Macroeconomics

1. Aggregate DD →

2. Aggregate supply (ss)

1	11	- - -	XX	=	2+7+ - -	+1 → this is Market DD.
2	7		1			

→ ~~Bad~~ Everyone has some no. of transactions ↳ buying sweet, watching movie

T → no. of transactions in any economy

P → price of ~~a~~ transaction

PT → total price of transaction

$PT = VM^s$ ← Velocity of money

↳ total money supplied (money circulated in economy

~~Not all money supplied is used in transaction~~

- What I'm giving to a person, he can use it in another transaction so ↑ V part added

~~Velo~~

T : total no. of transactions in an economy

P : price of a typical transaction

M^s : quantity of money supplied

V : velocity of money [Rate at which money circulates in an economy ↓ Rate at which a note exchanges hands

If in an economy, if price level ↑ ⇒ More price is paid in each transac^n, exchanged ~~money is~~ more rapidly

velocity ↑.

Ex. 100

$PT = 20 \times 100$

$= 2000$

$M^s = 1000$

$PT = VM^s$

$V = 2$ ⇒ ~~Rate of circulation~~ Re 1 is circulated 2 times

⇓

For Rs. 2000 of transactions per year, with money supplied = Rs. 1000, each Rupee has to exchange hands 2 times a year

→ since T is very difficult to measure; T is substituted with total o/p of an economy. (no. of goods & services produced in an economy)

$PY = VM^s$

$T \cong Y$ ⇒ $T = f(Y)$: if more no. of transac^n : o/p will be more.

so, T can be replaced by Y.

⇓

Quantity theory of Money.

⇒ $\frac{\overline{M^s}}{P} = \frac{1}{V} Y$

P: aggregate price level.

In any year, M^s by RBI is fixed.

So, I can find relation b/w P & Y.

Suppose V is also const.

so, $P(\uparrow) \Rightarrow Y(\downarrow)$

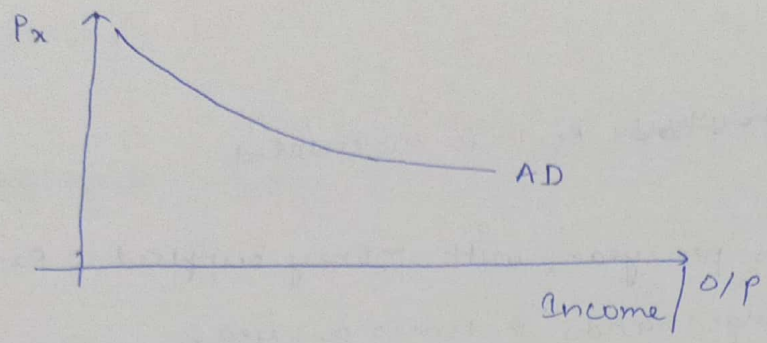
Q. If 1000 items are sold, why not sum it up.? Why $P \propto \frac{1}{Y}$ is proved? Why to discuss this all?

Ans. micro → Individual level

macro → A group of diff. classes

To talk about macro ⇒ we did all this.

Aggregate DD Curve :



Aggregate Supply

2 situations :

- Long Run
- Short Run

① **Long - Run**

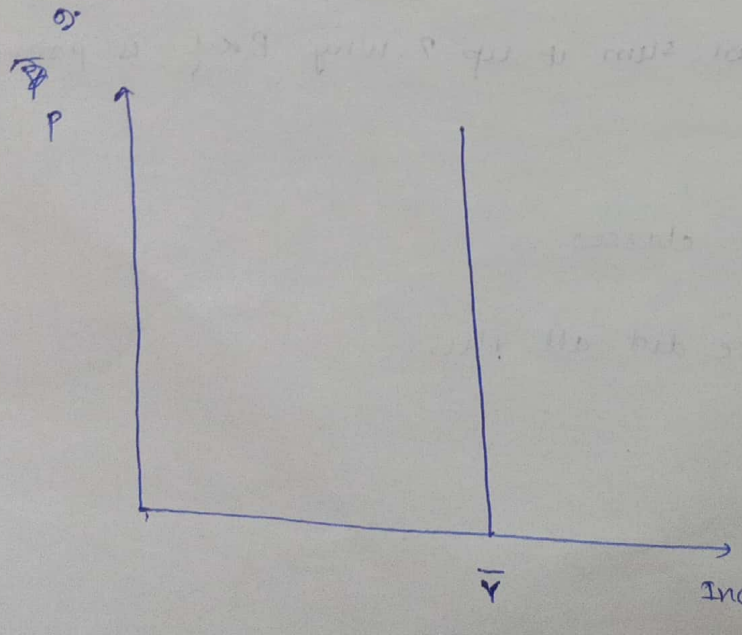
$\bar{Y} = f(\bar{K}, \bar{L})$ → Production func^n

↓

In Macro : in long Run, Capital & labor are fixed & total o/p is fixed

↓ Reason

- entire resources are exhausted ⇒ its o/p is not going to change
- you are at your maximum point



