Module - 2

Macro - Economics

→ Text: Mankiw Chap -23 onwards

→ Last 3 weeks (Short Run) Keynesian Macroecs.
↳ ~~Dornb~~ Dornbusch & Fischer.

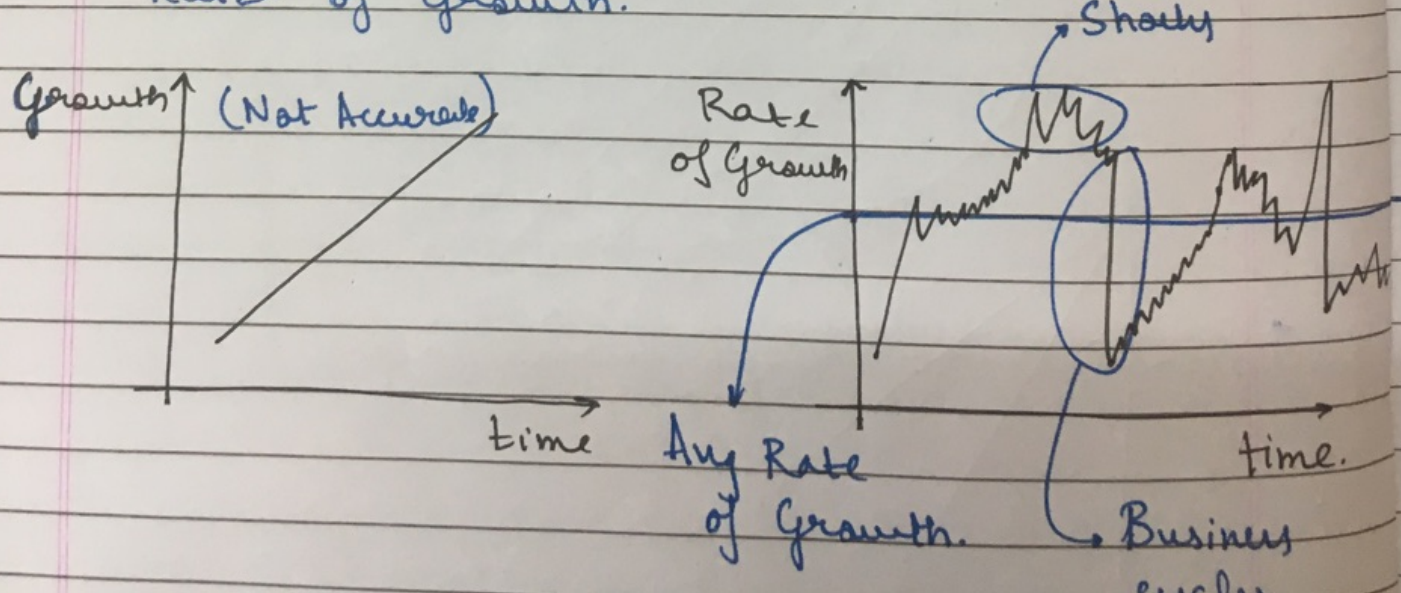
~~Chap 23 : Cost of Fixing~~

Macroeconomics

→ Study of the economy as a whole. Changes that effect many firms & households at once.

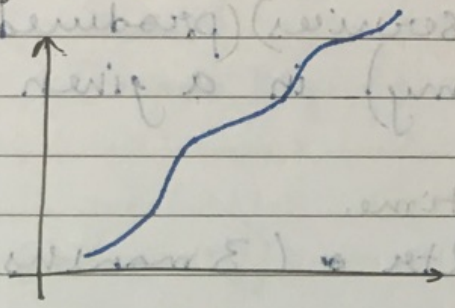
Economy's Income

→ Measures: (of National Income)
- GDP : Gross Domestic Product.
- Others
- Rates of Growth.



Shocks → +ve
Shocks → -ve

→ Accurate GDP Vs time (From Rate of Gth).



(Business cycles only)

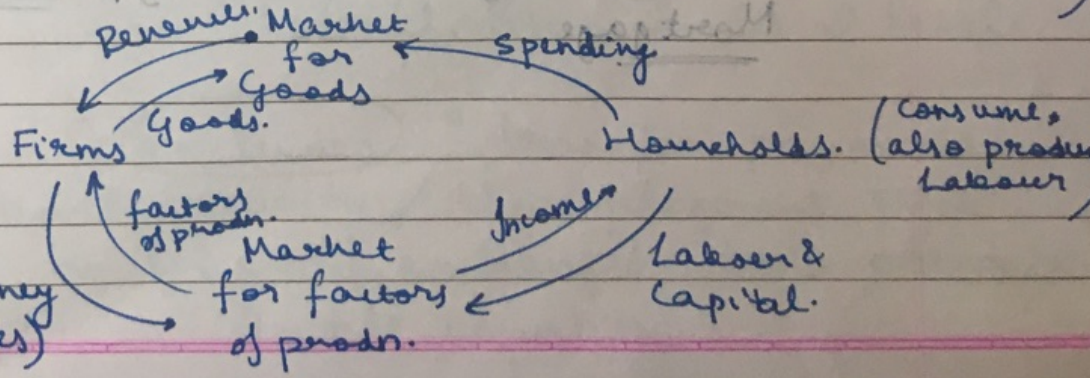
→ Time horizon in Macroeconomics

- Behaviour of prices is different in short run and long run.
- In the (short run) → Keynisian Mac. prices are "sticky"
- In the (long run) → classical Mac. " " flexible.

Economy's Expenditure

→ For an economy as a whole income = expenditure.

→ Circular flow Diagram* (Banks, Fin. Inst., savings and few others are exc.)



GDP ($Y = C + I + G + NX$)

cons. invest. Gov. exp. Net. exp.

→ Value of whatever gets produced in the economy.

GDP: (1 Total) (2 market value) (3 of all) (4 final) (5 goods and services) (6 produced) in/over within a country (economy) in a given period of time.

→ Period of time.
Minimum Qtr (3 months)

→ What is not included in GDP
- Exclude items produced and consumed at home ex home meals.
- Illegal Black markets.

Components of GDP

1) Consumption (C): (Consumption by households)

→ • Spending by households on goods and services with the exception of purchases of new housing (Rent may be included)

→ Consumption includes Rental value (Imputed rent: if they were renting) Not Mortgage.

→ NX = X − M
exports. → imports

→ Measures of Eco. (Mankiw)
- GDP (Income of Everyone)
- Inflation
- Unemployment rate
- Spending at stores (Retail sales)
- Trade Deficit.

2) Investment (I)

- Total spending on goods that will be used in the future to produce goods.
- Includes
  - → Capital Equip.
  - → Structures (factor.)
  - → Inventories (Goods produced but not yelled sold)
- Does not Include "Non Real" Stocks & Bonds

3) Gouerment Purchases (G)

→ Spending by gouerment on G&S at Federal, State & Local levels.

→ G excludes "transfer payments". Social Security / Unemployment since no G&S are exchanged, this prevents Double counting.

4) NX (Net Exports)
= exports - Imports:

- Foreign spending on home G&S
- Imports are portions of C, I, G hence excluded to prevent double counting.

Examples

→ How much is GDP & its comp. affected if at all.

(A) C ↑ by $200, GDP ↑ by $200

(B) I ↑ by $1800, ΔGDP = 0, NX ↓ $1800

(C) ΔI = 0 (I ↑ 1200, I ↓ 1200 since 1200 from Inventory)
→ ΔGDP = 0

(D) I ↑ by $30 million, C ↑ $470 million
GDP ↑ $500 million.

Real Vs Nominal GDP

→ Inflation distorts GDP

GDP

Nominal	Real
• Values at current prices, does not a/c for Inflation	• Values o/p at the prices of a base year. • Corrected for Inflation.

GDP Deflator

→ Measure of the overall level ~~level~~ of prices

→ GDP defl. = $100 \times \frac{\text{Nominal GDP}}{\text{Real GDP}}$

→ Base year is a parameter.

→ Base year typically change every 10 yr.

1961-1970 → 1960

1971-1980 → 1970

→ Inflation rate = % y2y change in GDP defl.

Ex

base year

2002: $100 \times (6000/6000) = 100.0$

2003: $100 \times (8250/7200) = 114.6$

Inflation → 14.6%

Chapter 24

→ Cost of living.

→ CPI (Consumer Price Index)

- Measures the typical consumer's cost of living.

ex DA (Dearness allowance) is calculated from CPI

→ DA is component of Salary that adjusts for Purchasing power as Prices ↑

CPI Calculation

Steps

1) Fix the "basket"
What items does a typical consumer purchase

India: Central Statistical org. (CSO)
typical, as defined by CSO

2) ~~Use prices~~ Find prices.

3) Calculate total cost.

4) Choose a base year to compute CPI

$$CPI = 100 \times \frac{\text{Cost of basket in current yr.}}{\text{Cost in base yr.}}$$

5) Inflation ~~rate~~

(for two successive years that are the same base year)

$$\text{Inflation} = \frac{\Delta CPI}{CPI_{\text{last yr.}}} \times 100$$

→ base years.

	Mangoes	text books
Q→ 2004	10	50
2005	10	60
2006	12	60

A) Basket in 2004?

B) CPI in 2005?

C) Inflation rate 2005-6? (Ans 5%)

~~CPI~~ / ~~food~~ =

Problems with CPI

1) Substitution bias
- Some prices rise faster
- Consumers substitute towards goods whose P↓
- CPI misses this & overstates cost of living.

ex

		Price	Before	After
Basket	Food	Wheat ↑	5kg	3kg
		Rice ≈	5kg	7kg

CPI uses Actual.

2) Introduction of new Goods.

→ Variety ↑
→ This allows consumers to buy things that more closely meet their needs.
→ → Again CPI over estimates costs of living.

ex Milk packet sizes
→ buy smaller packets for exact amount required.

3) Increase in Quality of Goods.

ex 1 Rs.1500 Sweater Vs 2 Rs.1000 Sweater!

CPI Vs GDP Deflator

→ Imported consumer goods
- CPI ✓
- GDP Def ∝ (M gets added in C but subtracted in NX)

→ Capital Goods
- CPI ∝ (Not consumed by the consumer)
- GDP Def ✓ (If produced domestically)

→ The Basket

- CPI → Fixed Basket
- GDP → Basket of Currently prod. Goods & Services.

