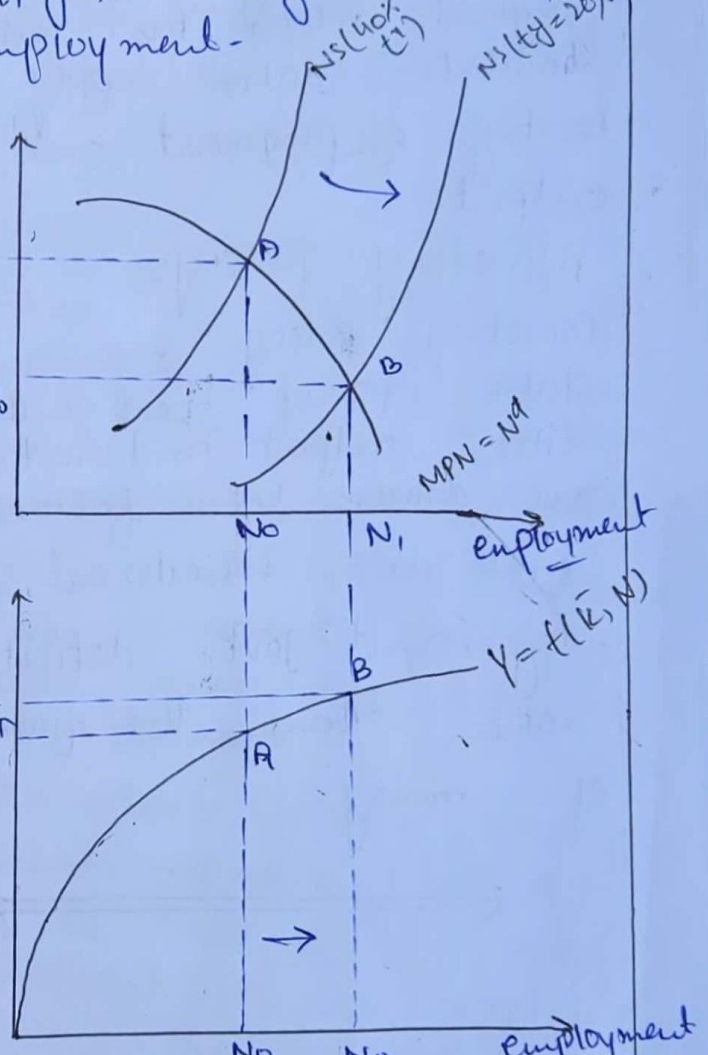
(iii) Tax Policy:

*) Demand side effects:

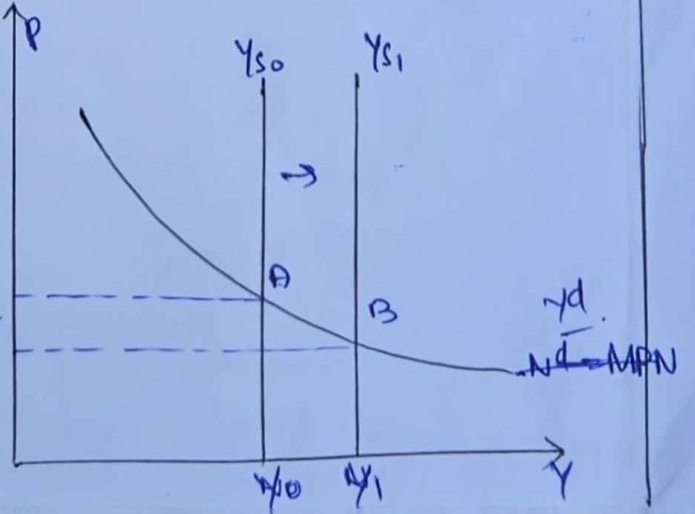
A tax cut increases households disposable income and stimulate consumption, However, if the govt sells bonds to finance the lost revenue. It leads to higher interest rate, reduced investment and increased saving, which lower consumption back to its previous level, leaving aggregate demand unchanged. If the revenue lost is replaced by printing new money, the increased money supply rises aggregate demand and the price level. Ultimately, the tax cut itself does not affect aggregate demand; it is the change in the money supply that has an impact.

*) Supply side effects:

If the tax cut is a lumpsum cut (e.g $100 for each household), only demand effects are relevent. However, If income tax are reduced (e.g from 40% to 20%), it incentivizes labor supply, increasing output & employment.



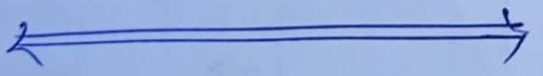
(C) Aggregate supply and demand



Such a reduction in marginal tax rates leads to more labor being available because workers keep more of their income, which increases employment and output, reducing the price level. This change results in higher supply of goods and services, reducing the price level if aggregate demand remains unchanged. So lowering marginal income tax rates stimulate labor supply, boosting employment and output.

(ii) Monetary Policy

Monetary policy ensures stable prices, real variables like output and employment are driven by factors such as investment, saving, and govt deficits, rather than the quantity of money.



Chapter No 5 &

The Keynesian system

The role of aggregate demand

5.1 The Problem of unemployment

During the Great depression, unemployment in the US soared, leading to severe economic hardship.

John Maynard Keynes argued that low aggregate demand caused high unemployment and advocated for government spending to stimulate the economy.

Classical economists focused on skill improvement and budget balancing, which proved ineffective. Keyne's revolutionary idea was that active government interventions through increased spending could boost demand and reduce unemployment, changing economic policies fundamentally.

5.2 The Keynesian model: conditions for equilibrium Output

In the Keynesian model, economic equilibrium is achieved when total output equals total demand as.

$$Y = E$$

Where aggregate demand consists of consumption (C), investment (I), and

ernment expenditures for goods and services, Thus in equilibrium we have

$Y = E = C + I + G$ → This model simplifies by assuming a closed economy, treating GDP as equal to national income. National income is distributed among Consumption (C), Saving (S), and taxes (T).

National products also ~~equals~~ includes realized investment.

$$I = I_r.$$

So,

$$Y = C + I_r + G.$$

By combining these relationships, we derive three equivalent conditions for equilibrium.

(i) AD equals Total output

$$Y = E = C + I + G$$

(ii) Saving plus taxes equals Investment plus Government spending.

$$S + T = I + G$$

(iii) Desired I = Realized I

$$I = I_r.$$

The circular flow of income illustrates these conditions, showing that $S + T$ (leakages) must equals $I + G$ (injections).

if $S + T > I + G$ then it will results in reduction in aggregate demand leading to excess production.

but if $T + S < G + I$ then demand will exceed the production, so Any deviation from the equilibrium prompts adjustments in production to correct inventory levels, driving the economy back towards equilibrium.

5.3 The components of Aggregate demand

we expressed the condition for equilibrium in the simple Keynesian model in terms of the component of aggregate demand. we now consider the factors that effect the components of aggregate demand: consumption, Investment, and Government spending. saving and taxes also enter into our discussion.

→ Consumption & Consumer expenditure, which represents 60 - 70 % of the GDP, is the largest component of the aggregate demand. According to the Keynesian consumption function, Consumer expenditure is a stable function of the disposable income.

$$(Y_D - Y - T)$$

Keynes argued that while other vaibles ~~are~~ influence

Consumption, income is the predominant factor-

↳ Keynesian consumption function

The specific relationship between income and consumption, known as the consumption function, is mathematically expressed as-

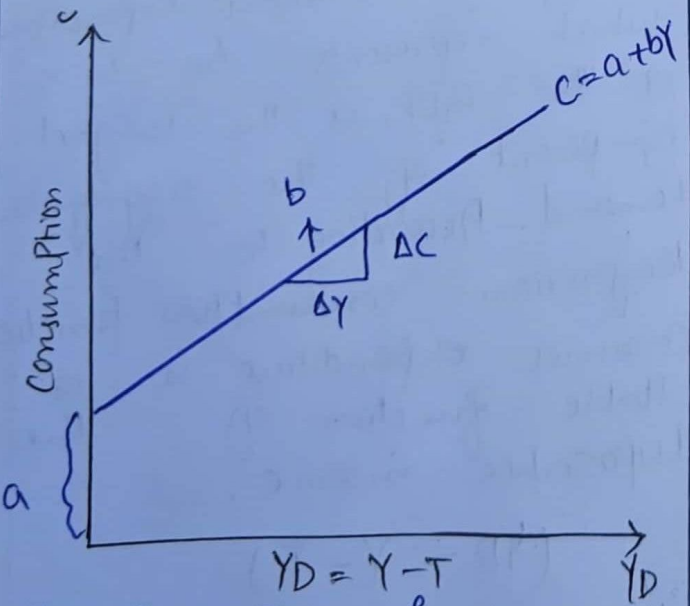
$$C = a + bY$$

& $a > 0$, $0 < b < 1$

a ⇒ intercept, assumed to be positive, represents the level of consumption when disposable income is zero. It reflects the impact of non-income factors on consumption.

b ⇒ Slope of the function, termed the MPC, indicates the increase in consumer expenditure for each unit increase in disposable income.