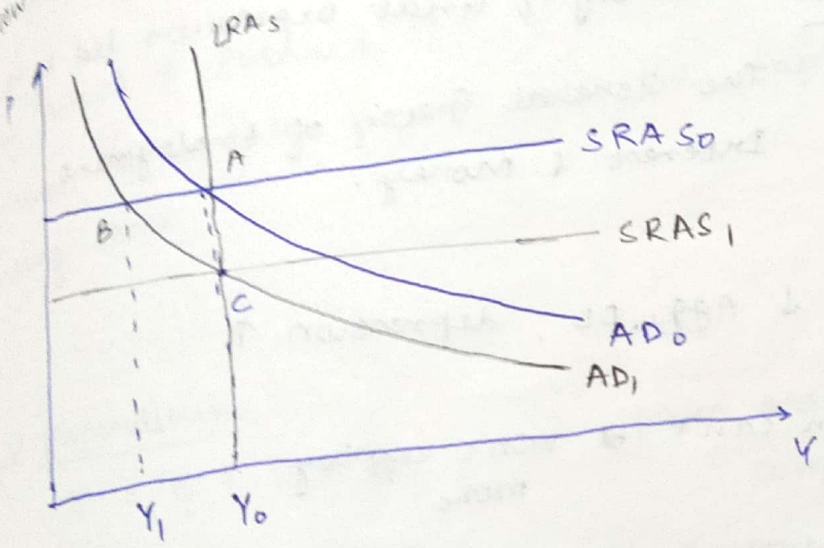
Prices are flexible here.

Long-Run are sticky

Ex. High inflation is occurring. You go to a restaurant today and after some days. Menu card won't have change in prices immediately. It'll change after lot of time

→ prices are adjusted at slow rate (slow to adjust)

How to move from Short-Run to Long-Run ?



Aggregate DD : $\frac{\overline{M_S}}{P} = \left(\frac{1}{\overline{V}}\right) Y$

Short-Run : P not changed (sticky)

If M_S ↓ : Aggregate DD will ↓ : At same P, Y has ↓

o/p has ↓ ⇒ Employment ↓ ⇒ People won't buy goods → P_e ↓

Economy will move from A to B.

In long Run → shift from B to C.

(They know permanent change, so, they will change price)

$SRAS_1$ → new short run price.

13-11-19

2009 → Recession
World's GDP ↓ by 1%.

1929 → The Great Depression
World's GDP ↓ by 15%

Keynesian Economics

Macro
↳ Keynesian Economics (study of Great Depression led to this)
↳ Book: The General Theory of Employment, Interest & Money.

Idea: Whenever there is ↓ Agg. DD, depression ↑

Once low Income ⇒ Firm can't sell ⇒ won't employ more

Income / o/p / GDP = C + I + G + (X − M)

C → Total consumption expenditure
I → Investments
↳ Pvt.
↳ Public
G → Total expenditure by govt.
X − M → Exports − Imports

Data analysed has shown that: [uniform across all countries]
C → 60%.

→ India: economy has ↓ Reason → C has dropped down for the first time.

→ We'll study tools of Keynesian Economics :

1. Goods Market (How Y is affected)
2. Goods & Money Market (Y + Money from bank (stock))

Simple Keynesian Model

2 kinds of things an economy has :

→ Actual expenditure
→ Planned "

Q. Why Actual ≠ Planned ?

Ans. Because Firms sales don't meet the expectations & they end up adding stock.

Planned Expenditure :

$E = C + I + G$ (Not adding trade part to avoid complications)

$C = c(Y - T)$

$= a + b(Y - T)$

Y : Income

T : Taxes

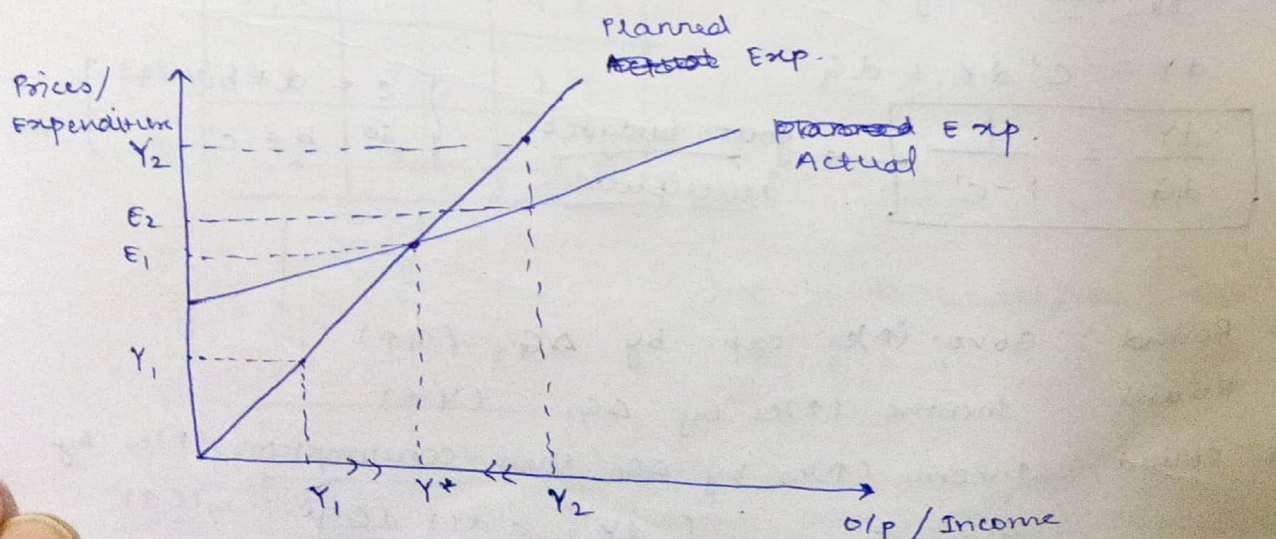
Y − T : Personal Disposable Income

b → slope : how much consumption change by changing Y − T

a → intercept : even if Y is 0, I'll consume something (autonomous consumption)