Q

A. CPI ↑, GDP Def ↑ but CPI ↑ more since Tea is an important component of CPI but a minuscule component of GDP

B. GDP Def ↑ CPI (No change, at least immediately)

C. CPI ↑ but GDP Def (No change ∵ Imported)

Correcting Variables for Inflation

- DIY example

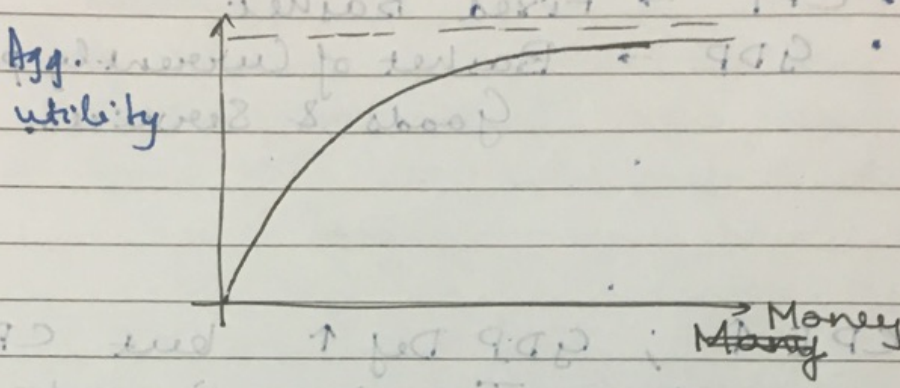
→ Real and Nominal Interest Rates

Real Interest Rate = Nominal Interest Rate − Inflation

→ Tells us how much extra "purchasing power"

Mankiw Chap 25

Production & Growth



Productivity

→ Y → Real GDP
L → Labour.

∴ → Productivity of labour = $\frac{Y}{L}$

1) → K → Physical Capital
Productivity is higher when the average worker has more capital,

$\frac{Y}{L} \uparrow$ if $\frac{K}{L} \uparrow$

2) → H → Human Capital
Knowledge & skills through edu., training and experience.

$\frac{Y}{L} \uparrow$ if $\frac{H}{L} \uparrow$

3) Natural Resources (N) : Land, Mineral deposits

As $\frac{Y}{L} \uparrow$ if $\frac{N}{L} \uparrow$

Tech. Knowledge

→ Understanding of the best way to produce G & S (Any advance that ↑ Productivity)

ex Henry Ford Assembly Line.

** Tech. Knowledge is Different from Human Capital
- Tech. Knowledge → Open Source info. about better process
- Human Capital → effort put in by people.

Prodn. Func.

→ $Y = A \times F(L, K, H, N)$

A → Level of technology, allows higher prodn. from any given comb. of Inputs.

Returns to Scale

→ Const. returns to Scale.

$2Y = A \times F(2L, 2K, 2H, 2N)$

→ Ex. : $Y = F(K, L)$

ex $Y = \alpha K + \beta L$

$Y = K^{1/2} L^{1/2}$ $(K^a L^b,\ a+b=1)$

General cobb Douglas function.

$a+b>1$ ⇒ ↑ returns to scale.

Saving & Investment

→ Reducing Consumption ⇒ ↑ Saving

Chap 26

- Saving, Investment & the Financial Sys.

Financial System

→ Help match b/w savings of one & investment of another.

Savings ⟷ Investment
↳ happens directly & Indirectly.

Savings ≈ Supply of Funds
Investment ≈ Demand of Funds

Directly → Fin Mkt → Bond Mkt / Stock Mkt
→ Equity / Stocks
• Partial ownership.
→ Bonds / ex treasury bonds.
• Certificate of Indebtedness
• Pay back after fixed time.
• Can sell / deal in bonds even before maturity.

→ Real Investment is buying Capital.
→ Invest here means: parking savings not Investment in Macro sense.

Indirect
Financial Intermediates (Institutions which form Indirect funds to borrow)
→ Banks.
→ Mutual Funds: Sell shares to the public and use proceeds to buy portfolios of stocks & bonds.
→ Diversify risks
→ Club together stocks into single units hedging risk.

Savings

Private Saving

→ Household Income − (consump + tax)

$= (Y - T - C)$ → consumption

tax

Public Saving

Tax Revenue − Gov. Spend.

$= (T - G)$

National Saving

Pri. + Pub.

→ Portion of Nat. Income not used for cons./ Ex. Gov spend

$= Y - C - G$

Saving & Investment

$Y = C + I + G + NX$

→ Ignore NX − (Closed Economy)

$Y = C + I + G$

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

= National saving

→ In a closed economy

Investment = National Saving.

Budget Deficits & Surpluses

→ Budget Surplus.

- Excess of tax Revenue over G

= T − G = public saving

→ Budget Deficit (India!)

= Shortfall of tax revenue.

= G − T = − (pub. saving)

Ex Y = 10 T$

C = 6.5 T$

G = 2 T$

G − T = 0.3 T$

T = 1.7 T$ ✓

T − G = Pub. saving = −0.3 T$ ✓

private saving = Y − T − C

= 10 T − 1.7 T − 6.5 T

= 1.8 T$ ✓

Nat. saving = 1.8 + −0.3 = 1.5 T$ ✓

Investment = 1.5 T$ (Closed Eco.)

→ Continued

If $T \to 1$ $T - 0.2$ level

$\Rightarrow T = 1.5\,T\$$

Case 1: Consumers save full proceeds of Tax cut.

Pub saving = $-0.5\,T\$$

Pri. saving = $-2.0\,T\$$

Nat. saving = $1.5\,T\$$ = Investment

** Case 2: Save $\frac{1}{4}$ Tax cut & spend other $\frac{3}{4}$ spent ↳ C

Nat Saving ↓ 0.15 ←

Pub saving = $-0.5\,T\$$ ↓ 0.2

Priv saving = ↑ $0.05\,T\$$

$Y^\circ = C^\circ - T^\circ = 1.8$

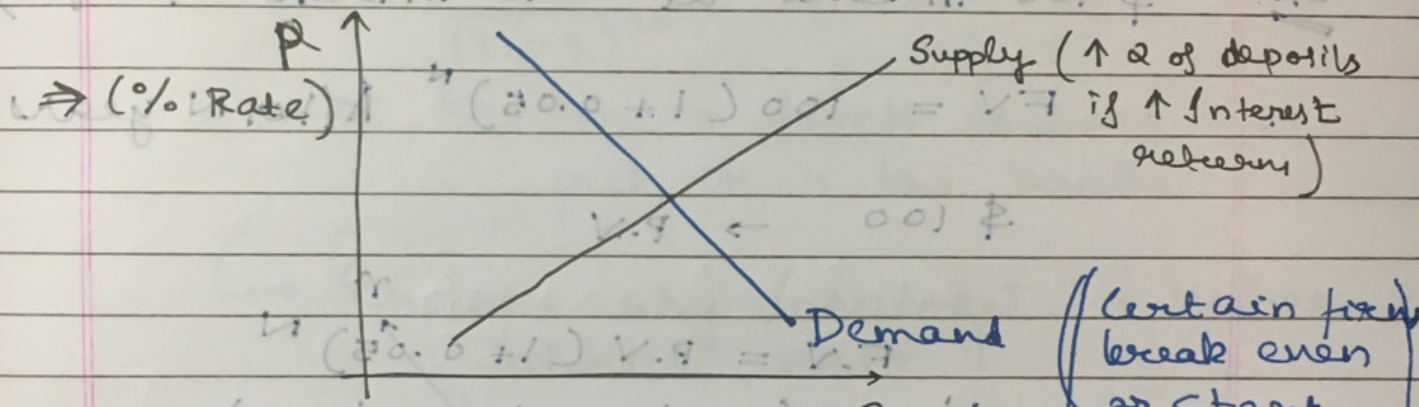
Since No prodn change GDP is remain constant

⇒ Nat. Investments ↓ 0.15

Market for Loanable Funds

→ Supply & Demand in the financial system

Assumptions: Single financial Mkt.
→ All savers deposit here.
→ All borrowers take from here.
→ Single Interest rate (Both Interest on saving & loan int. are same)



(Certain firms break even or start becoming profitable at ↓ %)

★ Chap 26: Do Not do Gov. Policy from Mankiw (→ later half) ★

Chap 27 Basic Tools of Finance

Present Value

→ To compare sums of money from different times

→ Present value of a future sum

ex $100 in bank at 5% interest (per year)

$FV = 100(1+0.05)^N$ After N years

$100 → P.V

$F.V = P.V(1+0.05)^N$ (r)

r → Nominal rate of interest (Includes Inflation (= Inf. + foregoing i

$$P.V = \frac{F.V}{(1+r)^N}$$

Ex Suppose r = 0.06

& We invest 100 m$ to build a factory that will yield $200m in 10 yrs

Should we invest in factory or financial system.

P.V of $200m 10 years from now

$$= \frac{200m}{(1.06)^{10}} = \$112m$$

$112m $100m

⇒ PV of $200 > P.V of $100

⇒ Better to Invest in factory.

Ex In previous: r = 0.09
Now?

$$\frac{200m}{(1.09)^{10}} = \$84\ m$$

⇒ Better to ditch factory & put it in the bank.

↳ Explains why Investment ↓ when Interest rate ↑

(e.g. my incentive)

Compounding

→ Accumulation of a sum of money where interest earned adds to principle.