Graphically,



the consumption function is a straight line with a positive slope b, illustrating that consumption increases with the disposable income but at a rate less than one to one.

↳ Marginal Propensity to Consume (MPC) &

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

It represents the fraction of the additional income that is spent on consumption. A/C to Keynes, although consumption increases with an increase in disposable income ($b > 0$), the increase in consumption is less than the increase in income ($b < 1$)

↳ The relationship b/w income, consumption, and saving &

From the national income identity:

$$Y = C + S + T$$

we derive disposable income as

$$YD = Y - T = S + C.$$

This shows that the disposable income is the sum of consumption and saving. Consequently, the consumption function implicitly defines the saving function. A/C to Keynesian theory, the saving function is

$$S = -a + (1-b)Y_D.$$

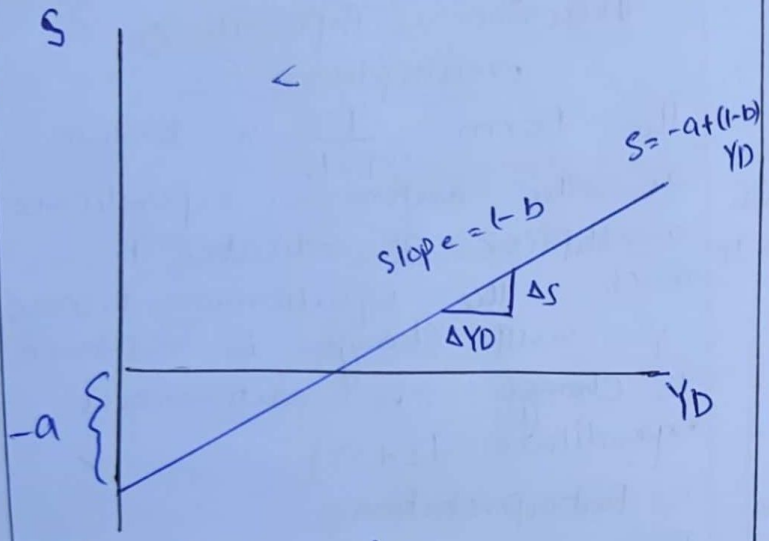
$-a$ = intercept term indicates the level of saving when ($YD \equiv Y-T$) disposable income is zero, which is

negative since "a" represents consumption at zero income.

(1-b): This slope represents the marginal propensity to save (MPS), the fraction of additional income that is saved. It is defined as -

$$MPS = 1-b = \frac{\Delta S}{\Delta YD}.$$

Graphically:



The saving function is a straight line with a slope of (1-b) and a negative intercept -a, showing that saving increases with disposable income but at a rate less than the increase in disposable income.

Expansion of Keynesian consumption theory:

Later economic theories have expanded Keynes basic model to incorporate additional factors influencing consumption -

(1) Household wealth increases leads to higher consumer spending for a given level of income.

(2) Permanent income which broadens the definition of income to include an average of current and expected future income levels.

→ Investment:

Investment plays a crucial role in the keynesian system, influencing changes in income. Unlike the stable consumption tied to disposable income, investment is highly variable and impacts aggregate demand significantly.

Autonomous vs induced expenditure:

Induced expenditure: consumption dependent on income.

Autonomous expenditure: Investment independent of current income and a major source of income variability.

↳ Investment spending is more volatile than consumption, sharply declining during economic downturns as shown by historical data.

Determinants of investment:

(i) interest rate ⇒ higher interest rate discourages.

(ii) Business expectations:
↳ managers forecast future profitability based on uncertain knowledge, often leading to herd behaviour and sudden shifts in sentiments.

↳ Investment expectations are fragile and prone to

sudden changes, causing economic instability.

↳ Government Spending and taxes

Government spending (G) and tax receipts (T) are controlled by policymakers, with taxes realistically vary with income.

5.4 Determining equilibrium Income

To determine the equilibrium level of income, we start with the basic model that represents the condition for equilibrium income.

$$Y = E = C + I + G.$$

Y represents the equilibrium income, C is consumption, I is investment and G is government spending. The variables I and G are considered autonomous expenditures, meaning they are determined outside the income level-Y.

Consumption function

$$C = a + bY_D$$

Substituting Y_D into the consumption function

$$C = a + b(Y - T).$$

Substitute the consumption function into the equilibrium condition.

$$Y = C + I + G$$

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

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

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

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

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

This is the formula for the equilibrium income.

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

$\frac{1}{1-b}$ → Autonomous expenditure multiplier

$(a - bT + I + G)$ → autonomous expenditures

The term $\frac{1}{1-b}$ is known as the autonomous expenditure multiplier. It indicates how much the equilibrium income Y will change in response to change in autonomous expenditure (I + G)

Interpretation:

The autonomous expenditure multiplier $\frac{1}{1-b}$ is greater than 1 because b (MPC) is between 0 and 1. This implies that any change in autonomous expenditure (a, I, or G) will have a multiplied effect on the equilibrium income Y.

↳ the higher the MPC (b), the larger the multiplier, for instance.

① if $b = 0.5 = \frac{1}{1-0.5} = 2$

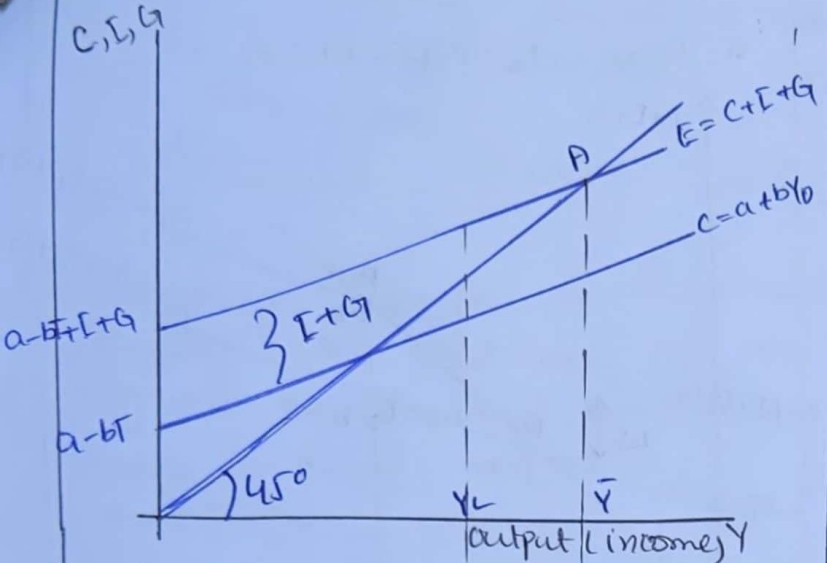
if $b = 0.8 = \frac{1}{1-0.8} = 5$.

if $b = 0.9$, then $\frac{1}{1-0.9} = 10$

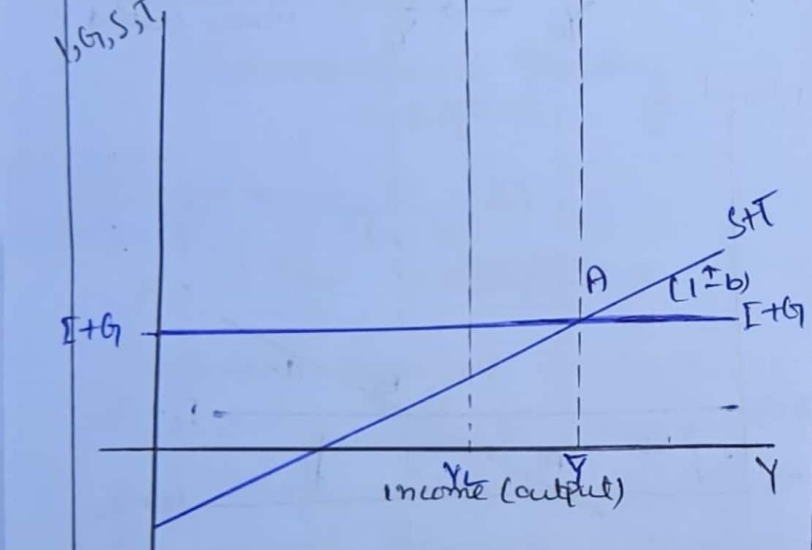
Graphical representation:

Determination of equilibrium income

a) aggregate expenditure.



b) investment, G, S and taxes.