$0 < b \leq 1$

b : Marginal Propensity to Consume (MPC)



Keynesian Cross

Monetary Policy : undertaken by RBI

Suppose,

Economy is producing at Y_2 level:

Actual ≠ Planned : stocks will accumulate → employ less → economy goes from Y_2 to Y^*

Y_1 : Actual > Planned : Firms can't meet expectation → employ more → go from Y_1 to Y^*

→ govt. makes many policies based on this premise.

Q. How govt. expenditure depends on this ?

Ans. If the govt. decides that it is launching a scheme, invest in any kind of Fiscal Policy , then
↓
undertaken by govt.

$$Y = C + I + G$$

$$Y = C(Y - T) + I + G$$

As $G \uparrow$, Y also $\uparrow$

Taking T & I const. (since we've to find relation b/w Y & G)

$$Y = C(Y - \bar{T}) + \bar{I} + G$$

On differentiating,

$$dY = C' dY + dG$$

$$\boxed{\frac{dY}{dG} = \frac{1}{1 - C'}}$$ → govt. budget Multiplier

$\left\{ C = a + b(Y - t) \right.$
$\left. \text{so, } b = C' \right\}$

Initial Round : Govt. (↑)es exp. by ΔG ($G \uparrow$)

First Round : Income (↑)es by ΔG ($Y \uparrow$)

Second Round : Income (↑)es by ΔG, then consumption (↑)es by $C' \times \Delta G$ ($C \uparrow$)
↓
MPC

$\left[dY = C' dY + dG \right]$
⇓
consumption part ($dY = \Delta G$ here)

Third Round: C↑ → Expenditure ↑ → Firms will employ more ↑ to produce more → Income ↑ (MPC × ΔG) → Consumption will ↑ by $C' \times (C' \times \Delta G)$

Ex → Govt. Investment of ₹ 100 Crores in 2013

$$Y_0 = C(Y - \bar{T}) + \bar{I} + G_1$$

→ so, Y_0 (↑)es by 100 Crores (Y_1) in 2013

→ If Y (↑es) from Y_0 to Y_1, then consumption will also (↑)

→ consumpⁿ (↑)es by MPC (C') in 2013

New consumpⁿ = $C' \times \Delta G$

→ Income (↑)es from Y_1 to Y_2 by $C' \times \Delta G$ in 2014

→ when Income has (↑)ed to Y_2, in 2014 consumption (↑)es by $C' \times (C' \times \Delta G_1)$

so, (↑) in Y is:

$$dY = dG + C'dG + (C')^2 dG + (C')^3 dG + \dots$$

$$= dG\,(1 + C' + (C')^2 + \dots)$$

$$dY = dG\left[\frac{1}{1 - C'}\right] \rightarrow \text{govt. budget multiplier}$$

18/11/19 Game Theory:

	L	C	R
T	2, 0	1, 1	4, 2
M	3, 4	1, 2	2, 3
B	1, 3	0, 2	3, 0

B ✗
C ✗

I

II

I : T dominates B
C

II : R "

	L	R
T	2, 0	4, 2
M	3, 4	2, 3

→ Physical interpretation of $\frac{dY}{dG}$:

If $\frac{dY}{dG} = \frac{1}{1-0.6} = 2.5$ if govt. expends Re 1, it will get 2.5 as income.

→ $Y = C(Y-T) + \bar{I} + \bar{G}$

Totally differentiating,

$dY = C'dY - C'dT$

$dY(1-C') = -C'dT$

$$\boxed{\frac{dY}{dT} = \frac{-C'}{1-C'}}$$: inverse relation

→ Tax multiplier

If $C' = 0.6 \Rightarrow dY = -1.5\,dT$: If tax ↑ by 1 unit, my income will ↓ by 1.5 units.

Q. Why the govt. tax us?

With T, govt. can supplement G. So, ideally, (all taxes are taken for

$\Delta T = \Delta G$

Balance budget multiplier.