The Rule of 70

→ If a variable grows at a rate of x percent per annum then it will double in $\frac{70}{x}$ years.

per year. years
rt

$P = P_0 e^{rt}$ $\ln 2 = (rt)$

$t_{\text{Doubling}} = \frac{\ln 2}{r}$

$$P = P_0 \left(1 + \frac{r}{n}\right)^{nt}$$

$$P = P_0 (1 + r)^t$$

$$\ln P_0 \cdot \ln 2 + \ln P$$
$$= \ln P + tr$$

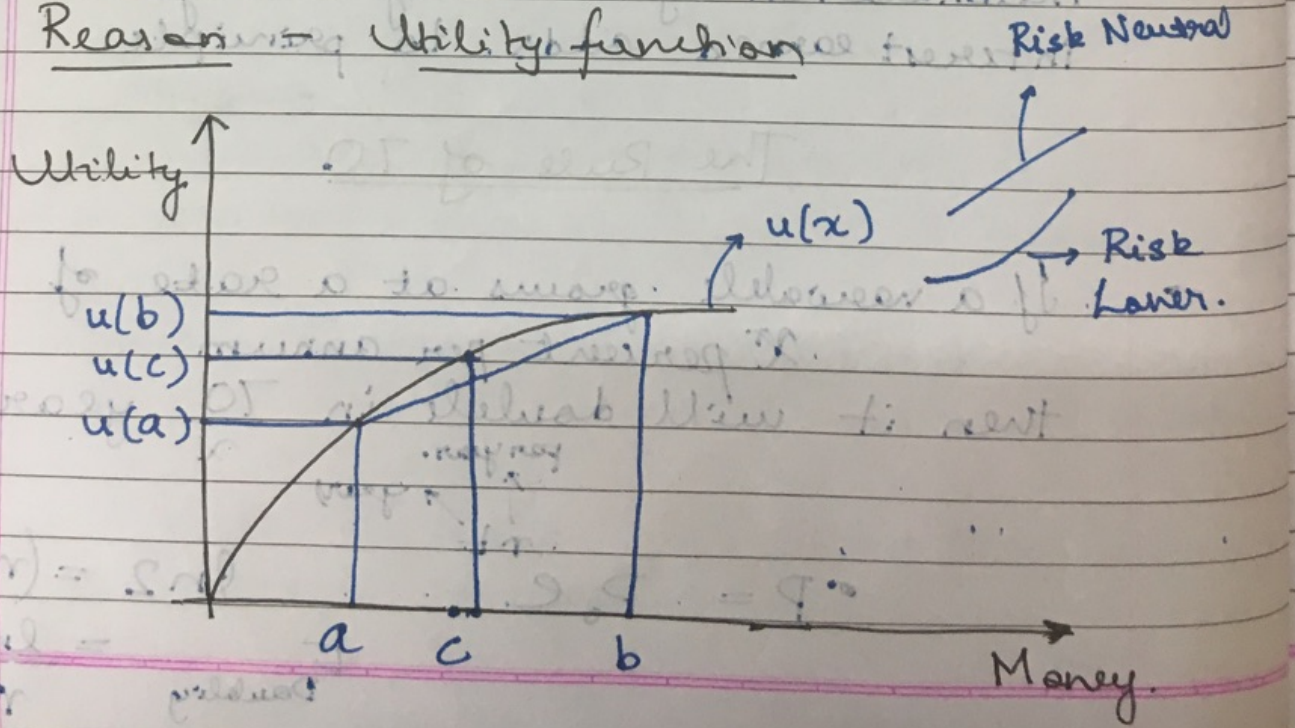
$$\underline{\ln 2 = tr}$$

Risk Aversion

→ Dislike uncertainity (Most people)

→ The pain of loosing x $ is > pleasure of gaining x $

Reason = Utility function



$\exists\ \lambda \in [0,1]$

s.t $c = \lambda a + (1-\lambda) b$

$$u(\lambda a + (1-\lambda) b) > \lambda u(a) + (1-\lambda) u(b)$$

→ This kind of money utility function captures risk aversion.

→ Certainity Equivalent

ex $\$600 \rightarrow p = 1$

Vs

$\$300, p = \frac{1}{2}$ and $\$900, p = \frac{1}{2}$

→ Any risk averse person would prefer the expectation value (called certainity equivalent) of the Gamble over the actual gamble.

i.e Any risk averse per. will value $600 over the above gamble.

Insurance (Risk Management)

→ A person facing a risk pays a fee to an insurance company, which accepts part/all of the risk.

Problems in Insurance Mkts

1) Adverse selection:
A high risk person benefits more from insurance, so they are likely to purchase.

- This is due to "Asymmetric Info."
  Insurees have some info. that Insurance companies don't.

  Soln. : Increase Insur. premium.

2) Moral hazard:

→ People with insurance have ↓ Incentive to avoid risky behaviors.

- Soln. ↑ Premium.

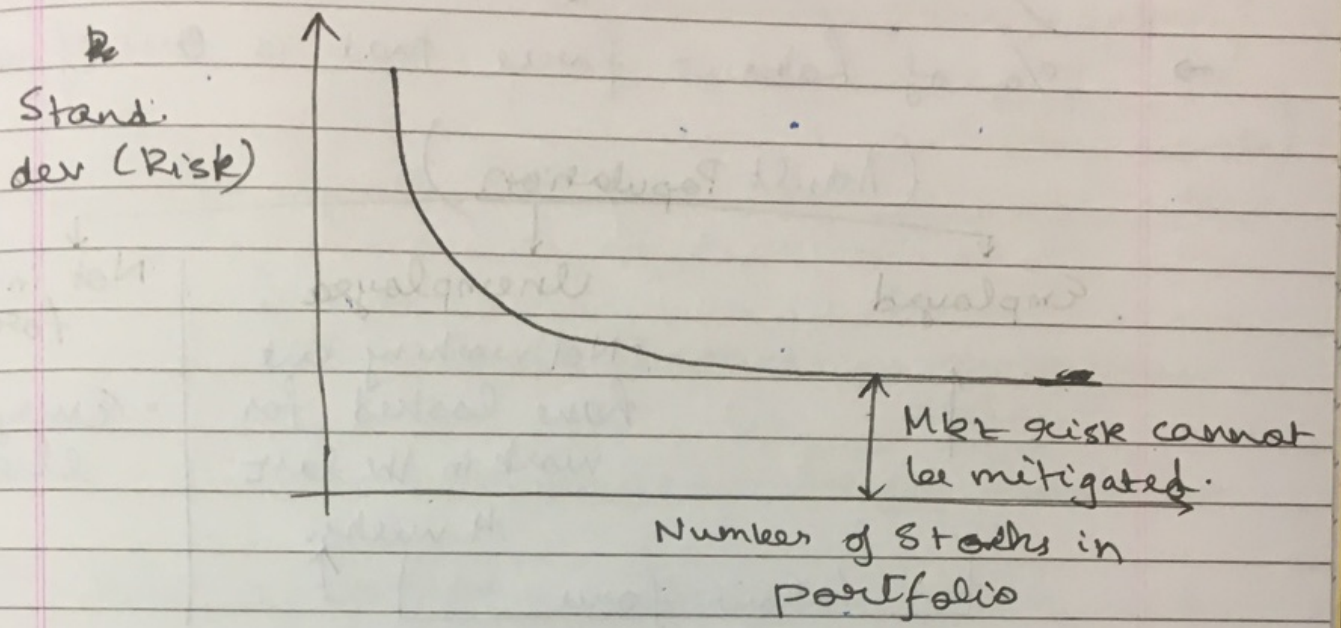
Measuring Risk

→ Measured using Standard Deviation.

Reducing Risk by Diversification

→ Replace a single risk with a large no. of smaller unrelated risk.

→ Diversification can reduce from specific risk but cannot reduce Mkt risk. (ex Recession, War)



→ Riskier assets pay a higher return on avg, to compensate for higher risk.

Asset Valuation

price of the shares/Stocks Vs their actual value.

price > value overvalued
price < value undervalued
price = value fairly valued

price → public
value → requires insight.

Q→ AT&T Stocks.

Value of $ at every year end

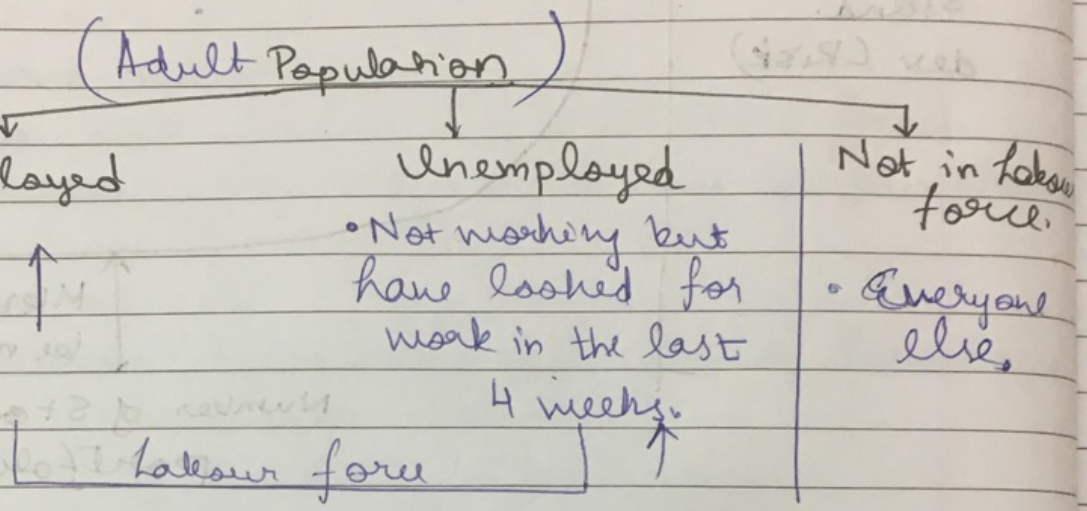
$$\frac{1}{(1.1)} + \frac{1}{(1.1)^2} + \frac{1}{(1.1)^3} = \cancel{3\$}$$

$$+ \frac{30}{(1.1)^3} \rightarrow \Sigma = \$25.03$$

↓
True value of AT&T stock.

Mankiw
Chap 28) # Unemployment

→ % of labour force that is out of work.