↳ The 45° line represents points where aggregate expenditures equal output (income), $Y = E$.

↳ The C+I+G line represents aggregate expenditure schedule. It intersects the 45° line at equilibrium income Y.

↳ The intersection of C+I+G with the 45° line indicates the equilibrium income where aggregate demand equals aggregate output

$$Y = E$$

↳ Below the equilibrium level of (Y_L)

① Aggregate demand (C+I+G) exceeds output (Y)

② This excess demand leads to an increase in production, moving the economy towards equilibrium.

↳ Above the equilibrium level of

① Aggregate demand is less than output.

② This leads to unintended inventory accumulation and a decrease in production, moving the economy back to equilibrium level.

In summary, the equilibrium level of income Y is determined by the balance of aggregate demand and output, adjusted by the autonomous expenditure multiplier. Changes in autonomous expenditure will lead to proportionally larger changes in equilibrium income due to multiplier effect.

5.5 Changes in Equilibrium income: To understand the effect on equilibrium income from changes in autonomous investment demand, let's consider the equations and concepts from Keynesian economic theory.

Changes in equilibrium income due to investment:

The change in equilibrium income (ΔY) in response to a change in autonomous investment (ΔI) can be derived from the Keynesian multiplier model. the multiplier effect demonstrates how initial changes in autonomous spending (such as investment) lead to larger changes in overall income.

→ Equation for equilibrium income.

$$Y = \frac{1}{1-b}(a - b\bar{T} + I + G_1)$$

Assuming the autonomous expenditures $(a - b\bar{T} + G_1)$ are fixed, the change in income due to change in investment is given by the investment multiplier.

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

This equation means a 1-unit change in investment (ΔI) causes income (ΔY) to change by $\frac{1}{(1-b)}$ units.

Example calculations:

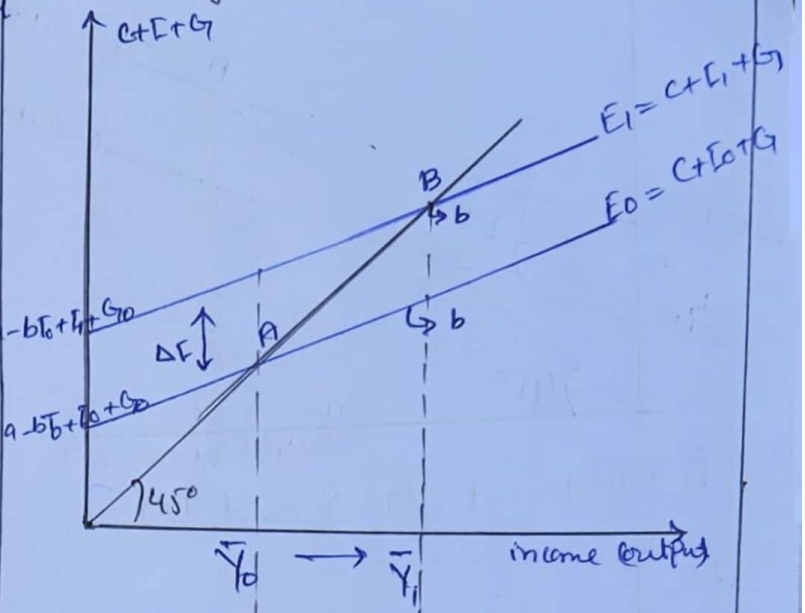
If $b = 0.8$, the multiplier is

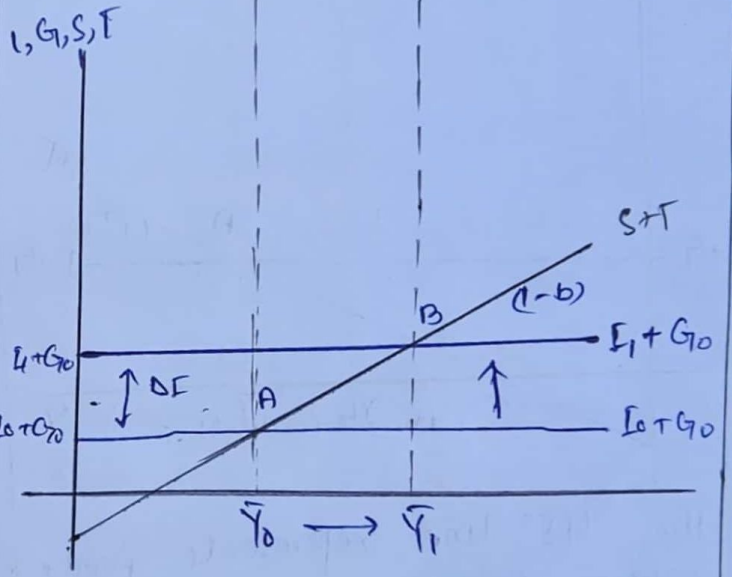
$$\frac{1}{1-0.8} = \frac{1}{0.2} = 5$$

Therefore, a 1 unit increase in investment ($\Delta I = 1$) results in a 5 unit increase in equilibrium income ($\Delta Y = 5$).

Graphically, effect of an increase autonomous investment on equilibrium income

a) Aggregate expenditures.





Why Income changes by multiples

→ The inital increase in investment increases demand directly.

→ This increase raises income for those producing the investment goods, leading to an increase in disposable income.

↳ Increase in disposable income leads to higher consumption based on MPC. For instance, if MPC = 0.8

...its will be spent on ...mption

...his process continues, with each round of spending generating further increase in income and consumption.

Government Spending and taxes:

Similarly changes in Government spending (G) and taxes (T) also effect equilibrium income through their respective multipliers.

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

↳ Government spending multiplier.

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

↳ Tax multiplier.

Balance Budget Multiplier:

When government spending and taxes increases/changes by equal amounts ($\Delta G = \Delta T$), the net effect on equilibrium income is given by the balanced-budget multiplier.