$Y = C(Y-T) + \bar{I} + \bar{G}$

$dY = C'dY - C'dT + dG$

Since it is balanced budget, $dG = dT$

$\Rightarrow dY(1-C') = (1-C')dG$

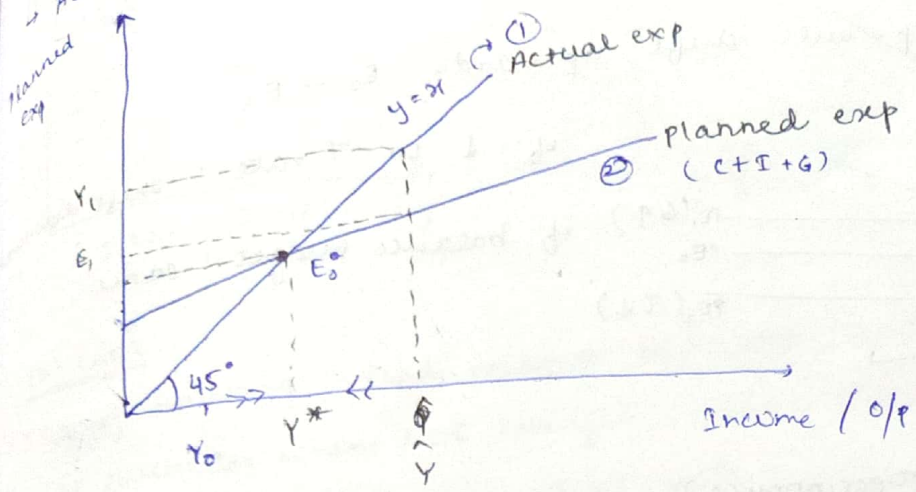
$\Rightarrow \boxed{\frac{dY}{dG} = 1}$

- In balanced budget : any change in govt. exp. leads to the same change in income & vice-versa.

(Because it is my money that is getting invested, so proportion will be same)

Keynesian Model (Revision) [See this one, ignore previous discussion]

→ Actual & Planned exp



①: All along the 45° line, the economy is planned expenditure is exactly equal to Income / o/p produced.

↳ Ideal setup

↳ Economy is in equilibrium.

②: Planned exp:

$$E = C + I + G$$

$$C = a + bY \qquad 0 \le b \le 1$$

- At $Y = Y^*$ (E_0) the economy is in eq^m.

→ This won't be the case always.

at $\hat{Y}$: we don't have ideal setup.

Q. What firms will do at $\hat{Y}$?

Actual exp. > Planned exp.

⇒ They will have more stocks : will produce more : Move to Y^*

~~Planned > Actual~~

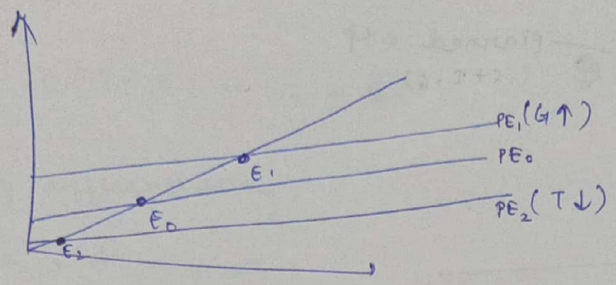
To get to the eq^m point

Income o/p > eq^m : More is being produced. So, it'll produce ↓ to get to eq^m point

Q. Y_0 : Income o/p < eq^m : less is being produced. would move ~~left~~ to right

→ At E_0, people's plan have been realized, they have no incentive to change.

- When G ↑ : Planned exp. will shift upwards $E_0 \rightarrow E_1$.



if ↓ in T rate : shift downwards

if balance budget : same.

Textbook : Mankiw (Macroeconomics)

20-11-19

Problem :

↳ Investment of the economy is considered to be fixed.

But, usually, Investment is function of Interest rate.

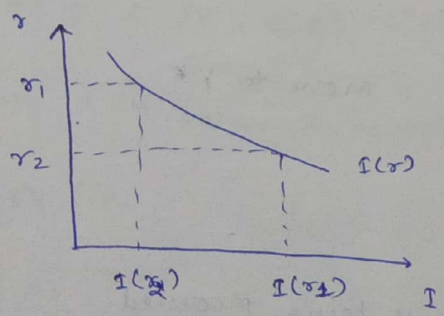
↳ How much banks give on your saved money.

The interest rate, Investment & the IS-Curve

$$E = C(Y - \bar{T}) + \bar{I} + \bar{G}$$

$$I = I(r) \qquad r : \text{rate of interest}$$

and $I'(r) < 0$.

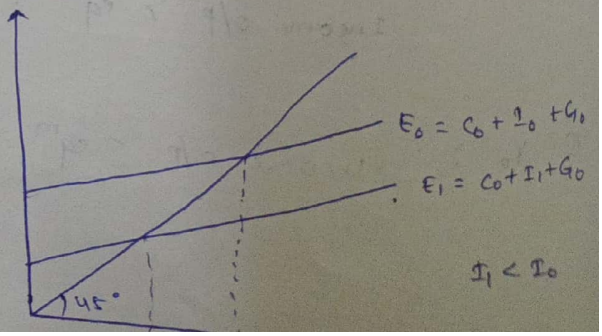


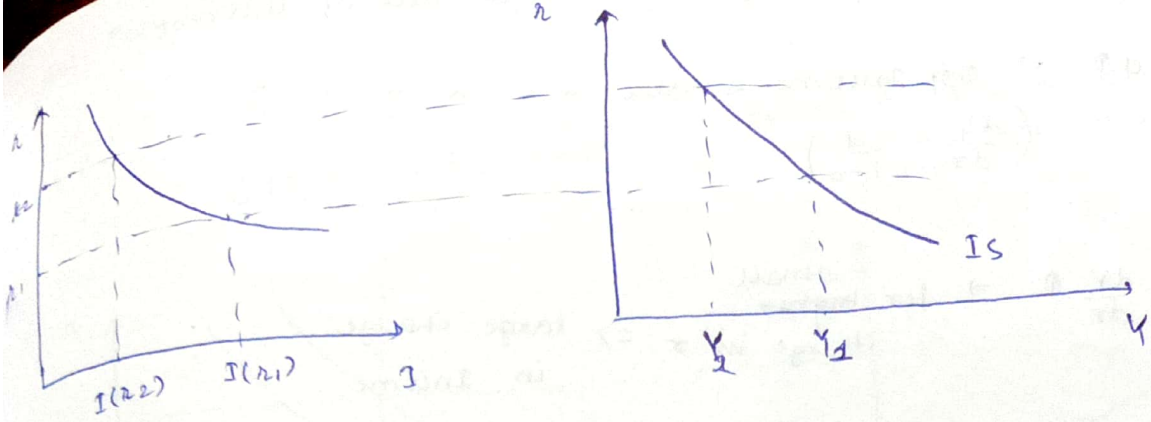
If r↑ ⇒ I have to save more ⇒ I'll invest less

$r(\uparrow) \Rightarrow I(\downarrow) \Rightarrow E(\downarrow)$

when $r(\uparrow)$: $E_0 \rightarrow E_1$

$Y_0 \rightarrow Y_1$





IS-curve:

- Idea of drawing: find relation b/w rate of interest & o/p of economy
- GDP fluctuates when ROI changes

Q. Why Investment is a func^n of r?

Ans. r is basically the opportunity cost of holding money.

(if r ↓ : won't save more ⇒ Invest more)
(hold)

- if r(↑) → I(↓) → E(↓) → Y(↓)
  r(↑) → Y(↓) : IS curve

Eq^n of IS curve:

$$Y = C(Y-T) + I(r) + G$$

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

$$I(r) = c - dr \qquad (\because I'(r) < 0)$$

↳ even when r=0, there is some investment, so the c part is included

$$\Rightarrow Y = a + b(Y-T) + c - dr + G$$

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

$$Y = \frac{a+c}{1-b} - \frac{b}{1-b}T + \frac{G}{1-b} - \frac{d}{1-b}r$$

so, $\frac{dY}{dr} = \frac{-d}{1-b}$ → slope of IS curve.

- Slope of IS curve is:
  Steep : b ↑, d ↓ (small Δ in r ⇒ Δ in Y ↓)
  Flat : b ↑, d ↑ (small change in r ⇒ large change in Y)

→ d ↑ : Investment is highly sensitive to rate of interest.

* so if d ↑ ⇒ Income is also " " " "

$\left(\frac{dY}{dr} = \frac{-d}{1-b}\right)$

if b ↑ : $\frac{dY}{dr}$ ↑ ⇒ for small change in r ⇒ large change in Income

Flat = Income is sensitive to r.

→ change in income level depends on how much we consume & how much we invest

Real Money Market

Real Money Supply

$\frac{M^S}{P}$ = Real Money Supply

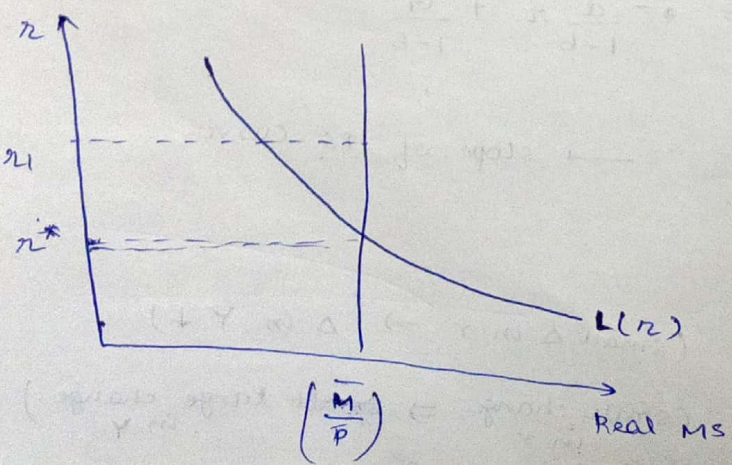
$\frac{M^S}{P} = \left(\frac{\bar{M}}{\bar{P}}\right)$ → considered as fixed in given amount of time

This is out of our hands. (Central Bank does it)

We've demand in " ".

Demand :

$\left(\frac{M}{P}\right)^d = L(r)$; $L'(r) < 0$ if r ↓ : I'll demand more money



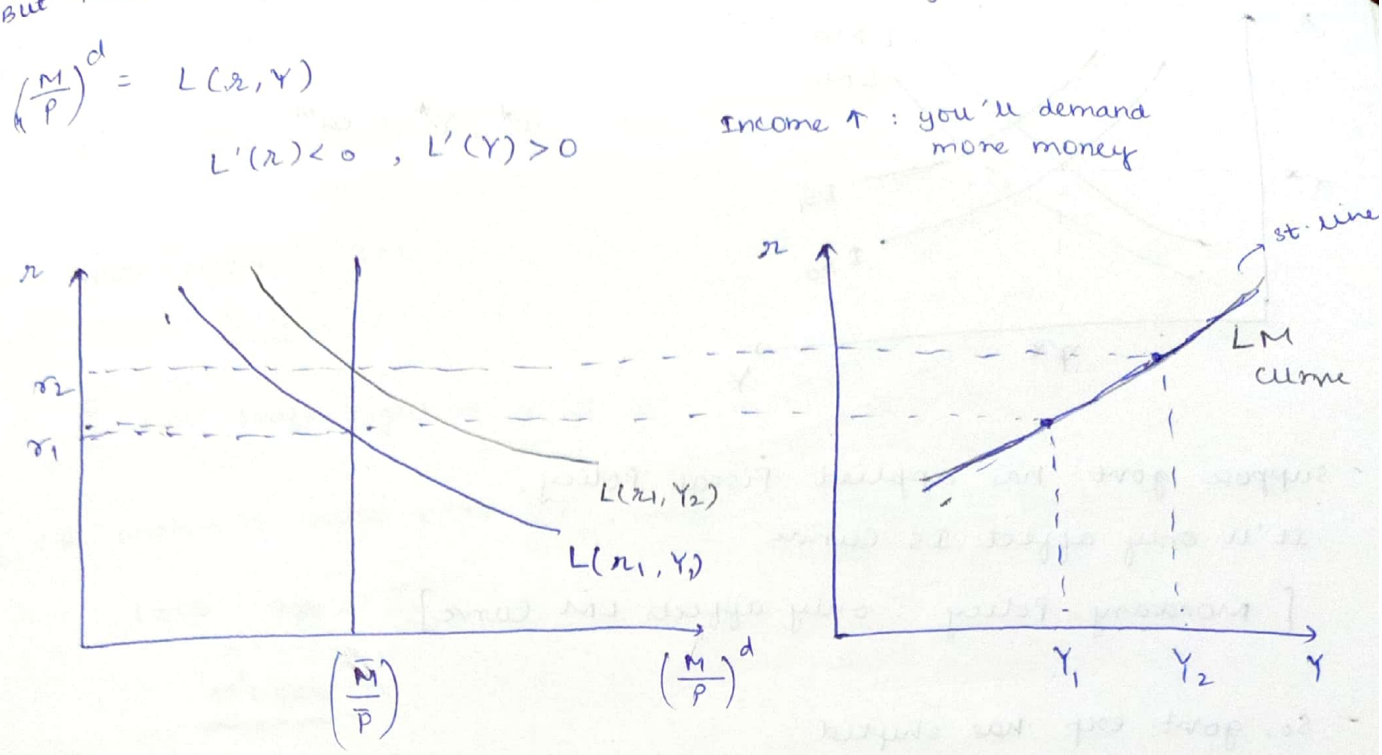
r1 : Banks have more money but can't give (S > 0) so, they ↓ r.

- But Real Money doesn't only depend on r solely.

$$\left(\frac{M}{P}\right)^d = L(r, Y)$$

$$L'(r) < 0 \quad , \quad L'(Y) > 0$$

Income ↑ : you'll demand more money



Suppose income rises : $Y_1 \rightarrow Y_2$

so, $L(r, Y)$ will shift upwards

we have more capacity → will demand more money → many people will demand → Bank's M ↑ r

So, as my Y ↑ , r also ↑.

→ $L(r, Y) = eY - fr$

$$\frac{M}{P} = eY - fr$$

$$\Rightarrow r = \frac{1}{f}\left(eY - \frac{M}{P}\right) = \frac{e}{f}Y - \frac{1}{f}\frac{M}{P}$$

$$\frac{\partial r}{\partial Y} > 0 \quad : \text{LM slope is +ve.}$$

$$\frac{\partial r}{\partial Y} = \frac{e}{f}$$

Phy. Interpretation :

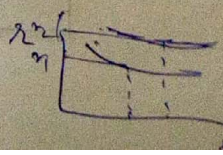
if e ↑ ⇒ for small Δ in Y : demand for money is ↑

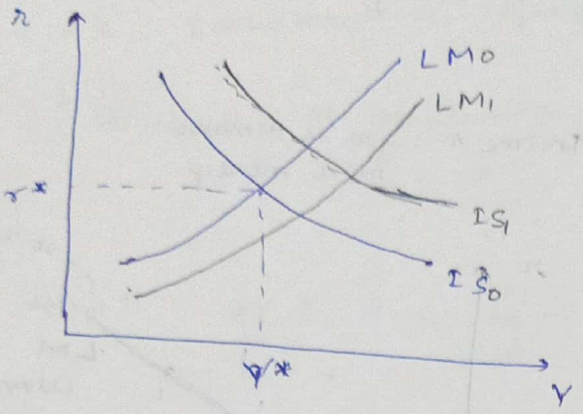
so, Rate should also be ↑ more.

for f : inverse condition

if f ↑ : demand for money will be ↓

large Δ : small Δ





r^*, Y^* : eqm

- suppose govt. has applied Fiscal Policy.
  It'll only affect IS curve
  [Monetary Policy : only affects LM Curve]

- So, govt. exp. has shifted
  → IS. shifts
  At same r, Y is more
  good fiscal policy → shift right
  bad → " left

- Central banks control commercial banks by changing r.

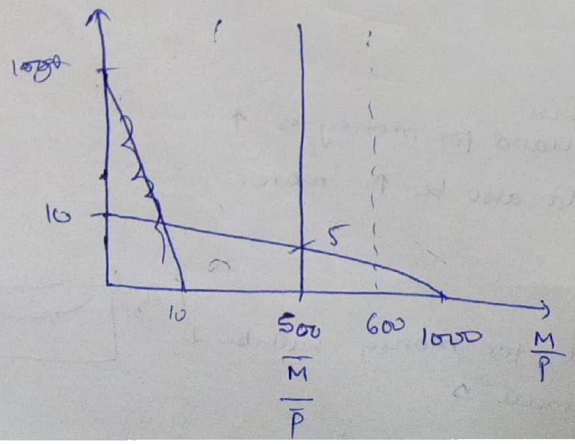
Monetary Policy :

- If $\left(\frac{\bar{M}}{\bar{P}}\right)$ ↑ ⇒ More money to Comm. bank ⇒ Comm. bank will try to give more money ⇒ r ↓ ⇒ LM shifts right (down).

good monetary policy → shifts down
bad " " → " up

Demonetization : shift up.

Ex. $\left(\frac{M}{P}\right)^d = 1000 - 100r$, $M^s = 1000$, $P = 2$, Graph = ?
↓
For Real Money balances ($L(r)$ Curve)
LM: rel^n b/w r & Y.



$\frac{\bar{M}}{\bar{P}} = \frac{1000}{2} = 500$

eqm rate : 5.

$1000 - 100r = 500$

→ Assume that P is fixed, what happens to r if Ms is ↑ed from 1000 to 1200

$$\frac{\bar{M}}{\bar{P}} = \frac{1200}{2} = 600$$

$$1000 - 100r = 600$$

$$r = 4$$

$\frac{\bar{M}}{\bar{P}}$ will shift right ⇒ r is ↓

→ If C.B. wishes to raise r to 7%, what M^s should it set?

$$1000 - 700 = \frac{M^s}{2}$$

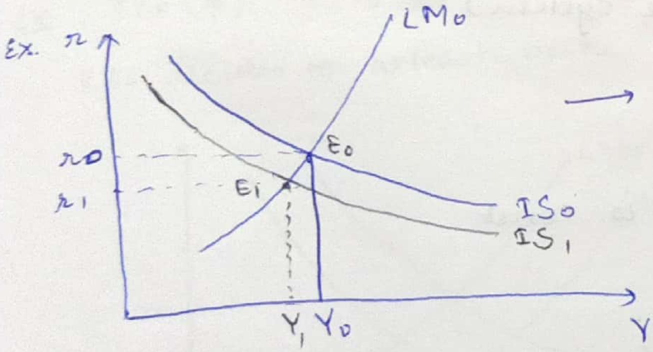
$$M^s = 600$$

1/11/19

Shifts in the IS-curve

- Any positive Fiscal Policy would shift IS curve to the right.
  [Ex. Tax(↓) / Govt. Exp.(↑)]
- Any (-ive) Fiscal Policy would " " " " " left
  [Ex. Tax(↑) / Govt. Exp.(↓)]

Ex.



→ Recession : Both r & Y are falling.

↳ suppose there is an ↑ in Tax : IS will shift left
so, economy moves from E0 to E1

Tax (↑) ⇒ → r (↓) ⟶ Y (↓)

Mechanism from r0 to r1 :

- Tax (↑) ⟶ - demand for money ↓
  - Loan Market ↓ (demand)
  - r ↓
  - People will be saving more (in bonds) [Loan DD (↓)]
    So, price of Bonds (↑)

but not investing anywhere

~~[Ideally: if ... people will~~

How to come out of this Recession ?

1) It may ask Central Bank to keep r same.

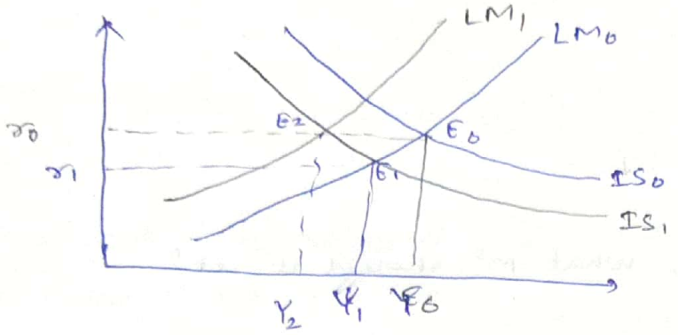
RBI knows if r↓, Y↓

so, to make the economy liquid, may keep r const.

↓ To do this

LM curve should be shift upwards.

This will happen when, M^s (↓).



In economy :

Tax (↑) : IS has fallen → Recession phase : r↓ & Y↓.

So, RBI will have M^s (↓)

Tax(↑):

- DD for money (↓) [∵ less disposable money at hand]
- Loan DD (↓)
- r (↓)
- Price of Bonds (↑)
- [Economy is not requiring that much of money as it had since DD for money (↓)]

(There's lot of money in the system)

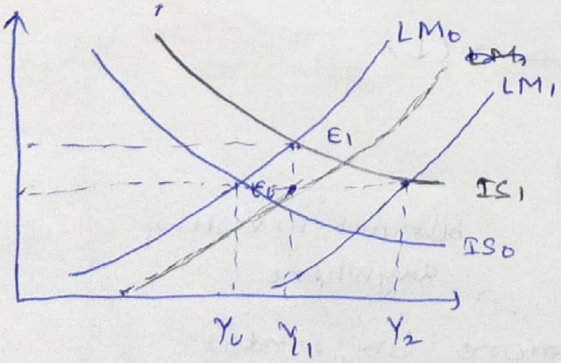
So, M^s is ↓ by RBI

LM will shift upwards.

- He may ↓ M^s s.t. r is const.

2) Central Bank may keep Y same.

⟹ Suppose, we have G (↑) : so IS will shift left



⇒

G(↑) → Y (↑) → Money demand (↑)

→ Loan DD (↑) → r (↑)

→ Price of Bonds (↓)

⇓

If RBI wants to keep

- r const. : LM should be shifted right (+ve Monetary policy)

so, M^s ↑ by RBI.

Same fiscal policy is ↑ng O/p from Y_0 to Y_2 instead of Y_1

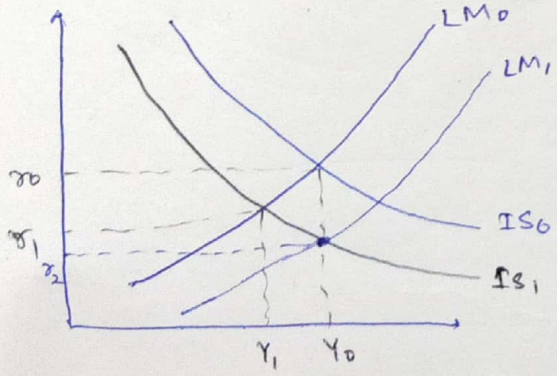
- Both MP & FP have an interconnection.
- When both don't work in coordination, problems like Recession, Inflation arises.

- Suppose RBI doesn't want to ↑ the income. So, he will shift LM curve to the left.

→

Ex. Govt. Exp (↑)
↳ Income (↑)
↳ M^D (↑)
↳ Loan DD (↑)
↳ Price of Bonds (↑)
↳ r (↑)
↳ $\Delta Y = Y_1 - Y_0$ (earlier graph)
↳ Extra demand for money that causes r to ↑.
If it is accompanied by an (↑) in M^S, LM curve shifts down
↳ same old Fiscal policy is able to ↑ Y to Y_2.
$\Delta Y = Y_2 - Y_0 > Y_1 - Y_0$

Ex. Tax (↑) → r (↓) → Y (↓)
RBI decides to atleast make Y const. ⇒ LM shifts down

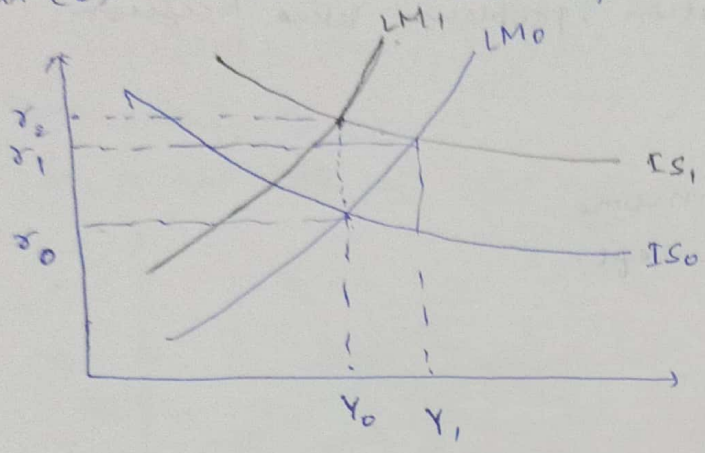


$(r_0, Y_0) > (r_1, Y_1) \mid (r_2, Y_0)$
↓
better than (r_1, Y_1)
↓
done by M^S (↑)

M^S (↑) ⇒ RBI will give loans at ↓ r to comm. banks → Comm. Bank will charge r↓ $[r_0 \to r_2]$ → demand for loan ↑ → economy will move Y_0 to Y_1 position.

Q. There's a ↓ in tax rate & govt. wants to keep Y same, what is proper channel to do it?

Tax (↓) → IS will shift upwards



To keep Y const. → LM will shift upwards

Tax (↓) → Money DD (↑) → Loan DD (↑) → r ↑ → Price of Bond (↓)

Y same ⟶ LM will shift ↑

M^S (↓)

→ Tax rate (↓) → IS shifts right
→ r (↑)
→ Y (↑) (∵ Loan DD ↑ due to (↑) M^D)

⇑
People are spending more. r has ↑

(1) To keep r same : M^S (↑)

(2) To keep Y same : M^S (↓)

↳ I'm not allowing the fiscal Policy to be affective. , M^S (↓)