→ Labour force participation rate

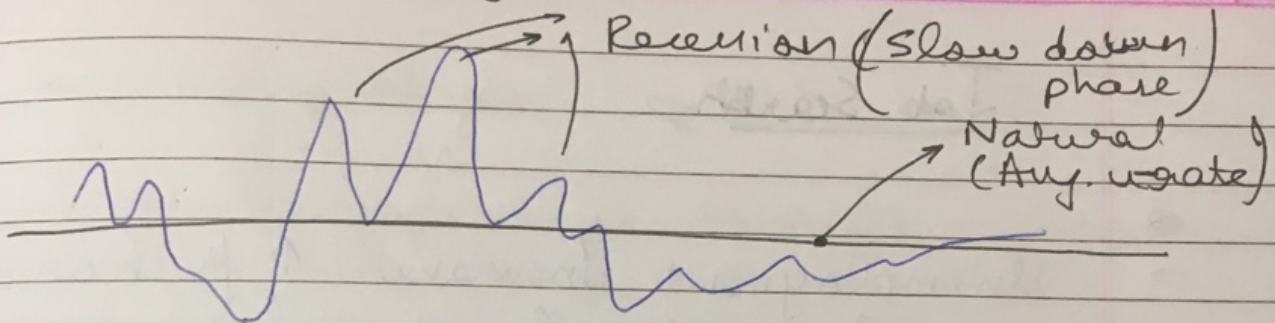
$$100 \times \frac{\text{Labour force}}{\text{Adult population}}$$

→ Indian Statistics Examples

Problems with u-Rate

→ Excludes discouraged workers.
→ Does not tell us about people working part time ∴ full time employment is not available.
→ Underemployment : Disguised unemployment
→ Lying about employment to get Social Security.

U-Rate: Cyclical Vs Natural



Cyclical: Depends on the business cycles.

↳ ex Recession

→ Why a constant natural u-rate, why not 0 any?

Reason:

1) Frictional unemployment
   - Occurs when workers spend time searching for the right job.
   - Short term.

2) Structural.
   - ~~to~~ ↓ < Jobs, ↑ > People

→ Frictional unemployment.

Job Search

→ Process of matching workers with app. jobs.

Sectoral Shifts

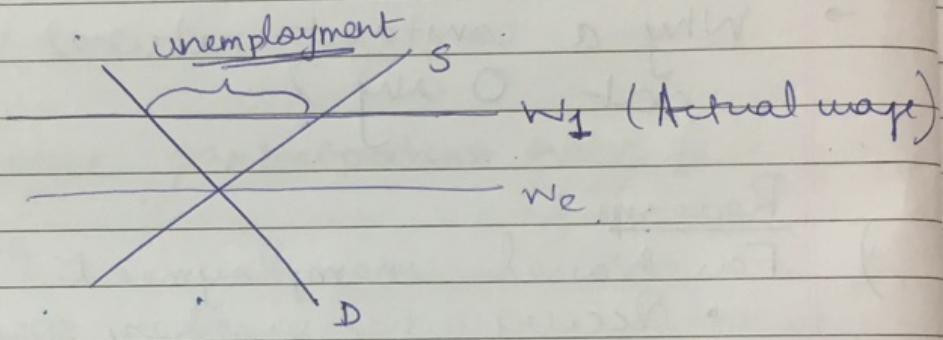
→ ex Shift to ~~IT~~ IT
   → Causes ppl. to lose jobs.

Cause: ~~Fri~~

Job Search

→ Unemployment Insurance ↑ frictional unemployment, · Good in long terms because of perfect match.

· Structural Unemployment



→ Labour Unions

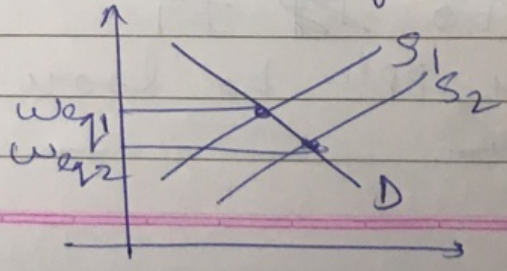
- Unions raise the wages above eqm. value, causes unemployment.
- "Insiders" are better off, "Outsiders" are worse off.

→ Unions, Good / Bad?

Bad

→ causes unemployment

→ ↓ wages in ununionised mkts.



When ppl. who can't find jobs in union mkt go to eqm market & (wages ↓

→ Efficiency wages:

→ Higher than eq: wages to boost worker productivity.

→ Pros of efficiency wages in slides

Quiz

Thur 26th Oct 11:35 (Online type)

Chap 29: The Monetary System

→ We need money.

→ Barter system has the problem of double coincidence of wants.

Other functions of Money:

→ Medium of exchange.

→ Unit of account (Uniform valuation)

→ Store of value: Transfer purchasing power from present to future.

Money

Commodity Money	Fiat Money
• Commodity with Intrinsic value	• Have value because of Govt. Decree.
ex Gold coins	ex Currency

→ Money Supply / Stock : Quantity of Money in the eco.

Fiat → Currency : Paper / Physical.

Fiat → Demand Dep. : Withdraw anytime

Bank Reserves

→ Follow fractional reserve Bank. Sys. i.e. they keep a fraction of deposits as reserves. rest → loans.

→ RBI establishes min reserve req.

→ Minimum (Reserve Ratio) → R

→ Bank T-account

Assets	Liabilities
Reserves	Deposits
Loans	

→ Money creation via bank Deposits

- If 100 $ in economy, with Reserve Ratio = 0.1
- Then what is the maximum money supply with this 100 $ cash.

$$100 + 100 \times 0.9 + 100 \times (0.9)^2 + \dots\dots$$

$$\frac{a}{1-r} = \frac{100}{1-0.9} = 1000\ \$$$

- In General $\frac{\text{Real Money}}{\text{Reserve Ratio}}$

Q→ $R = 0.2$: Diff b/w Increase in money supply & just Max. money supply.

* Not in Slides *

1) Open Mkt operations:
Buying and selling of Govt bonds or securities by the central bank in order to expand / contract the money supply in the economy.

2) Govt. bond / security:
Bond issued by a national govt. with a promise to pay periodic interest payments and repay the face value on the maturity date.

Purposes

1) Support Govt. Spending, i.e to finance Budget Deficits.

2) To control the money supply in the economy.

Chap 30: Money Growth & Inflation

→ Relation b/w Money supply and Inflation

→ If P = CPI / GDP Deflator (Price Level)

→ Then $\frac{1}{P}$ is the value of 1 $ measured in Goods

→ Quantity of Money determines the value of Money (∴ Prices.)

→ As Prices in Economy ↑, value of money ↓

Quantity Theory of Money

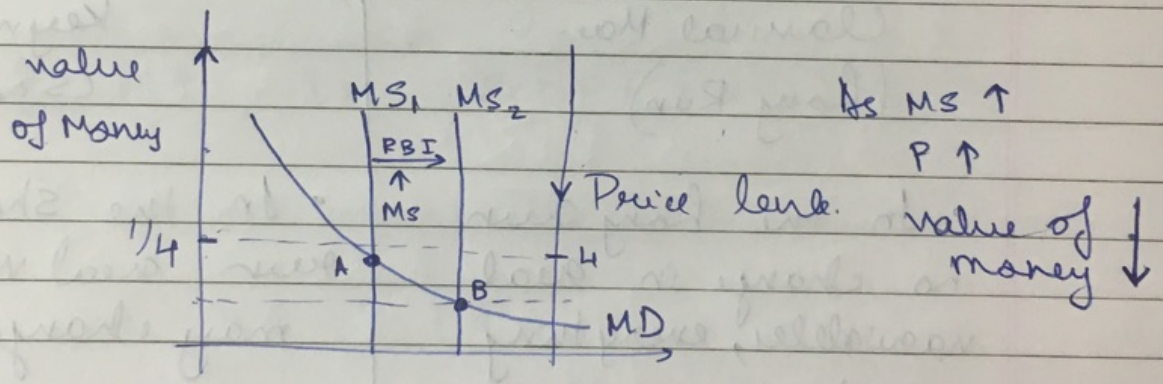
→ Asserts that the qty of money determines the value of money.

→ Money Supply (MS)

- Money supply in economy determined by RBI

→ Money Demand (MD)

- Qty of wealth people want to hold in liquid form.
- MD is ~~-ve ly related~~ +vely related to Price level (P)
- MD is -vely related to value of Money.



→ Real vs. Nominal variables

Real : Price in terms of Physical Commodity / "relative prices"

Nominal : Price in terms of $

Classical Dichotomy

Independent
- → Nominal Prices (Absolute) change with M.S
- → Real Prices (Relative) do not change with M.S

→ Monetary Neutrality

• Proposition that changes in the money supply only effect Nominal variables and not real variables.

→ Macroeconomics

Classical Mac. (Long Run)	Keynesian Mac. (Short Run)
• In the long run no change in real variables, everything adjusts	• In the short run real variables may change.

Velocity of Money

$$V = \frac{(P \times Y)}{M}$$

→ Dot product!

P → Price level ↑
Y → GDP
P, Y → Vectors
M → Money Supply.

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Money velocity = $\frac{\$10 \times 3000 \text{ pizzas}}{\$\ 10{,}000}$

→ 30,000 $ worth of Pizzas must change hands 3 times on average for a money supply of $ 10,000

If M↑, and P is same (Short run) then velocity ↓

→ $\boxed{M \times V = P \times Y}$ → Money qty eqn.

→ V is constant, Positive relation b/w M (Money Supply) and P×Y

→ If M↑, the GDP (P×Y) ↑

→ Y is determined by tech. level (Const.)

→ ⇒ M↑ ⇔ P↑

Q→ Y = 800 units of corn
MS = 2000 $ P = 5 $

$V = \frac{800 \times 5}{2000} = 2$

$2 \times 2100 = P \times 800$

Inflation = $\frac{\$0.25}{5} = 5\%$

$P = \frac{\$4200}{800} = \$5.25$

c

2100×2 (fixed) (fixed) $= \$4200$

$\$4200 = P \times 824$

$P = \frac{\$4200}{824}$ (Prices go up less)

1050

206

(Inflation is less) $\rightarrow \frac{0.1}{5} = 2\%$

$\frac{525}{103} = 5.1$

Hyper-Inflation

→ Inflation exceeding 50% per month.

Inflation tax

→ Inflation is like a tax.

Fisher Effect

Nominal Rate = Real Rate + Inflation rate

Costs of Inflation

→ Shoeleather costs: Resources wasted when prices change.

→ Menu Costs: Costs associated with updating Prices (ex Restaurant Menu's)

→ Tax Distortions

$1000

case 1: inf = 0%, nom. int. rate = 10%.

2: inf = 10%, " " = 20%.

Tax 25%

(a) Real value of Deposit goes up the same (Same Real rate).

(b) case 1: $100 Income → $25 tax

$200 Income → $50 tax.

↑ tax.

(c) After tax real Rate.