$$\Delta Y = \Delta G + \left(-\frac{b}{1-b} \Delta T\right)$$

Since $\Delta G = \Delta T$

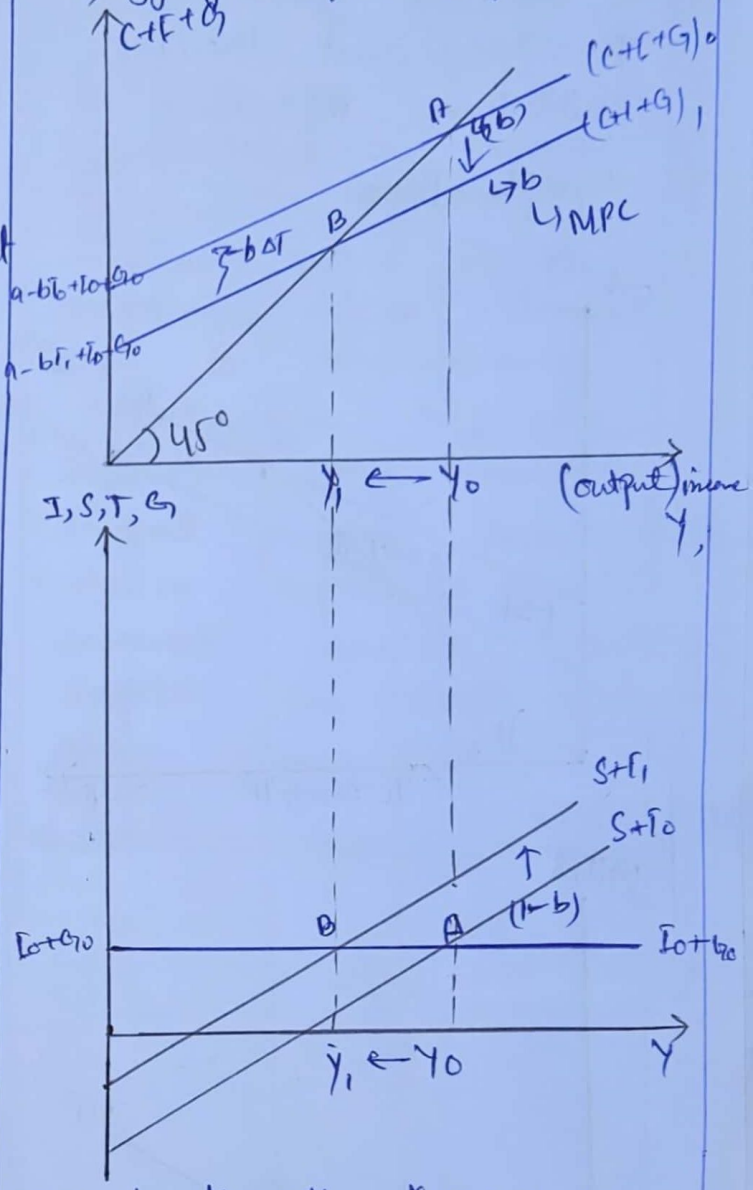
$$\Delta Y = \frac{1}{1-b}\Delta G - \frac{b}{1-b}\Delta T = \frac{1}{1-b}\Delta G - \frac{b}{1-b}\Delta G = \Delta G$$

Thus a one unit increase in government spending funded by a 1-unit increase in taxes increases equilibrium income by exactly 1.

Graphically:

effect of an increase in taxes on equilibrium Income:

a) Aggregate expenditure.

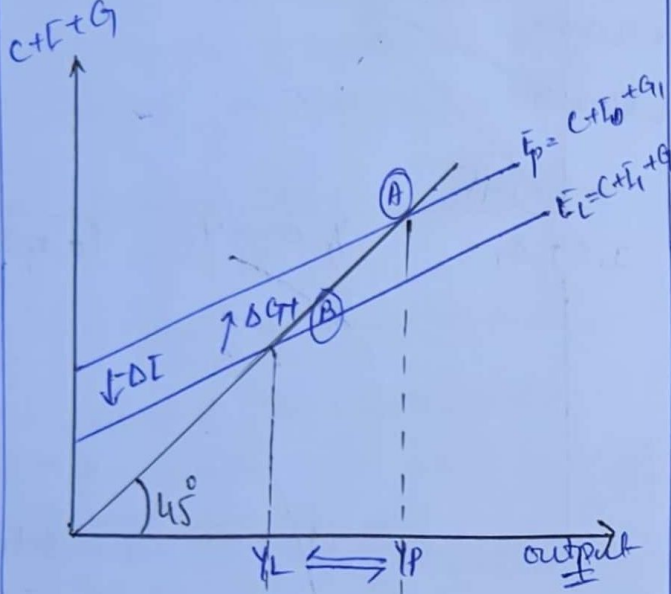


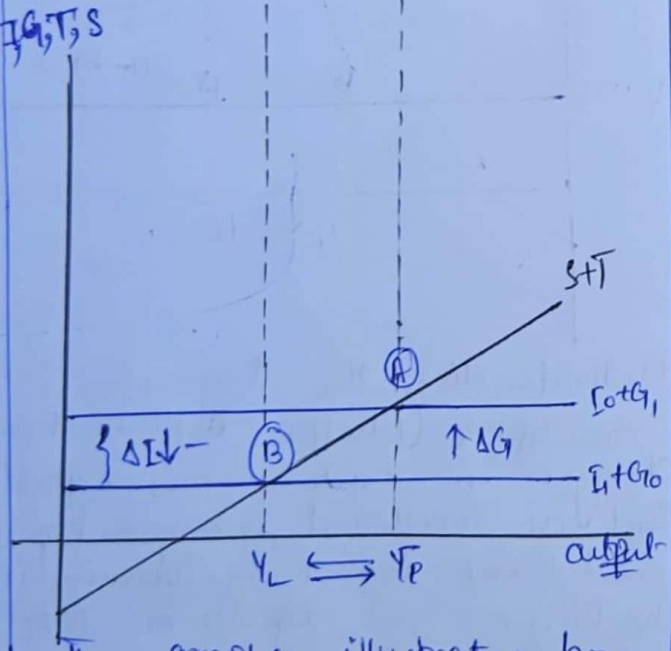
Understanding the keynesian multiplier helps explain how changes in autonomous expenditure such as investment, government spending and taxes impact equilibrium income. The precise effect depends on MPC with larger values leading to larger multiplier. The balanced budget multiplier shows that equal changes in government spending and taxes can still positively effect overall income.

5.6 Fiscal Policy Stabalizations

The fiscal policy instruments can be used to stabalize the total of autonomous expenditures and therefor, equilibrium income.

Graphically:





The graphs illustrates how fiscal Stabalizaton policy can contract a decline in autonomous investment and restore equilibrium income. Initially the economy is in equilibrium at a potential output of Y_P where aggregate demand is $C+I+G_0$. When I declines from I_0 to I_1, aggregate demand shifts downward to E_L, and the equilibrium income falls Y_L, below the potential level.

To contract the decline in I, the govt spending increases from G_0 to G_1, which shifts aggregate demand back to E_P, now equal to $C+I_1+G_1$. This restores equilibrium equilibrium income to Y_P. Alternatively, a tax cut could achieve the same effect, though it need to be larger than the increase in spending due to the smaller tax multiplier.

↳ This demonstrates how fiscal Policy can stabalize income in response to investment fluctuations.

5.7 Imports and exports in the Keynesian model

In the keynesian model, both imports and exports play cruicial role in determining equilibrium income in an open economy. The equilibrium condition for output, including net exports is

$$Y = E = C+I+G+X-Z$$

As Consumption we know that

$$C = a+bY$$

& Imports Z depends on income and have an autonomous component.

$z = u + vY$

u = autonomous component.

v = marginal propensity to import.

Equilibrium GDP in an open economy is derived by incorporating these functions into the equilibrium conditions:-

$$Y = a + bY + I + G + X - u - vY$$

$$Y - bY - vY = I + G + X + a - u$$

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

$$Y = \frac{a + I + G + X - u}{1 - b + v}$$

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

In this model, the autonomous expenditure multiplier is $\frac{1}{1-b-v}$, since $v > 0$, this multiplier is smaller than in closed economy $\left(\frac{1}{1-b}\right)$. Therefore, the more open an economy is to foreign trade, the smaller the multiplier effect, meaning income responds less to changes in autonomous expenditures.

↳ Autonomous expenditure in an open economy includes exports and the autonomous component of import. Changes in exports (X) increase equilibrium income similarly to increase in govt spending or investment. Conversely, an autonomous increase in imports demand (u) decreases equilibrium income by shifting demand from domestic to foreign goods.

In Summary:

Exports have an expansionary effect on equilibrium income, while increase in autonomous import demand have a contractionary effect. This difference explains why countries might promote exports and restrict imports to stimulate domestic economic growth, despite the overall efficiency gains from trade.

Chapter No 6

The Keynesian System (II): Money, interest, and income

In the Keynesian system, money influences the economy through its impact on the interest rate.

↳ $M_S \uparrow \rightarrow i \downarrow \rightarrow AD \uparrow \rightarrow$ due to high investment. This relationship operates through two key channels:

* the effect of interest rate on investment and other components of aggregate demand.

↳ Business investments is highly sensitive to interest rate because projects are typically financed through borrowing

↳ $i \downarrow \rightarrow I \uparrow \rightarrow$ making more projects.

Similarly, residential construction is affected as $i \uparrow \rightarrow I \downarrow \rightarrow$ reduce new housing start and demand for home.

So, in simple words the investment decreases as the interest rate increases.

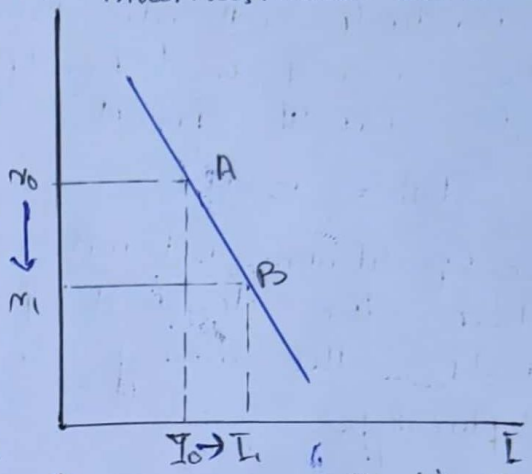
↦ negative relationship.

Aggregate demand increases as the interest rate drops, as lower borrowing cost boost investment and consumption, and leads to higher equilibrium income. In the Keynesian view, interest rates are crucial between money supply changes and overall economic performance

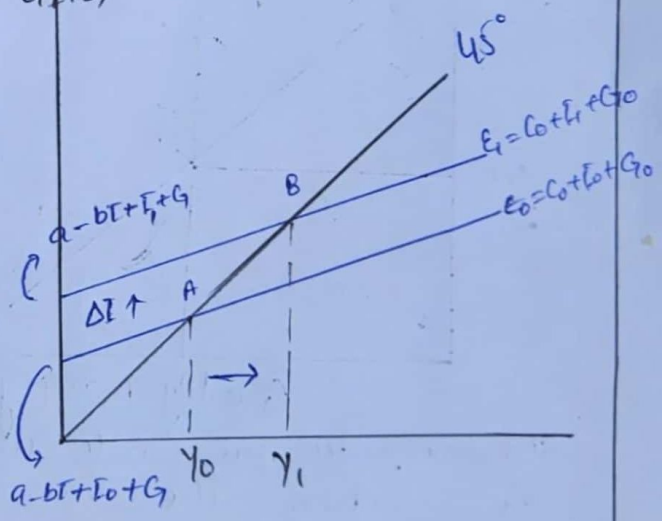
Graphically:

effect of decrease in interest rate on investment and equilibrium income-

a) Investment schedule



b) aggregate expenditure



↳ The Keynesian theory of Interest rates

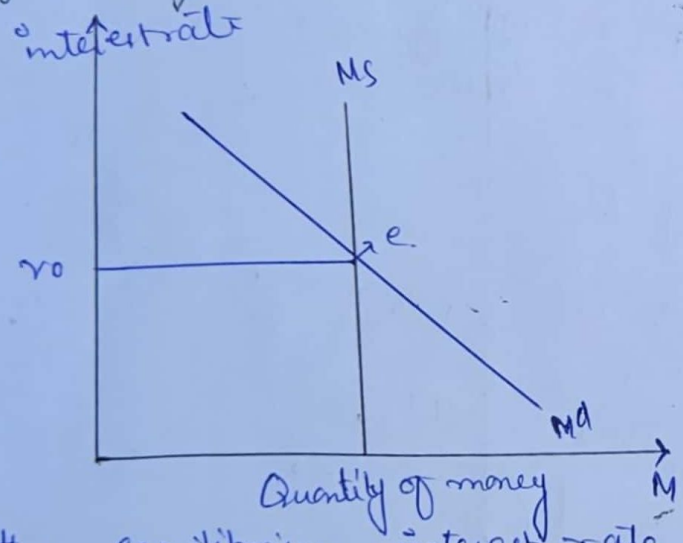
Keynes theory highlights the relationship b/w the quantity of money and the interest rate, focusing the "liquidity preference" the demand for money relative to bonds. He categorized financial assets into money

(Short-term highly liquid) and bonds (long-term, less liquid). Money, defined as M1, includes currency and checkable bank accounts, while bonds represents long-term assets like corporate stocks.

individuals allocate their wealth b/w money and bonds, with total wealth fixed

$$Wh = B + M$$

The equilibrium interest rate is where the demand for money equals the money supply. graphically:



the equilibrium interest rate is where the money demand equals money demand

↳ Keynes emphasized that central bank policies primarily influence the money supply. The equilibrium interest rate is determined by these policies and factors affecting the MD, which define the money demand curve (MD)

↳ The Keynesian theory of money demand

Keynes identified three motives for holding money.

*) Transaction motives

$$M_T^d = f(\gamma, Y)$$
$$-ive \quad +ive$$

*) Precautionary motives

Money is kept for unexpected expenses, like medical emergency.

$$M_p^d = f(\gamma, Y)$$
$$-ive, +ive$$

*) Speculative Demand

Money is held to avoid potential losses on bonds if interest rate rise.

$$M_s^d = f(\gamma, Y)$$
$$-ive \quad +ive$$

These demands combined form the total money demand function, which depends positively on income (Y) and negatively on interest rate (r), summarized as

$$M^d = L(Y, r)$$
$$+ive, -ive.$$

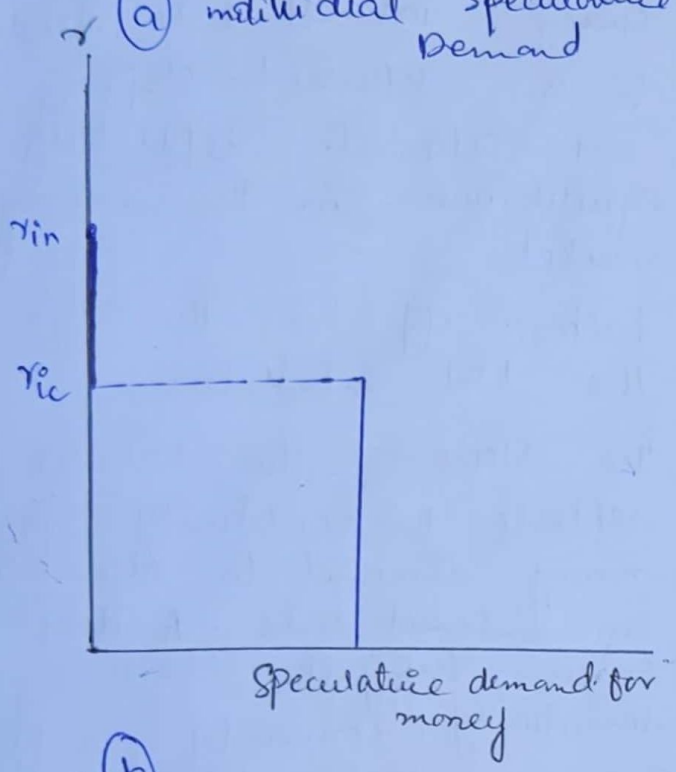
↳ As income rises, the demand for money increases, while higher interest rates decrease it.

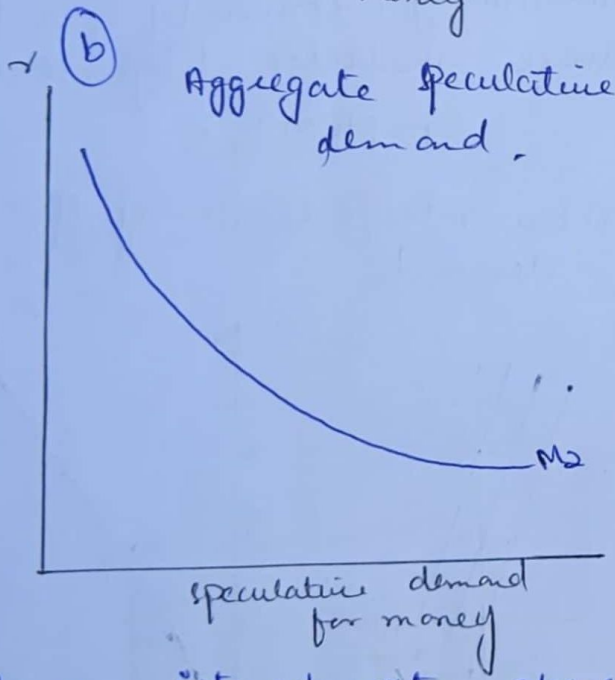
This relationship can be linearized as

$$M^d = C_0 + C_1 Y + C_2 \gamma$$, where C_1 and C_2 represents the sensitivity of MD to changes in income and interest rate, respectively.