$75

$150

30-10-12

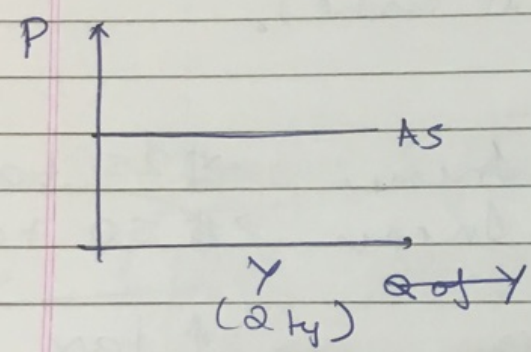
Keynesian Mac.

Ref. : Dornbusch and Fischer

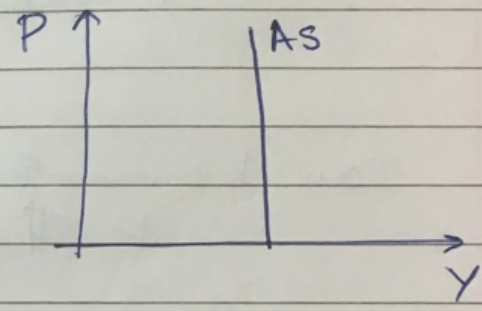
→ Difference b/w keynesian macro. & classical macro.

- Time horizon is different.
- Changes dynamics.

Keynesian (Short run)

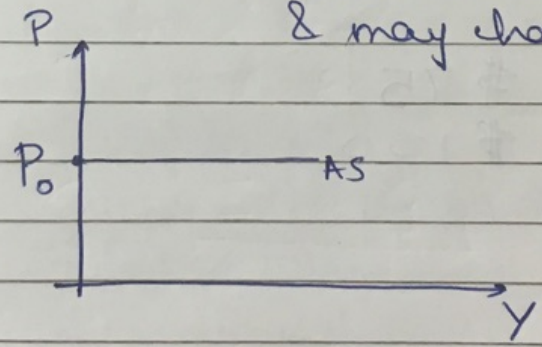


Long Run



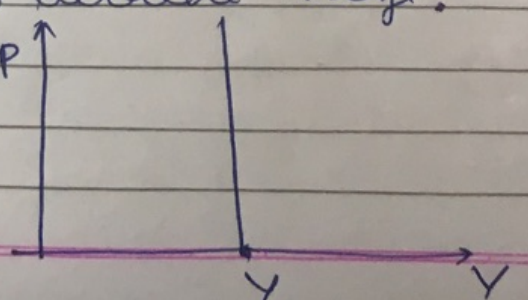
- Not super long run.
- "full employment" level determines o/p & may change in ↑ long run.

- **Keynesian**



→ Because there is unemployment, firms can obtain as much labour as they want at the prevalent wage.

Long-Run



→ Based on the assumption that labour mkt is always in equilibrium at the full employment level. Since labour force is fully employed
∴ Y cannot ↑ even if P ↑

→ Labour Mkt equilibrium underlying vertical schedule is maintained ~~via~~ by speedy adjustments in nominal wage.

ex
- Economy is in Equilibrium, AD shifts to right, i.e at existing price demand goes ↑.
- Firms try to obtain more labour offering higher wages
- But more labour not available.
- Hence Wages ↑, making the firms raise the prices of good but Y (o/p) is const.

→ In the Keynesian model, the central simplific is the ~~so~~ assumption that
1) Prices do not change at all.
2) Firms are willing to sell any amount of o/p at the Given level of prices
3) Hence AS curve is flat.

Relation b/w AD and equilibrium o/p

→ o/p is at the equilibrium level when
qty produced = qty demanded

$$AD = C + I + G + NX$$

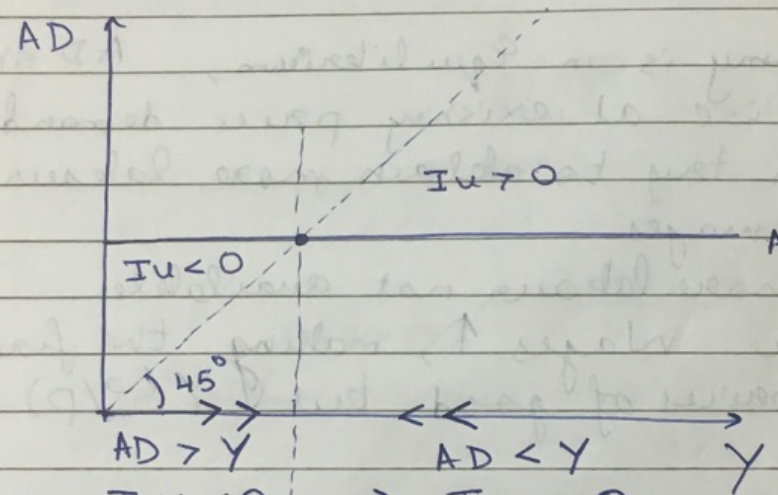
Keynesian AD →

$AD = C + I + G + NX$

↳ Planned expenditure on capital goods

Not P-Y spall

I_U → Unintentional Investment
↳ Unplanned (At eq = 0)



⇒ $I_U < 0$ ⇒ $I_U > 0$

Inventory used up | Inventory build up.

→ $AD = C + I + G + NX$

0 : closed economy

$\bar{I}$ & $\bar{G}$ remain constant

$C = \bar{C} + cY$

$\bar{C}$ ↓ const.

c ↳ marginal propensity to consume

~~Y = C + (T − G)~~

→ $\mathcal{C}$: Increase in C per unit ↑ in Y

$\mathcal{C} \in (0,1)$

- Personal savings (Y includes taxes / or disch taxes forms)

$$S = Y - C$$

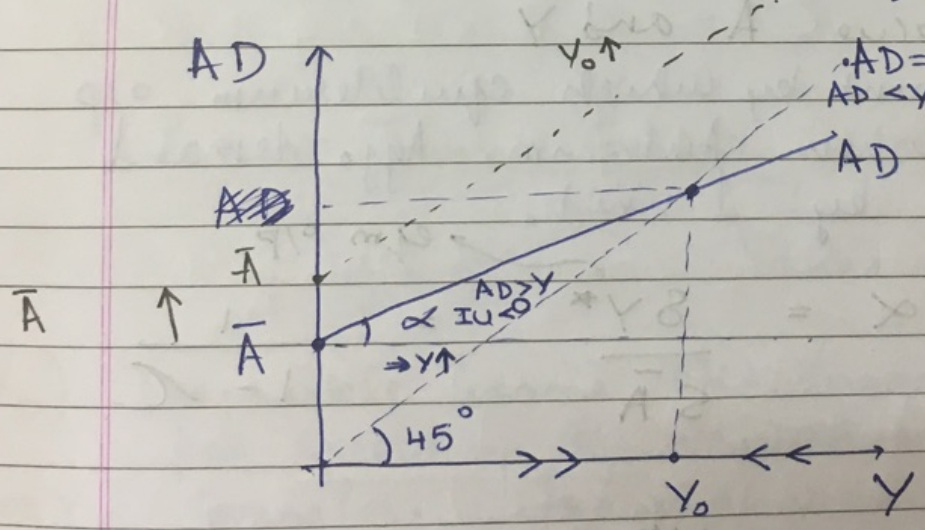
$$S = -\bar{C} + Y(1 - \mathcal{C})$$

↳ marginal propensity to save

$$AD = \bar{C} + \mathcal{C}Y + \bar{I} + \bar{G}$$

$$AD = (\bar{C} + \bar{I} + \bar{G}) + \mathcal{C}Y$$

↳ $\bar{A}$ (const)



→ For $Y < Y_0$, $AD > Y$, ~~and~~ firms inventories are falling $Iu < 0$, ∴ they increase prodn., conversely for $Y > Y_0$, $AD < Y$, $Iu > 0$, Inven. ↑ ⇒ they cut Y.

→ Solving,

$$AD = Y$$

$$Y_0 = \bar{A} + cY_0 \quad \text{(Solving)}$$

$$(1-c)Y_0 = \bar{A}$$

$$Y_0 = \frac{\bar{A}}{1-c}$$

→ Autonomous demand

31-10-17

– Keynes - Multiplier theory

- Keynes introduced it.
- It was a policy related theory which analysed that when Autonomous comp. of expenditures change then by what amount does Y change?

→ R/L btwn $\bar{A}$ and Y

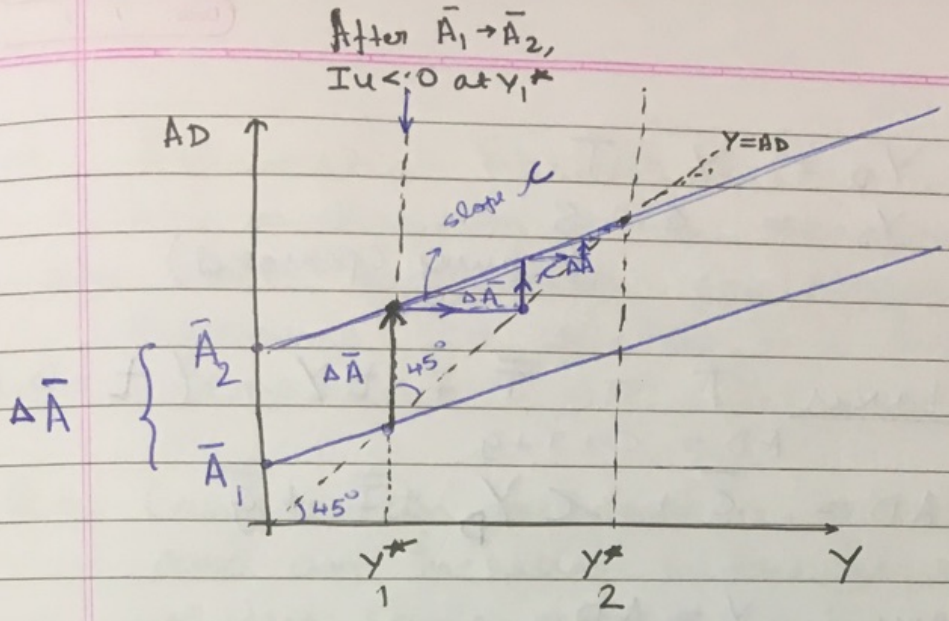
- The amount by which equilibrium o/p changes when Autonom. Agg. demand increases by 1 unit.

$$\alpha = \frac{\delta Y^*}{\delta \bar{A}} = \frac{1}{1-c}$$

(δY^* → eqm o/p)

→ using $Y^* = \bar{A} + cY^*$

(Y_D → Net



→ Initially just after $\bar{A}_1 \to \bar{A}_2$;

$$Y_1^* \to Y_1^* + \Delta\bar{A}$$

then, $Y_1^* + \Delta\bar{A} \times c$ ....

$$\Rightarrow \Delta Y = \frac{\Delta\bar{A}}{1-c}$$ (Infinite GP)

Govt. Sector

$G = \bar{G}$ Taxes.

(Y_D) Disposable Income: Net Income available for spending by households after receiving transfers from and paying taxes to the Govt.

→ Nett Y

Nett taxes = T = taxes − transfers

$$Y_D = Y - T$$

$$Y_D = C + S$$

↳ saving (personal)

Net taxes $T = \bar{T} + tY \quad (t \in (0,1))$

$$AD = C + I + G$$

$$AD = \bar{C} + cY_D + \bar{I} + \bar{G}$$

at equi $Y = AD$

~~$Y_D \; C + S = C + I + G$~~

$$\Rightarrow Y^* = \bar{C} + c(Y^* - \bar{T} - tY^*) + \bar{I} + \bar{G}$$

$$Y^* = \bar{C} - c\bar{T} + \bar{I} + \bar{G} + (c - ct)Y^*$$

$$Y^*[1 - c(1-t)] = \bar{C} - c\bar{T} + \bar{I} + \bar{G}$$

$$= \bar{A}$$

$$\frac{\delta Y^*}{\delta \bar{A}} = \frac{1}{[1 - c(1-t)]}$$

→ Automatic Stabilizer

• Any mechanism in the economy that reduces the amt. by which o/p changes in response to a change in Autonomous demand.

Q→ Consider an increase in transfer payments and an Increase in the Govt. expenditure of the same amt., which will have greater Impact on Y*

1) Budget Surplus: Excess of Governments revenues over its expenditures.

$$BS = TA - \bar{G} - \bar{TR}$$

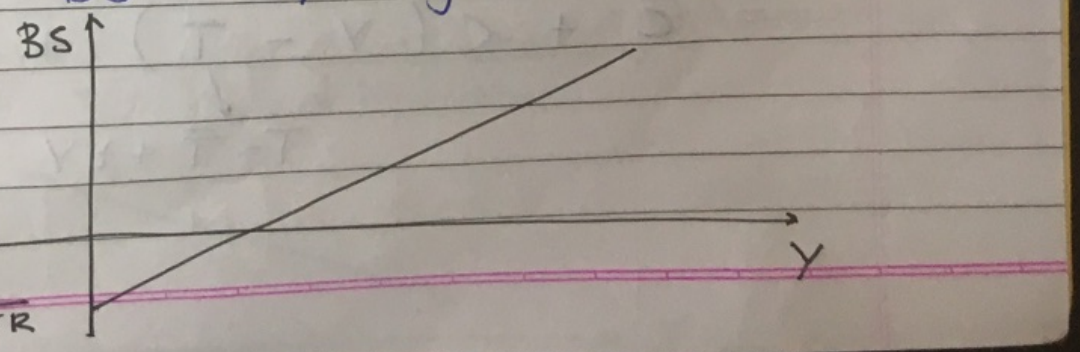
TA → Net taxes; $\bar{TR}$ → transfers

$$BD = -BS$$

BD → deficit

$$TA = tY$$

$$BS = tY - \bar{G} - \bar{TR}$$



2) Full Employment Budget Surplus:

→ Measures budget surplus at full level of employment.

$$BS^* = tY^* - \bar{G} - \bar{TR}$$

→ The Difference b/w the Actual and the full employment levels of the budget surplus is the cyclical comp. of B.S.

(IS Curve) Goods – Mkt Equilibrium

(Investment-savings)

- Shows combinations of Interest rates & levels of o/p such that planned spending = Income

  ↳ AD

$$AD = Y$$

(But with variation in I due to change in ~~Taxes~~ interest rate)

$$= C + I + G$$

$$= \bar{C} + cY_D + \bar{I} - bi + \bar{G}$$

assume $\bar{I} = \bar{I} - bi$

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

$$T = \bar{T} + tY$$

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$$= \underbrace{(\bar{C} - c\bar{T} + \bar{I} + \bar{G})}_{\bar{A}} + c(1-t)Y - bi$$

$$Y = \bar{A} + c(1-t)Y - bi \rightarrow \text{Eqm condition}$$

$$Y(1 - c(1-t)) = \bar{A} - bi$$

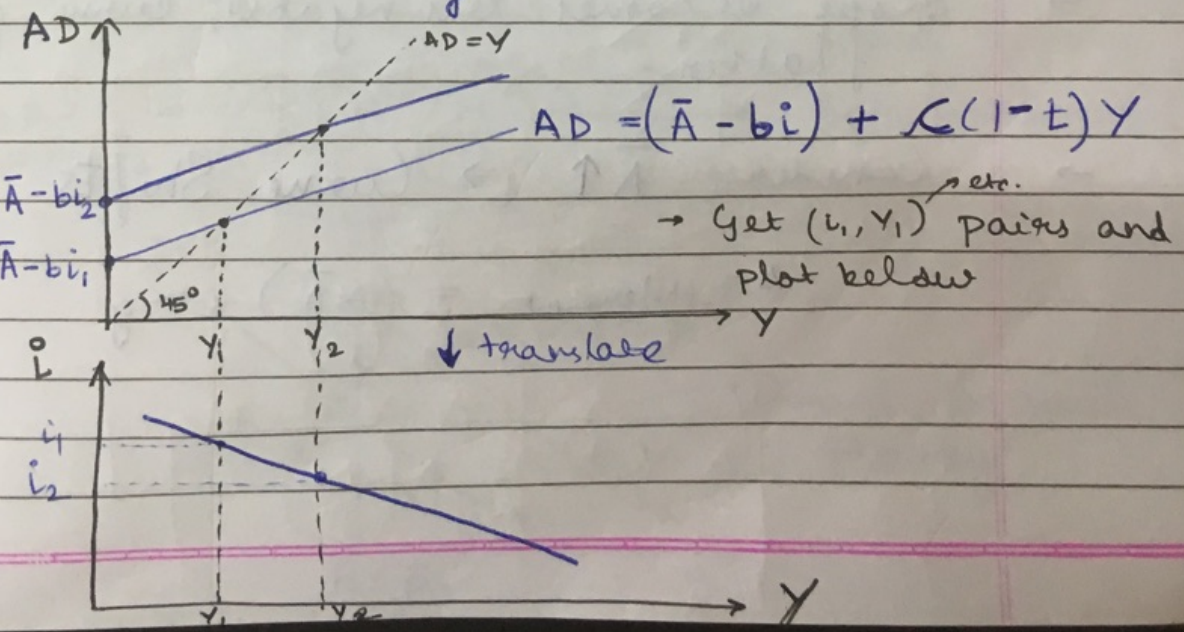
$$Y = \underbrace{\bar{A} - bi}_{\text{Auto. expenditure}} \rightarrow \text{called something.}$$

$$(1 - c(1-t)) \rightarrow \frac{1}{\alpha_g}$$

$c(1-t)$ → Marginal propensity to consume out of total Income

c → just coefficient of Y_D
≡ Marginal propensity to consume out of disp. Income

$$Y = \alpha_g(\bar{A} - bi) \rightarrow \text{Endogenous comp.}$$



$$AD = (\bar{A} - bi) + c(1-t)Y$$

→ Get (i_1, Y_1) etc. pairs and plot below

$$bi = \bar{A} - \frac{Y}{\alpha_g}$$

$$i = \frac{\bar{A}}{b} - \frac{Y}{b\alpha_g}$$

The ~~Autonomous~~ dem.
& ~~Investment~~ d

$$\alpha_g = \frac{1}{1 - c(1-t)} = \frac{1}{1-\bar{c}}$$

→ Consider $\bar{c} \uparrow$ (i.e $c \uparrow$ or $t \downarrow$)

⇒ $1 - \bar{c} \downarrow$

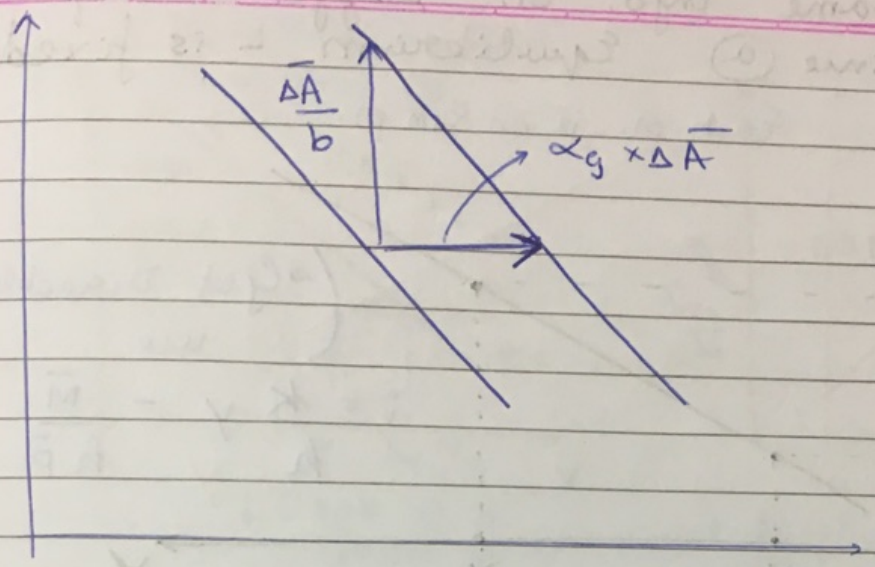
⇒ $\frac{1}{1-\bar{c}} \uparrow = \alpha_g$

⇒ $\frac{1}{\alpha_g} \downarrow$

⇒ Slope becomes less negative, curve gets flatter.

→ Consider $\bar{A} \uparrow$ ⇒ Curve Shifts

Δ x intercept $= (\Delta \bar{A}) \times \alpha_g$



→ All Analysis done bsm Algebra & curves

6.11.17

LM Curve / schedule (Money mkt eqm.)

→ Shows all combinations of interest rate and Income (i and Y) such that demand for real balances = Supply.

- demand for real balances

real Money / Balances

$L = kY - hi$

L → demand for real money.

M → Nominal money supply

P → Price level

M → Nominal money supply (central bank)

P → Price level.

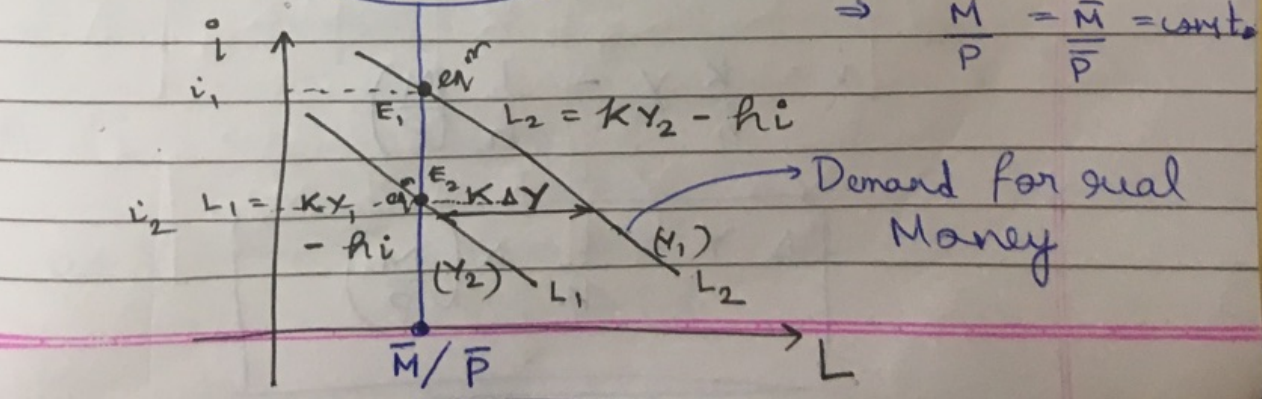
Real Money supply.

$\frac{M}{P}$ → Eqm condition

real money DD

Keynesian

$\Rightarrow \frac{M}{P} = \frac{\bar{M}}{\bar{P}} = \text{const.}$

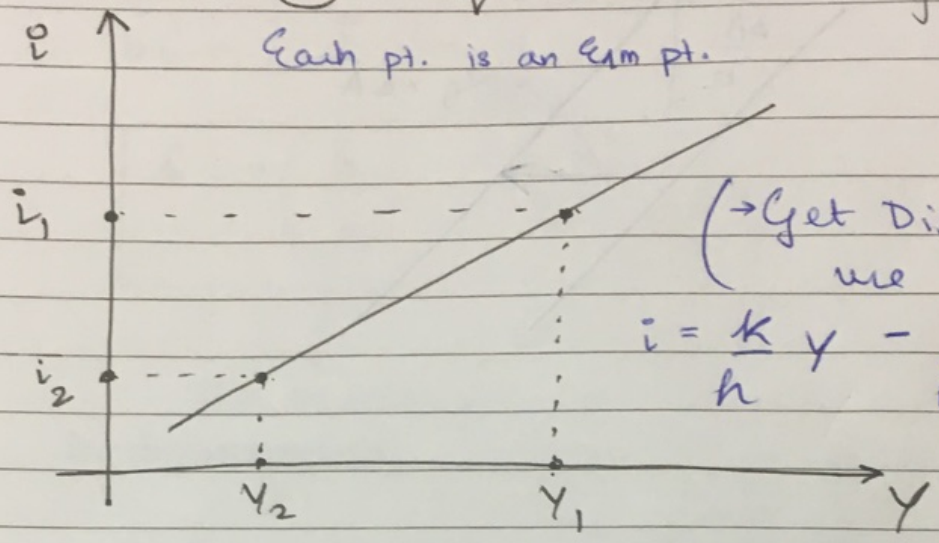


$i_1 > i_2$

$Y_1 > Y_2$

→ Same info. In Different space.

→ Since (a) Equilibrium L is fixed



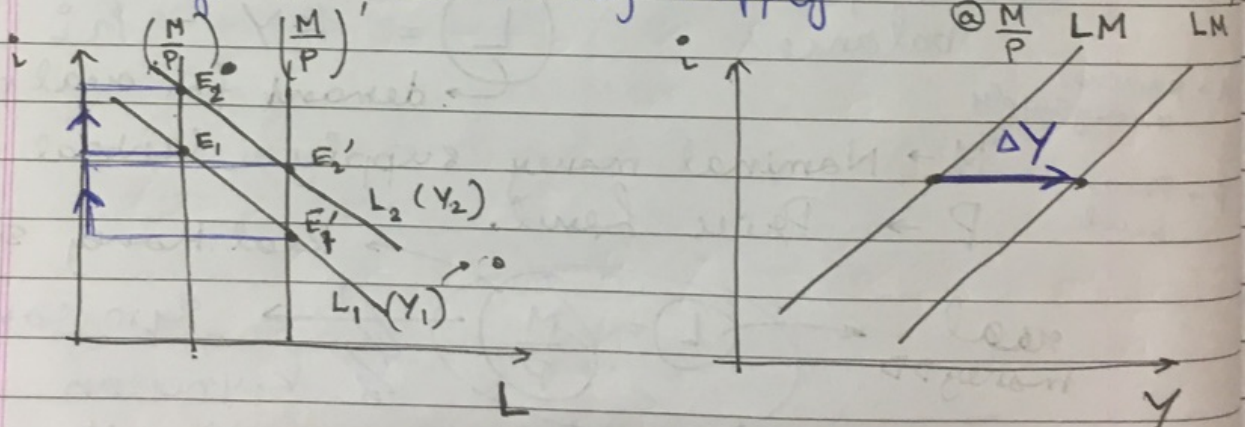
(→ Get Directly or use

$$i = \frac{k}{h} Y - \frac{\bar{M}}{h\bar{P}}$$

$$\frac{M}{P} \quad L_{eq} = \frac{M}{P} = kY - hi$$

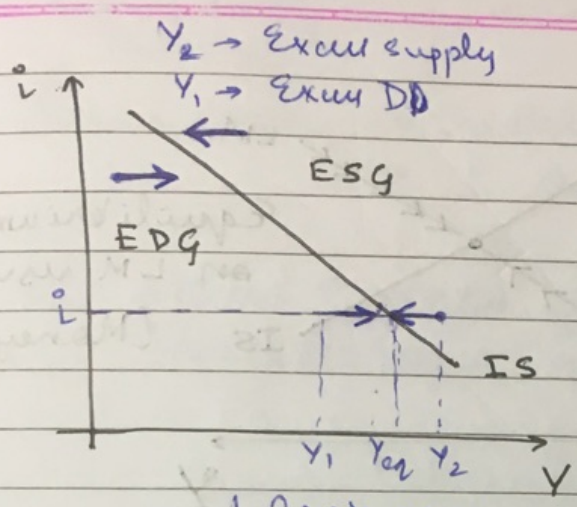
$$\boxed{i = \frac{k}{h} Y - \frac{\bar{M}}{h\bar{P}}}$$

→ Change in Real Money supply

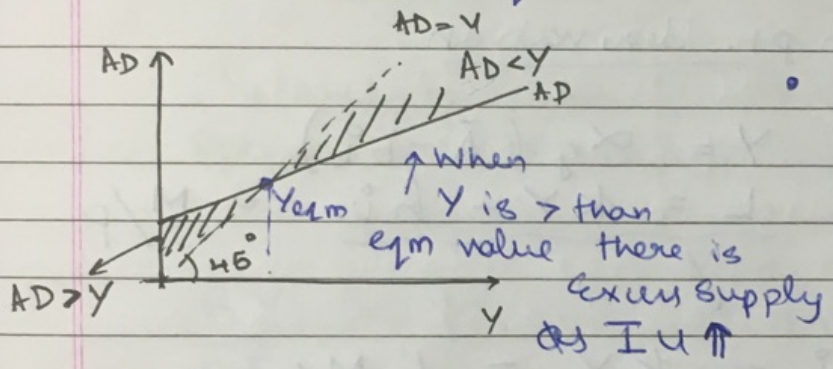


$$i = \frac{k}{h} Y - \frac{1}{h}\left(\frac{M}{P}\right)$$

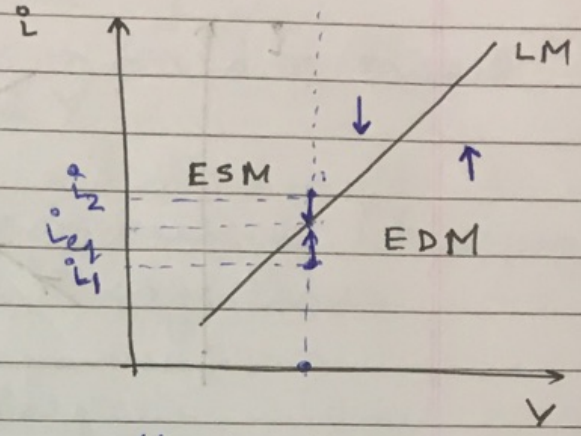
$$\boxed{\Delta Y = \frac{1}{k} \Delta\left(\frac{M}{P}\right)}$$



↓ Look at it from AD-Y eqm.

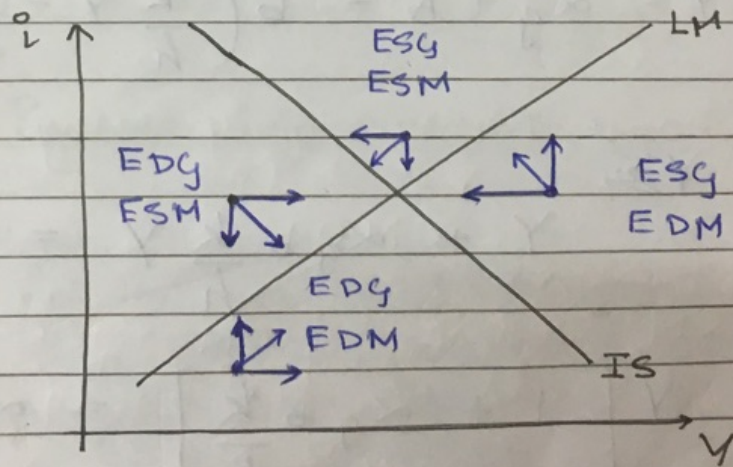


↑ When Y is > than eqm value there is Excess supply as IU ⇑



- If $i_2 > i_{eq}$, deposits ↑ ⇒ MS ↑ ⇒ excess supply
- If $i_1 < i_{eq}$, deposits ↓ People → DD money to hold as liquid.

→ **Combined** (Revised on 7.11)



At i ↔ EDG ⇒ Y ↑
ESG ⇒ Y ↓

at Y ↔ EDM ⇒ i ↑
ESM ⇒ i ↓

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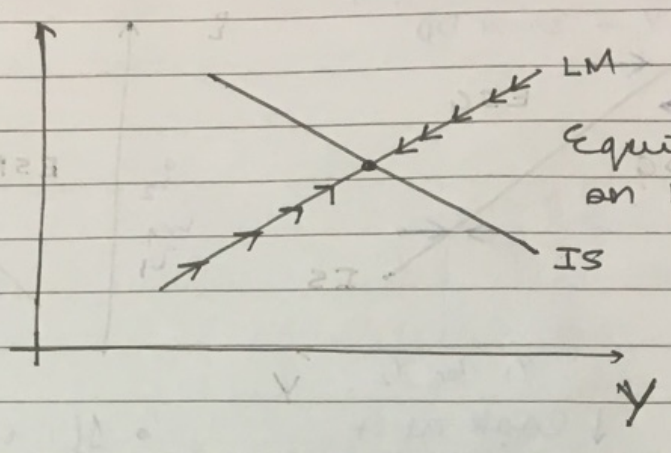

Equilibrium lies on LM usually (Money Mkt)

→ Equilibrium pt. derivation

$$IS \rightarrow \quad Y = \alpha_g (\bar{A} - b\dot{i})$$

$$LM \rightarrow \quad L = kY - h\dot{i} = M/P$$

$$\dot{i} = \frac{k}{h} Y - \frac{1}{h} M/P$$

$$Y = \alpha_g \left(\bar{A} - b\left(\frac{k}{h} Y - \frac{1}{h} M/P \right) \right]$$

$$Y + \alpha_g b \frac{k}{h} Y = \alpha_g \bar{A} + \alpha_g \frac{b}{h} M/P$$

$$Y \left[1 + \alpha_g b \frac{k}{h} \right] = \alpha_g \left[\bar{A} + \frac{b}{h} M/P \right]$$

$$Y = \gamma \left[\bar{A} + \frac{b}{h} M/P \right]$$

↓

where γ = Fiscal policy Multiplier $= \left[\frac{\alpha_g}{1 + \alpha_g \frac{bk}{h}}\right]$

→ Endogenous variables → fixed in model → i and Y

→ All others → fixed from outside (Indepen.) Parameters → Exogenous.

Macro Policy

Fiscal	Monetary
· Related to Govt. spending & taxes.	· Related to Money Supply

→ $\frac{\delta Y}{\delta \bar{A}} = \gamma$ → Fiscal policy Multiplier

→ $\frac{\delta Y}{\delta (M/P)} = \left(\frac{\gamma b}{h}\right)$ → Monetary policy Multiplier.

Wealth Budget Constraint

→ States that the sum for the Individual demand for money and demand for bonds has to add up to a person's total financial wealth.

L (= $\frac{M}{P}$ @ equi) + DB (= SB @ equi) = $\frac{WN}{P}$ (WN → nominal wealth)

L → dd for real balances

DB → dd for bond holdings

P → price level.

→ Applications of I-S L-M Model

- Monetary & Fiscal policy
  - → There are the two Macroeconomic policy tools the govt. can use to keep the economy growing at a reasonable rate with low inflation.
  - → Also used to shorten recessions and to prevent booms from getting out of hand.
  - → Fiscal policy has its initial impact in the goods mkt and monetary policy in the assets mkts, but because the goods and assets mkt are closely interconnected, both Monetary & Fiscal policies have effects on both the level of o/p and Interest rates.

Monetary Policy

→ Change money supply using OMO

OMO

OM purchase of bonds	OM sale of bonds
⇒ ↑ in real balances with Individuals	⇒ ↓ in real balances with Individuals.
⇒ (M/P) ↑	
⇒ i ↓	

→ Price of bonds $\propto \frac{1}{\text{Yield}}$ → coupon

- A perpetuity → gives $5 in unit time and Interest rate 5%
  ⇒ Cost of bond → $100 ($5 / 5/100)

ex A bond worth $100, on purchase by govt, price of bond becomes $200, lets say interest rate remains const. at 5%

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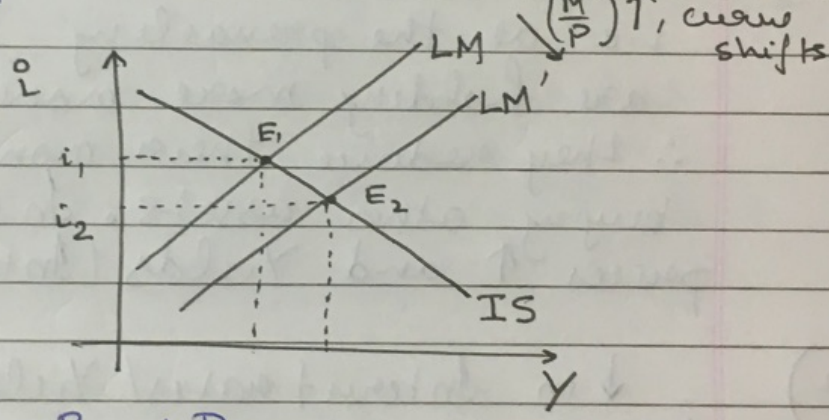
Recap

- Monetary expansion

Graphically



→ Relation with Bond Prices

- ↑ in Bond Prices (By Govt.) → ↓ in i

→ • Perpetuity Gives $5/month
  • Uniform Rates of Interest = 5%.
  ⇒ Value of Bond = $100

Now say price of bond set to $200
Then i will fall to 2.5% (Because promise of $5 holds)

Secondary effects

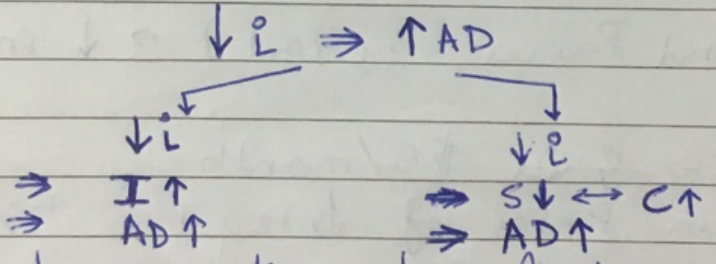
→ If i↓ ⇒ people save less as deposits ⇒ Consumption ↑ (↑ ⇒ AD ↑)

Transmission Mech.

→ Process by which changes in Monetary Policy affect Aggregate DD.

1) Increase in Real Bal. creates a portfolio disequilibrium
i.e. at the prevailing i and Y, ppl. are holding more money than they want
∴ they reduce their money holdings by buying other assets. In the process, asset prices ↑ and Yields (Interest rates) ↓

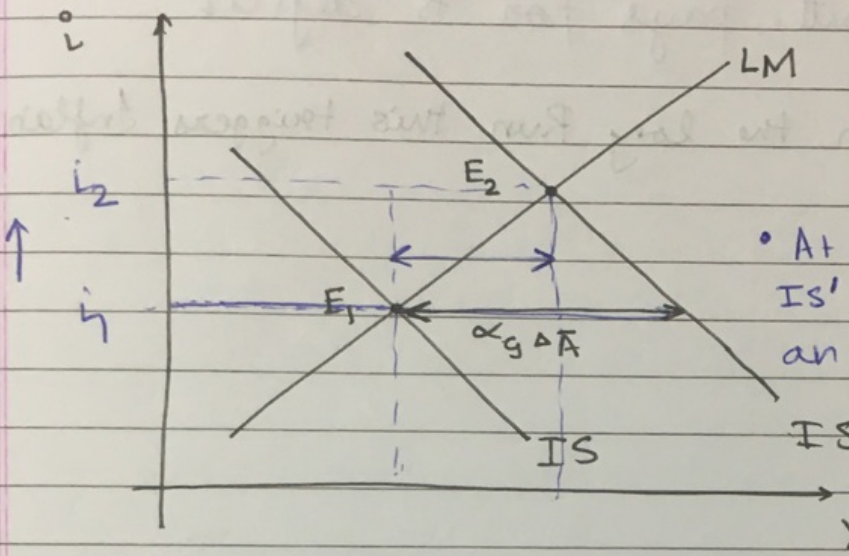
2) ↓ in Interest rates (Yield) affects aggregate demand AD through 2 channels



Thus through these two linkages, changes in the real ~~rates~~ money stock affect the level of o/p in the ~~econom~~ economy.

→ Cases where linkage ~~fails~~ fails are skipped.

→ Effect of $G\uparrow$ (Increase in Govt. Expenditure)



$\Delta\bar{A} = \Delta\bar{G}$ $(G\uparrow)$

- At old i_1 for new IS' curve there is an EDM.
- Hence $i\uparrow$ until it reaches level i_2

$i\uparrow \Rightarrow \downarrow I$ (Private investment)

→ Crowding Out: Govt. Expenditure has crowded out private investment.
In the sense that Potential: $\alpha_g \Delta\bar{A}$ but reality less

→ Countering Crowding out

- With unemployment ↑ thus a possibility for o/p to expand, Interest rates need not Increase at all
- When $G\uparrow$ there need not be any crowding out, this is because monetary authorities can accomodate the fiscal expansion by increase in money supply.
- Monetary policy is accomodating when in the course of a fiscal expansion $\left(\frac{M}{P}\right)\uparrow$ (Money supply) in order to prevent $i\uparrow$
- "Monetizing Budget Deficit"

→ Meaning that the Central Bank prints Money to buy the bonds with which the govt. pays for its deficit

→ Note: In the long Run this triggers Inflation