Graphically:

a) Individual speculative demand for money:-

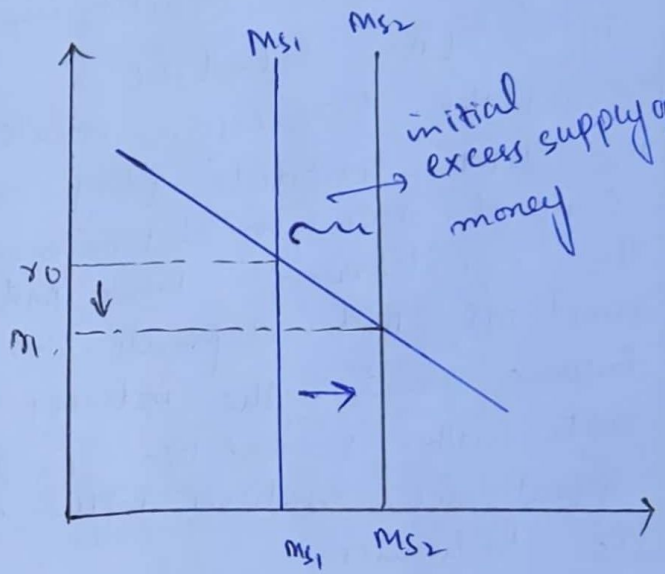




At any interest rate above the critical rate, the speculative demand for money is zero. Below the critical rate, the individual shifts to money. Part (b), as the interest rate becomes lower, it falls below the critical rate for more individuals, and the speculative demand for money rises.

The schedule flattens out at very low rate of interest, showing that at this low rate, increments to wealth would be held in the form of money, with no further drop in interest rate. Keynes termed this situation the "liquidity trap"

↳ The effect of an increase in money supply:-



$M_S \uparrow \rightarrow i \downarrow \rightarrow I \uparrow \rightarrow AD \uparrow \rightarrow Y \uparrow$

↳ Simple relations in the Keynesian model-

An increase in money supply from M_{S1} to M_{S2} causes initial money supply excess. the interest rate falls from r_0 to r_1 to restore equilibrium in the money market.

6.2 The IS-LM Model

In the ISLM model, we find the balance point for the interest rate and income, ensuring stability in the

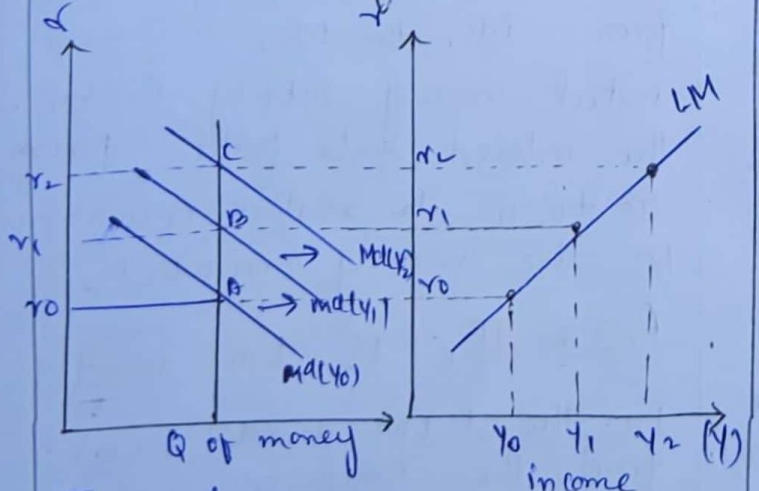
commodity, money, and bond market. Initially we focus on achieving equilibrium in the money market and then in the commodity market. To ensure a unique balance, we assume fixed policy variables like money supply and government spending.

Money market Equilibrium: The LM Schedule

In the Keynesian model, the LM schedule play a crucial role in determining the equilibrium b/w Md and Ms. Md depends on income and the interest rate, with transaction and speculative motives influencing its behavior.

At each point of the LM schedule the money market is in equilibrium.

Construction of LM schedule:-



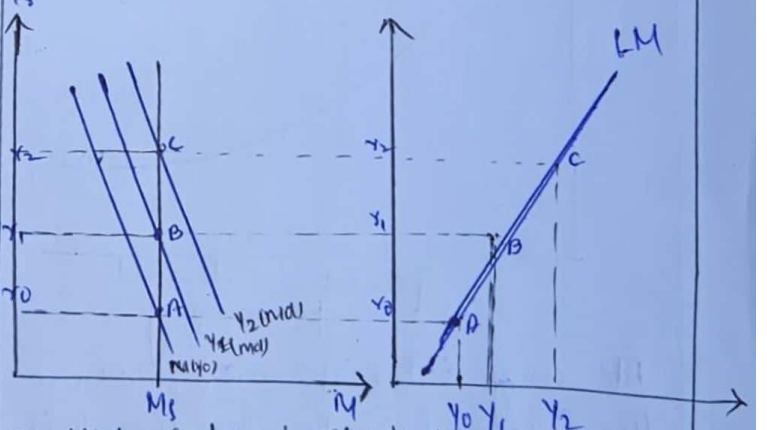
The LM schedule identifies combination of interest rates and income levels that balances money demand at any given interest rate with a fixed money supply. As income increases, so does money demand at any given interest rate, leading to an upward-sloping LM schedule, reflecting equilibrium in the money market.

Factors effecting the slope of the LM Schedule:-

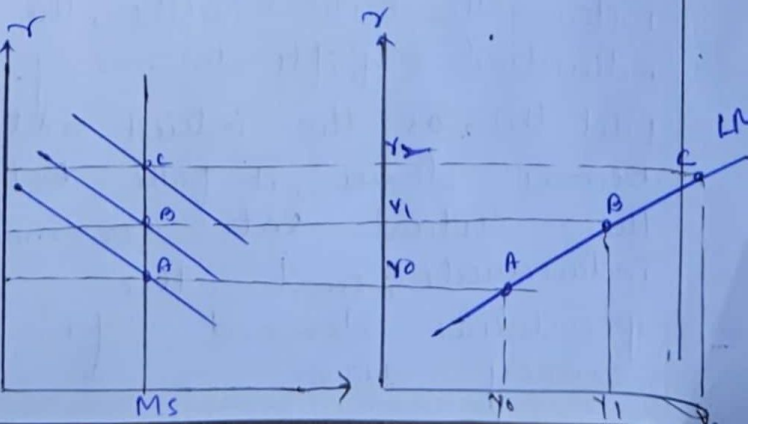
The slope of the LM schedule reflects the sensitivity of money demand to changes in interest rate. A steep curve suggests less sensitivity, conversely, a flatter curve indicates high sensitivity.

Graphically:-

a) Low interest sensitivity of money demand.



(b) High interest elasticity of Md:-



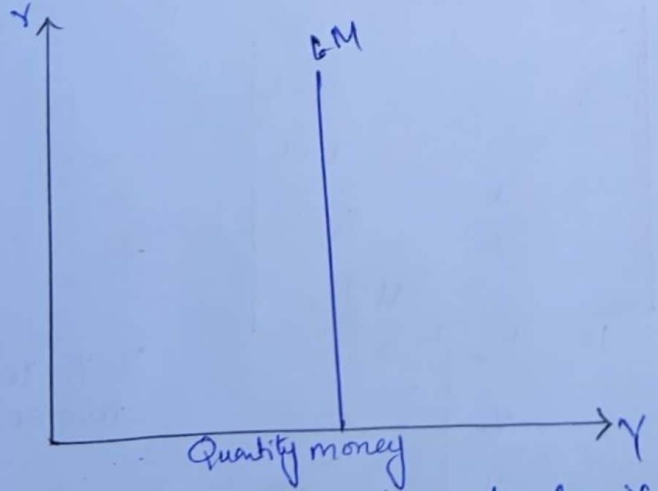
3 With low interest elasticity of money demand, the LM schedule is relatively steep. In part (b) money demand is assumed to be highly interest elastic and as a result, the money demand schedule is relatively flat. the LM schedule in this case is also relatively flat-

↳ Extream cases and Policy implications

Extream cases in the LM schedule, such as complete insensitivity or high elasticity of money demand, have significant Policy implications

A vertical LM schedule implies limited effectiveness of conventional monetary policy, while a horizontal schedule, as seen in the liquidity trap scenario, underscores the challenges in stimulating economic activity solely through interest rate adjustments

LM Schedule classical case.



The LM schedule is vertical if money demand is completely interest insensitive-

Factors that shift the LM Schedules

There are two factors that shift the LM schedule.

① Changes in exogenously fixed money supply.

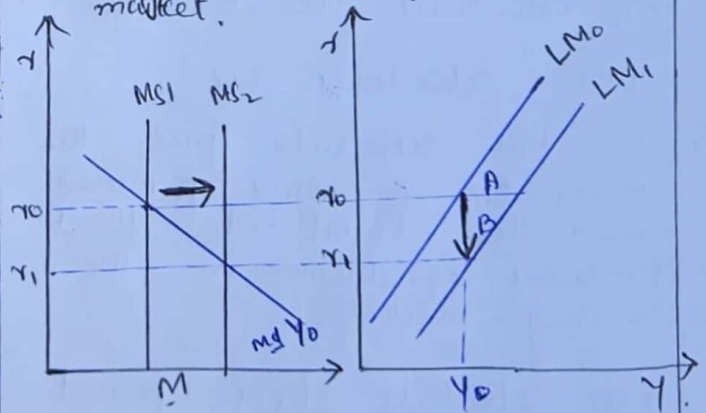
② Shift in money demand function-

↳ Changes in money supply.

An increase in money supply results into a lower equilibrium interest rate. Conversly, a decrease in the money supply raises equilibrium interest rate.

Graphically MS↑ → shifts the LM curve downward and to the right, indicating lower interest rates for any given level of income

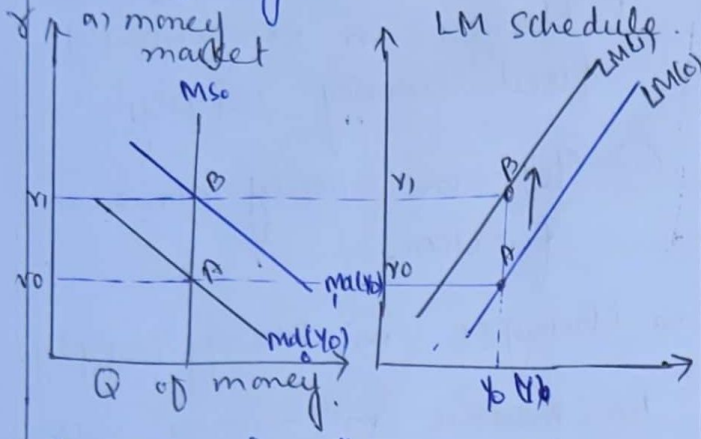
a) money market. b) LM Schedule.



Shift in the money demand function.

An increase in money demand at a given income and interest rate level shifts the LM schedule upward and to the left, reflecting higher

equilibrium interest rate, Conversely, a decrease in money demand shifts the LM schedule downward and to the right.



A shift in the money demand function from $md_2(Y_0)$ to $Md_1(Y_0)$ in part a raises the equilibrium interest rate for a given level of income. The LM schedule in Part (b) shifts upward to the left from LM(0) to LM(1)

The LM Schedule (Summary)

The essentials about the LM schedules are

(1) The LM schedule gives the combination of values of income and the interest rate that produces equilibrium in the money market.

(2) LM schedule slopes upward to the right.

(3) LM schedule will be steep (flat) if the interest elasticity of money demand is low (high).

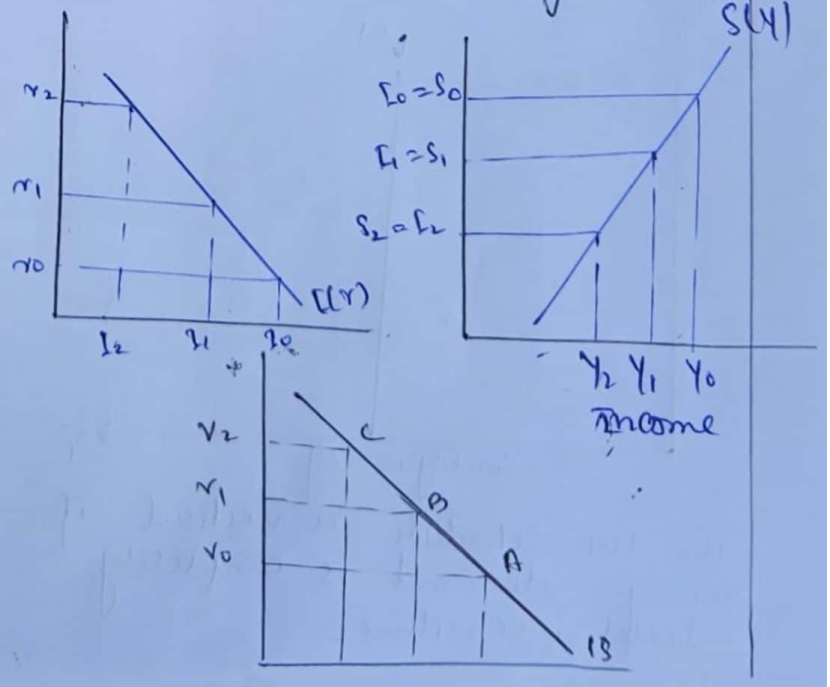
(4) The LM schedule will shift upward (downward) to the ~~right~~ (left) left (right) with a shift in money demand function that increases (decreases) the amount of money demanded at given level of income and the interest rate.

(4) The LM schedule will shift downward (upward) to the left (right) with an increase (decrease) in the quantity of money

Product Market equilibrium : the IS Schedule

The IS schedule, a key component of analyzing the Keynesian system, embodies the equilibrium in the product market. It arises from the equality b/w investment and saving, as $G+I = S+T$. This schedule captures the various combinations of interest rates and income levels that maintain this equilibrium.

a) investment and saving schedule



4| At interest rate r_0, r_1, r_2 investment levels will be I_0, I_1 and I_2 in Part a. To generate savings S_0, S_1 and S_2 equal to these level of investment, income must be at Y_0, Y_1 and Y_2 respectively Therefore, interest ~~fixed~~ rate - income combinations (r_0, Y_0) (r_1, Y_1) and (r_2, Y_2) are points (A, B, C) along the IS schedule in Part (b).

Note:- for lower level of income the interest rate is high and when it increases the interest rate decreases, thus the IS schedule is Negatively sloped.

Factors that determine the Slope of the IS Curve:-

The slope of the IS schedule which shows the relationship blw interest rates and equilibrium income levels, depends on two main factors.

(1) Investment elasticity:-

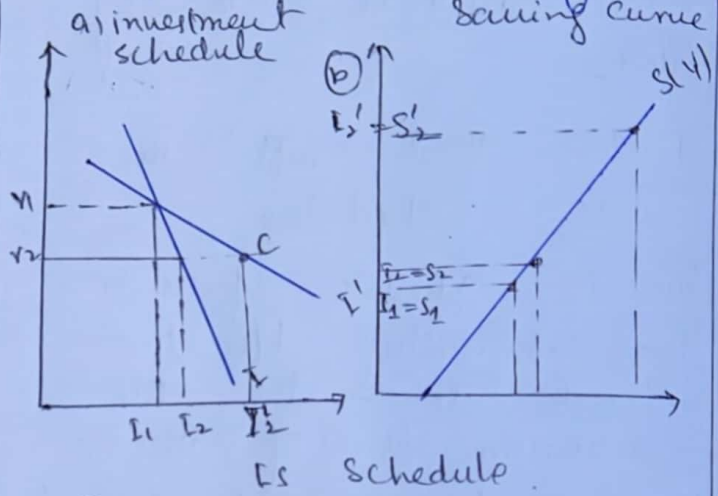
↳ If the investment doesn't change much when interest rate fluctuate (like on I schedule), the IS is steep, and vice versa.

(2) Role of Savings:-

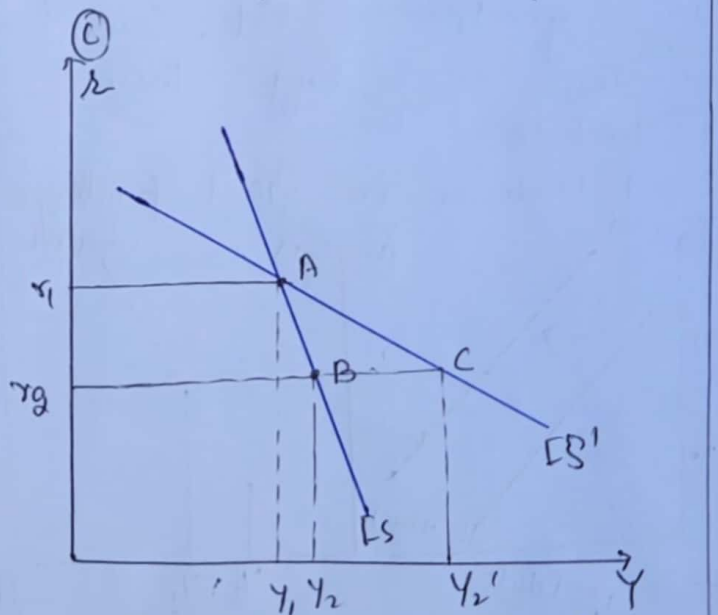
↳ A higher MPS leads to a steeper IS schedule.

↳ with a high MPS, Saving increase more with each unit of income. This means income doesn't need to rise much to balance Savings and investment when interest rate change.

↳ Understanding these factors helps economists predict how changes in interest rates or income effect the economy, guiding policies for stable economic growth.



IS schedule



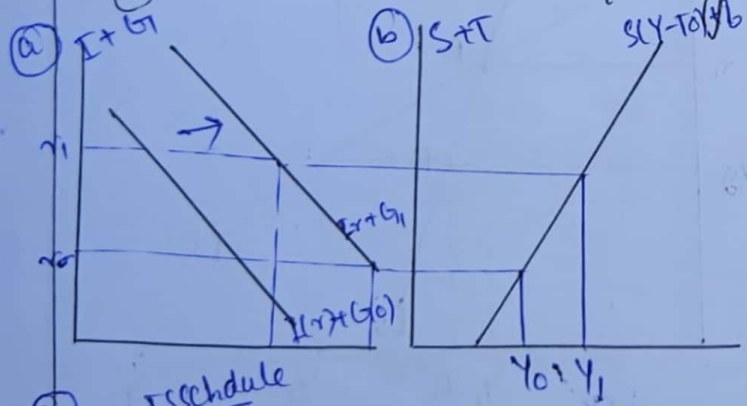
When the investment schedule is steep (I) in part (a), a fall in the interest rate will increase investment by a small amount. In part (b), therefor, only a small increase in saving and hence, income is required to restore product market equilibrium. Therefor

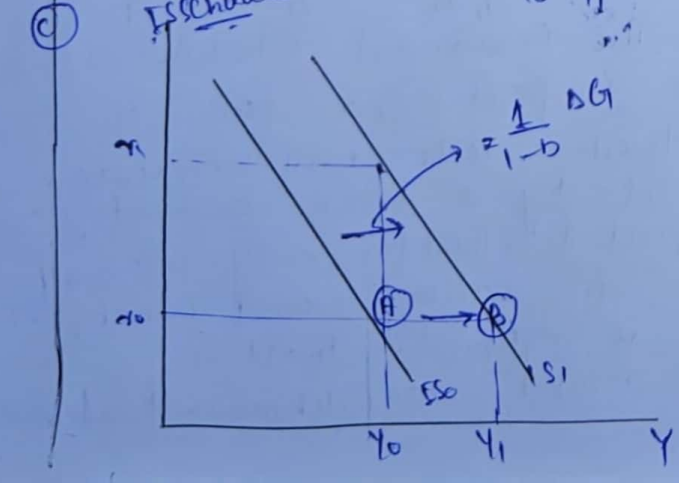
The IS schedule in part (c) will be steep. Where the investment schedule is relatively flat (I') investment will increase by a greater amount with a fall in the interest rate. Saving and therefor income, must then increase by a greater amount : the IS schedule for this case (IS') will be relatively flat.

↳ Factors that shift the IS Schedule

The IS schedule represents the relationship b/w the interest rate and the equilibrium level of income in goods market. Several factors can shift this schedule.

(1) increase in Govt spending



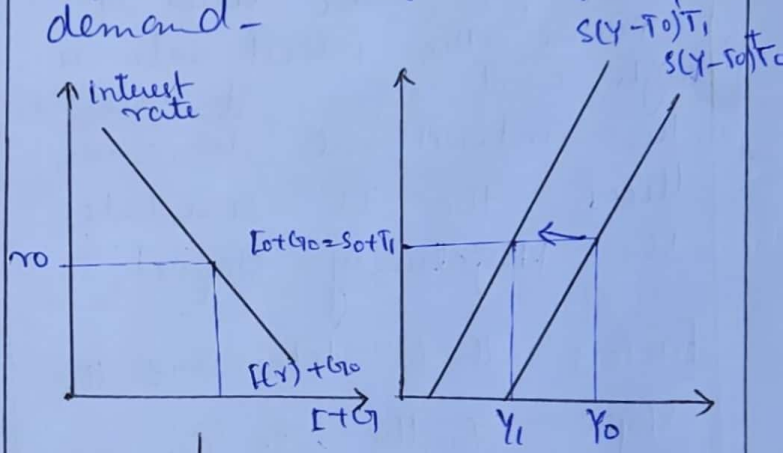


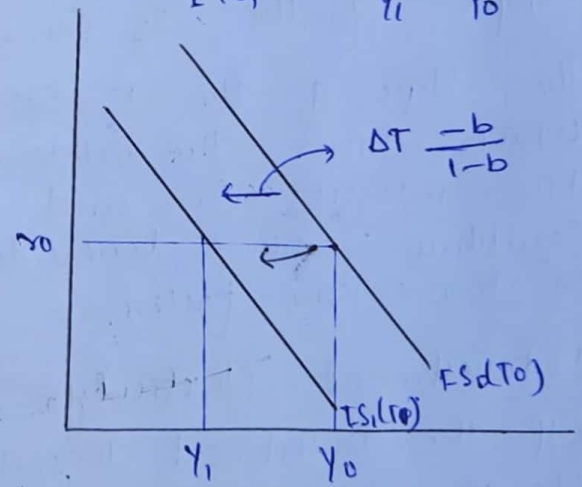
An increase in Govt spending shifts the IS schedule to the right from $IS_0 \rightarrow IS_1$.

(2) Changes in taxes

When taxes increases the IS schedule shifts to the left.

Higher taxes decreases the disposable income, lowering consumption and saving which decreases overall demand.





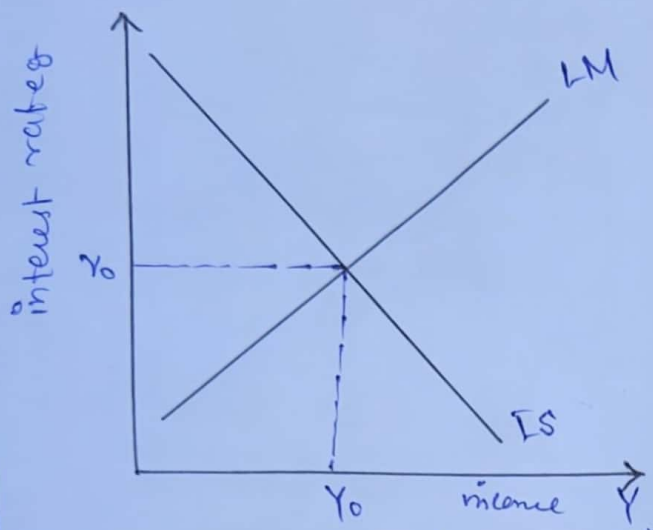
Important :

(1) The IS schedule will remain unchanged when government spending is exactly financed by taxes.

(2) If the government spending is higher then the taxes the IS schedule will shift to the right.

(5) (3) If the government spending is lower then the taxes, the IS schedule will shift to the left-

↳ The ISLM Schedule Combined:



The IS-LM model's equilibrium point determines the interest rate and the income level.

↳ Above the LM curve, there is an excess money supply, pushing the interest rate down.

↳ Below LM, excess demand pushes interest rates up.

↳ Right of IS curve, excess output lowers income,

↳ Left of IS curve, excess demand raises income.

Only at the equilibrium point, both markets are in equilibrium-

Graphically: