



ECONOMICS

Unit-7. "Putting All Markets
Together: The
AS-AD"7.1 Aggregate Supply: Effect of Y on P .

» Aggregate Supply Relation is derived from the behaviour of wages and prices.

For Wage Determination: $W = P^e F(u, z)$ (1)

For Price Determination: $P = (1+m)W$ (2)

→ P^e (expected price level), P (Real price level),
 u (unemployment rate), W (~~Real~~ ^{nominal} Wage), z (other
factors) and m (markup level).

» We then used these two relations to derive an assumption i.e.,
 $P = P^e$

Under this assumption, we derived the natural rate of
unemployment i.e.,
natural rate of output.

HERE in this chapter, we will not impose this assumption.

» It will turn out that this assumption will be imposed in
Medium run but not in Short run."

But without this assumption, we will derive a new eqn.:
(with wage & price setting relation) i.e., :

[among P , output level, P^e]



First : (Eliminating w from both the equations (1) & (2) :)

$$\Rightarrow " P = P^e (1+m) F(u, z) " \text{ --- (3)}$$

\therefore Price level depends on the expected price level and on the unemployment rate as well as m & z but they both are constant here (assuming).

Second : (replacing u with its output's expression :)

$$u = \frac{U}{L}$$

$$(U = L - N) \text{ so, } u = \frac{L - N}{L}$$

$$\therefore \text{ Keeping } L \text{ constant :- } 1 - \frac{N}{L}$$

Now, with the derivation of production function, which says one unit of output = one worker
 $\therefore \underline{Y = N}$ - Using this,

$$\text{we derive } \Rightarrow u = \underline{\underline{1 - \frac{Y}{L}}}$$

Final : Putting everything together for equation (3) :

$$" P = P^e (1+m) F\left(1 - \frac{Y}{L}, z\right) " \text{ (} m, L, z = \text{constant)}$$

This is the Aggregate Supply Relation.

"It should be called labor market relation BUT it is called AS Relation as it looks like a supply curve graphically."

Two important Properties: " $P = P^e (1+m) F(1-\frac{Y}{L}, z)$ "

- ⊙ $\uparrow Y = \uparrow P$ (increase in output = increase in price level)
- ⊙ $\uparrow P^e = \uparrow P$ (increase in expected price = increase in price level)

① • $\uparrow Y = \uparrow P$ [How / Because]:

- 1st Graph
- » An \uparrow in ^(Y) Output = \uparrow in ^(N) employment i.e., \uparrow price levels.
 - » \uparrow in employment = \downarrow in unemployment i.e., equals to \downarrow in unemployment rate ^(u)
 - » \downarrow in unemployment rate ^(u) = \uparrow nominal wage ^(W)
 - » \uparrow in $W = \uparrow$ prices set by firms = \uparrow price levels ^(P)

$$\therefore \underline{\underline{\uparrow Y = \uparrow P}}$$

$$\therefore \uparrow Y = \uparrow N = \downarrow U = \downarrow u = \uparrow W = \uparrow P$$

② • $\uparrow P^e = \uparrow P$ [How / Because]:

- » Wage setters (who sets real wage according to the inflation) expect an \uparrow in price level = they set \uparrow nominal wage.
- » \uparrow Nominal Wage = \uparrow Costs = \uparrow prices of firms = $\uparrow P$.

$$\therefore \underline{\underline{\uparrow P^e = \uparrow P}}$$

$$\therefore \uparrow P^e = \uparrow W = \uparrow \text{Costs} = \uparrow P$$

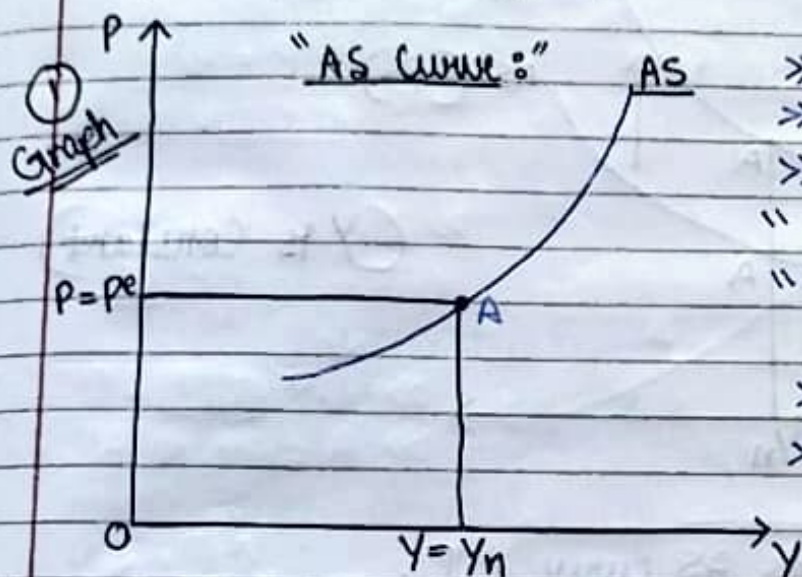
⇒ If \hat{Y} (the natural level of output) Y_n .

So,

$$\text{(Price level)} \underline{P} = \underline{P}^e \text{ (Expected price level)}$$



This relation between Output (Y), Price level (P) and expected price level (P^e) is shown in AS Curve.



"AS Curve:"

- \gg is upward sloping.
- $\gg \uparrow Y = \uparrow P$
- \gg equilibrium here is when " $Y = Y_n$ " is equals to " $P = P^e$ " i.e. A.
- $\gg \uparrow P^e =$ AS Curve goes up.
- $\gg \downarrow P^e =$ AS Curve goes down

③ • " $Y = Y_n$ " = " $P = P^e$ " [How/Because] :

2nd Graph

$\gg Y$ is above Y_n so, P is \uparrow than expected.
 \gg If: Y is right to Y_n then P is \uparrow than P^e .

$$\downarrow$$

$$\underline{Y_n \uparrow = Y}$$

$$\downarrow$$

$$\underline{P \uparrow = P^e}$$

\gg Y_n is right to Y then P^e is \uparrow than P . (Vice-versa)

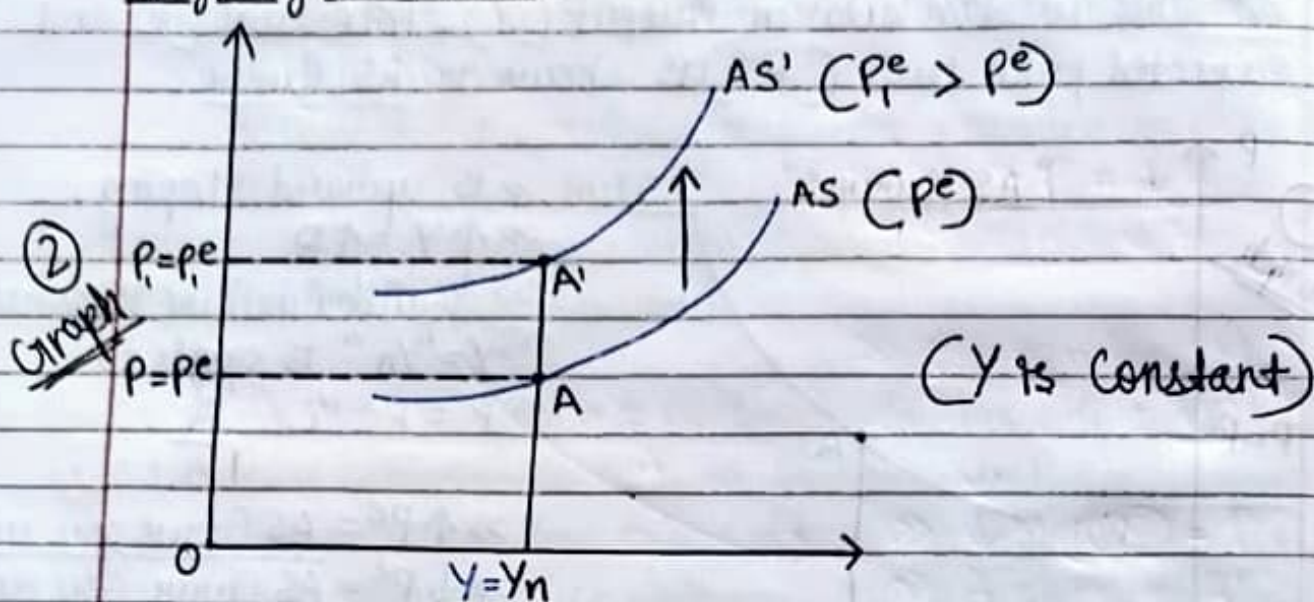
$$\downarrow$$

$$\underline{Y \uparrow = Y_n}$$

$$\downarrow$$

$$\underline{P^e \uparrow = P}$$



"Shifts of AS Curve:"

» \uparrow in P^e shifts AS curve UP.

» At a given level of $(Y) = u = \uparrow P^e = \uparrow$ Wages
 $\Rightarrow \uparrow P$

$\Rightarrow \uparrow Y = \uparrow P$

» At any level of $Y = P$ is \uparrow (AS curve goes UP)

» New equilibrium point goes from A to A'.

» $\uparrow P^e = P \Rightarrow$ Graph goes up.

» $\downarrow P^e = P \Rightarrow$ Graph goes down.

7.2 Aggregate Demand: Effect of P on Y .

» Aggregate Demand is derived from the equilibrium conditions in goods and financial markets.

• Goods - Market Equilibrium -

$$Y = C(Y - \bar{T}) + I(Y, I) + G \quad \text{IS Relation}$$



→ Y = Output, I = Investment Spending, C = Consumption, G = Govt. Spending, T = Transfer Payments / Tax.

• Financial Market Equilibrium -

$\frac{M}{P} = YL$ - "Demand for real balances / money"

$\frac{M}{P}$ = Money } "Real Money equation"
 P = Price }

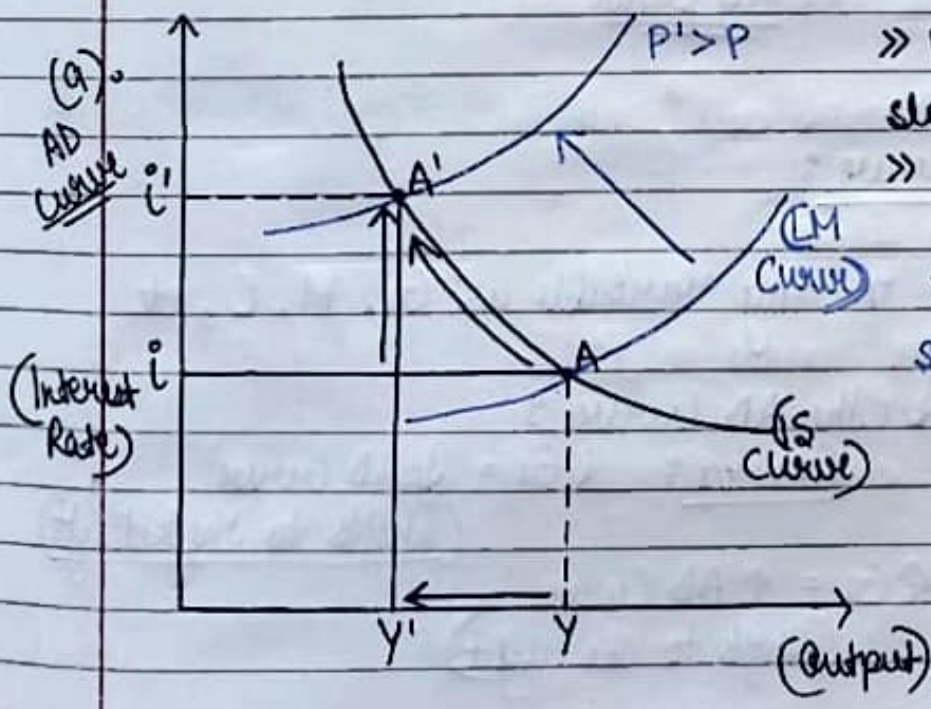
"LM Relation"

» Same effect on real money stock when: $M \downarrow$ and $P \uparrow$

(Same effect)

↓ "Real Money Stock"

» By using these IS & LM Relation derives the relation between price level and output level.



» IS Curve downward sloping: $i \uparrow = \downarrow Y$.

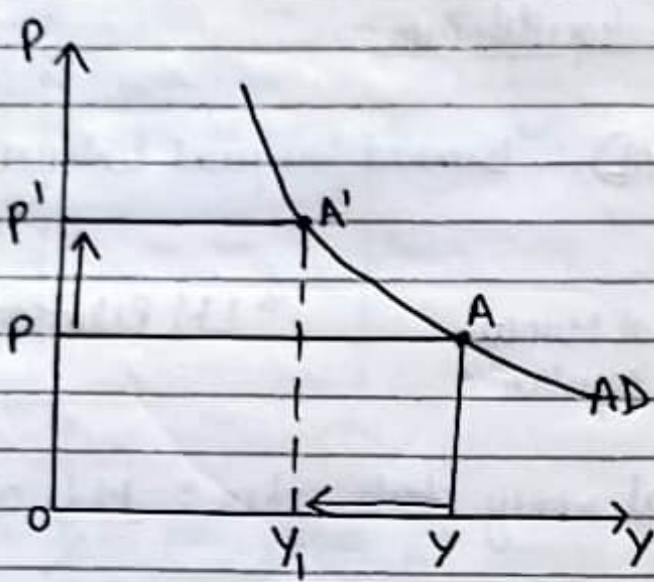
» A shifts to A'.

» LM Curve is upward sloping: $\uparrow Y = \uparrow L$ (Demand)

$\uparrow Y = \uparrow i$

∴ A = equilibrium of IS and LM relation.

New (b). AD Curve :



» $\uparrow P = \downarrow Y$
 $\uparrow P = \downarrow M$ (M/P)

» This is why LM Curve shifts UP

» $\downarrow M = \uparrow i$ (P)
 » A shifts to A'

∴ $\uparrow P = \downarrow Y$

∴ $\uparrow i = \downarrow Y$

∴ This Negative relation between P & Y is drawn as "Downward Sloping."

∴ AD Curve

» Shifts of AD Curve :

"Any \uparrow or \downarrow in any variable as G, M, C, etc other than (P),
also, \uparrow or \downarrow the AD Curve :

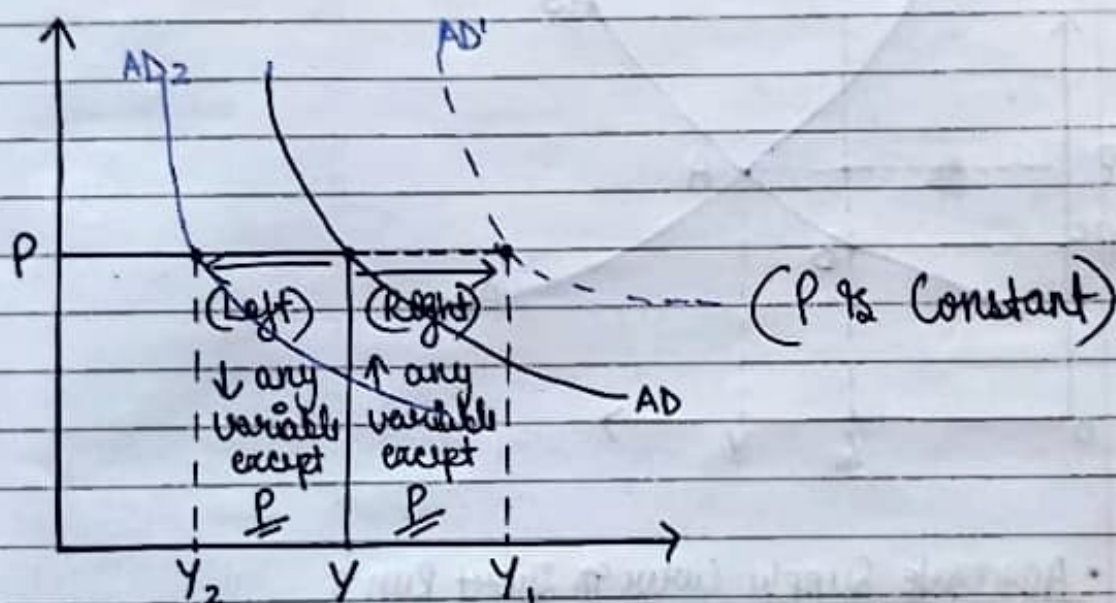
For ex: $\downarrow G = \downarrow$ AD Curve
 (Shifts to the left)

$\uparrow G = \uparrow$ AD Curve
 (Shifts to the right)

AD Relation: $Y = Y \left[\frac{M}{P}, G_1, T \right]$
 +, +, -

∴ Output is an ↑ function of (Real Money) $\frac{M}{P}$, ↑ of G_1 (Govt. Spending) and ↓ of T (Taxes).

→ $\uparrow P = \downarrow \frac{M}{P} = \downarrow Y$



7.3 Equilibrium in the Short Run and in the Medium Run :

» AS Relation : $P = P^e (1+m) F \left[1 - \frac{Y}{L}, z \right]$

» AD Relation : $Y = Y \left[\frac{M}{P}, G_1, T \right]$

» The value of P^e (Expected Price Level) of AS Relation. and the value of M, G_1, T (Monetary and Fiscal Policy variables) of AD Relation. "Depends on the equilibrium of Y & P "

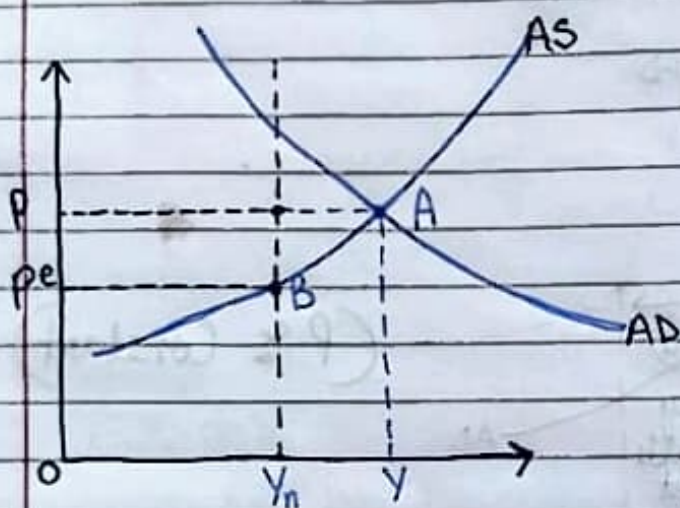


In Short Run Equilibrium, it is dependant on P^e (expected price level).

P^e changes the AS Curve, when P^e increases / decreases, AS Curve shifts UP / DOWN.

» So, in short run, P^e changes and how it affects the equilibrium :-

→ Equilibrium in the Short Run :



• Aggregate Supply Curve in Short Run :

» AS Curve is determined by (P^e) and Y_n (majorly).

» It is upward sloping.

» $\uparrow Y_i = \uparrow P$.

» Position of Curve depends on P^e .

» If $Y = Y_n$, $P = P^e$

» Point of AS Curve goes through point (B).



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• Aggregate Demand Curve in Short Run :

- » AD Curve is determined by M, G, T values.
- » It is downward sloping.
- » $\uparrow P = \downarrow Y$.

»»» Equilibrium point is A at the intersection of AS and AD.

▲ Point A : Financial Markets, Goods Markets, Labor Market are all in equilibrium.

∴ Financial and Goods Market are in equilibrium because it's on the AD Curve.

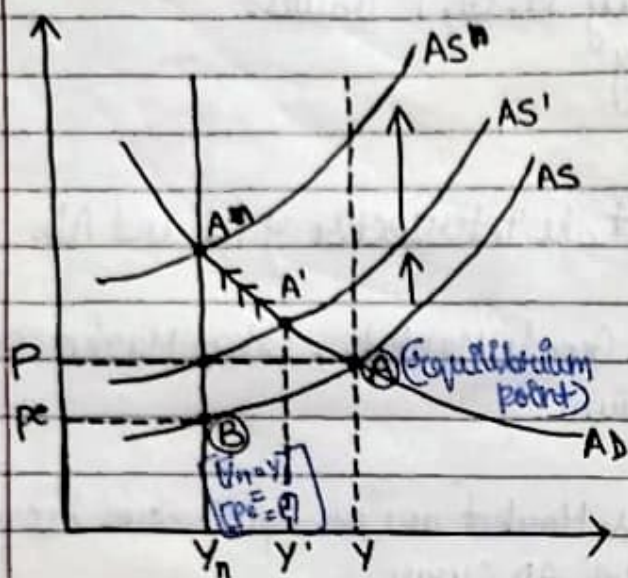
∴ Labor Market are in equilibrium because it's on the AS Curve.

∴ In Short Run, there is no reason of output (Y) being = to the Natural level of output (Y_n), Y is \uparrow/\downarrow than Y_n here.

This depends on the value of AS Curve i.e. the expected price level (P^e) and the value of AD Curve i.e. (M, G, T).



→ From Short Run To Medium Run :



• $Y = Y_1$ and Y_1 is higher than \underline{Y}_n . ($Y > Y_n$)

• Y exceeds \underline{Y}_n (at point A) = P exceeds \underline{P}^e .

• Which means the wage setters expectations had higher & increased.

• So, next time, wage setters will decide based on a Higher expected price level, $P^e > P$.
(Future)

• AS shifts up to AS', wage setters expect higher Price level.

• ↑ higher nominal wage = higher price.

∴ $P = \uparrow$ (1st reason)

• This upward shift in AS moves up along AD Curve.

• A to A' (moves up) and $Y = Y'$ (decrease)

• At A', Y' exceeds \underline{Y}_n , so $P \uparrow$ than \underline{P}^e .

• So, (2nd reason) why, $P \uparrow$ and wage setters keep their expectations of price level higher.



Summarizing: \odot A' exceeds A on equilibrium, and Y decreases to Y' .

\bullet AS shifts up to AS' , P exceeds the P^c .

\odot So, wage setters will increase their expectations for price level from next time (future). If $P^c > P$, AS curve will \uparrow .

$\rightarrow \uparrow P^c = \uparrow W = \uparrow P$.

\rightarrow This adjustment ends when $Y = Y_n$ & $P = P^c$ and wage setters does not change their expectation then.

\therefore In Medium Run, this all changes returns the Y to Y_n .

\rightarrow If Y exceeds Y_n , AS curve shifts up, until

$\rightarrow Y$ returns to Y_n .

7.4 The effects of a Monetary Expansion:

\gg The Dynamics of Adjustment -

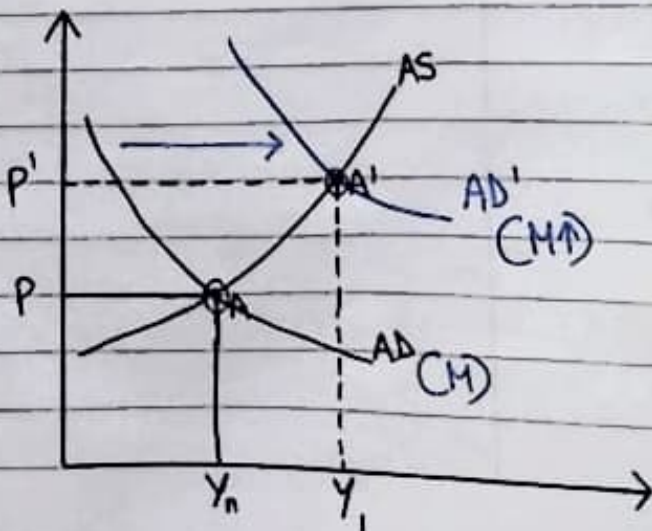
$$Y = Y \left[\frac{M}{P}, G, T \right] \bullet \uparrow M = \uparrow \frac{M}{P} = \uparrow Y$$

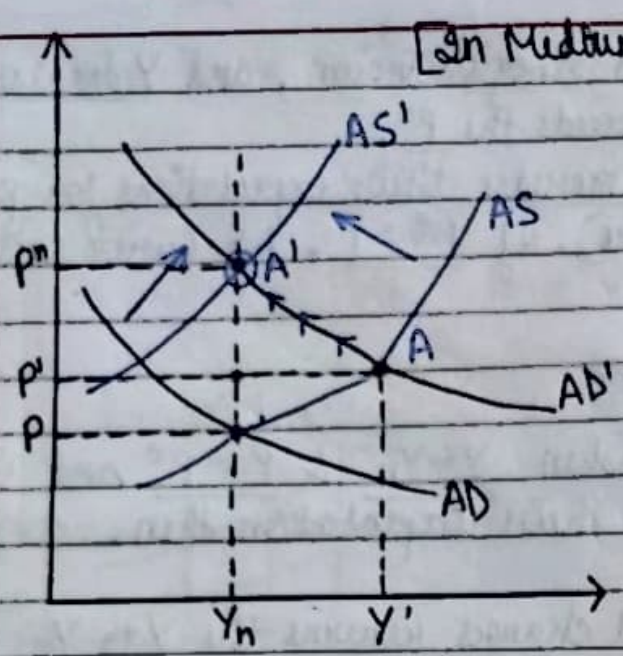
$\bullet \uparrow \frac{M}{P} = AD$ curve Right. ($\uparrow Y$)

\bullet In Short Run, Y and $P \uparrow$.

$AD = AD'$
(shifts right)

[In Short Run]





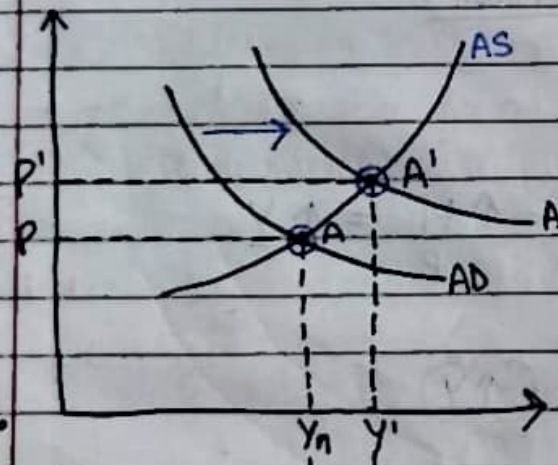
∴ In medium run,
AS shifts to AS'
and economy returns
to equilibrium at Y_n .

$(A') = (P^n = Y_n)$

• P increases & Y has no effect in medium run

by monetary expansion.
→ coz it goes back to its natural form.

» Getting Behind the Scenes:

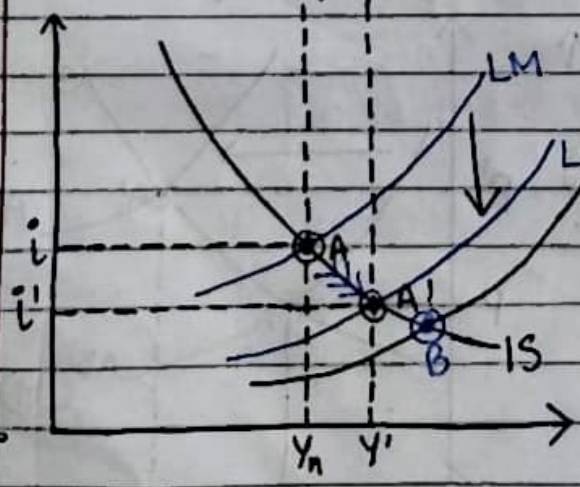


» The impact of this monetary expansion on interest rate is shown by IS-LM Curve.

» In short run, LM curve goes down: $i \downarrow$ and $Y \uparrow$.

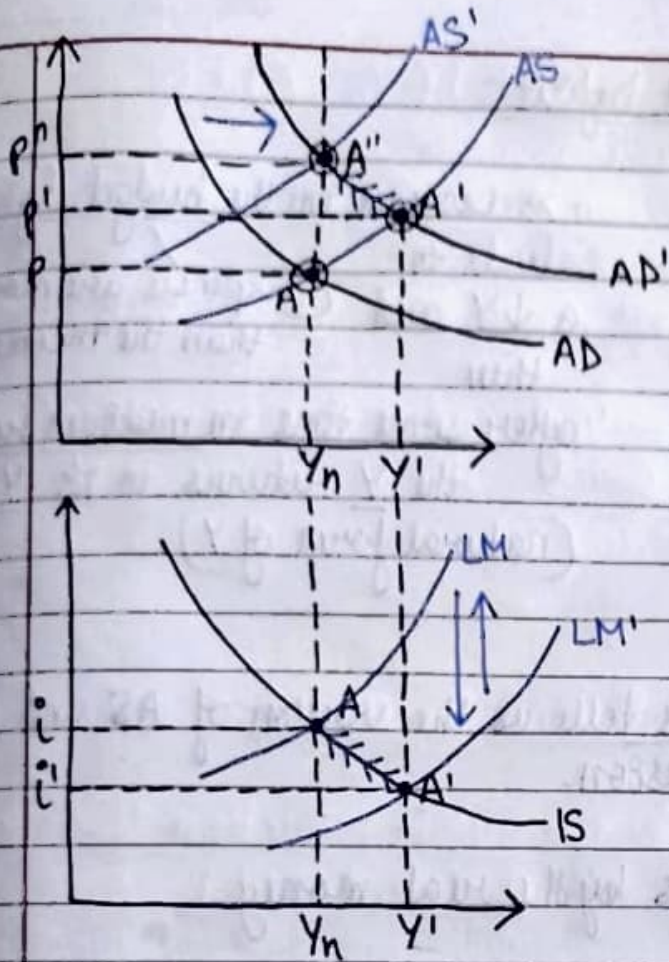
» B point is when P did not increase, LM will get larger to LM''.

(a).



[In short run, for i]
[In IS-LM Curve]

(b).



- Price increases and AS curve shifts to AS', returning the LM curve to its natural form. (Y' to Y_n)

- In medium run, LM curve goes up / returns to its natural output form, where i remains unchanged.

Medium
 [In ~~short~~ Run, for i]
 [In IS-LM curve]

>> The Neutrality of Money:

- In the short-run, Monetary expansion increase the output, decrease the interest rate & increase the Price.

$\therefore \uparrow Y, \downarrow i \text{ \& \ } \uparrow P$

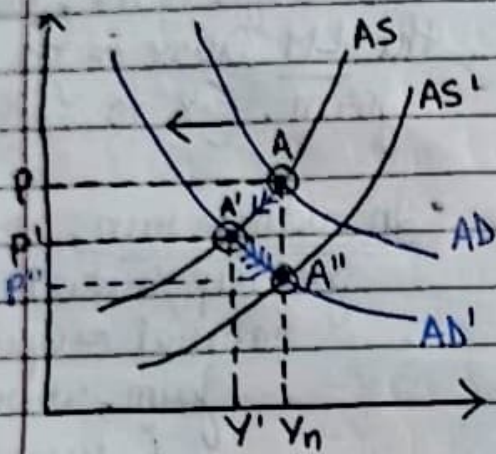
- In the Medium Run, Monetary expansion increase the nominal money & increase the Price.

$\therefore \uparrow M = \uparrow P$

>> The Neutrality of Money refers to NO EFFECT on Y or on i in medium run, but on P .



7.5 A Decrease in the Budget Deficit:

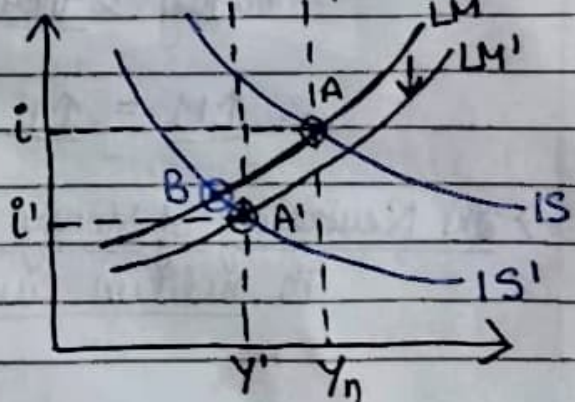
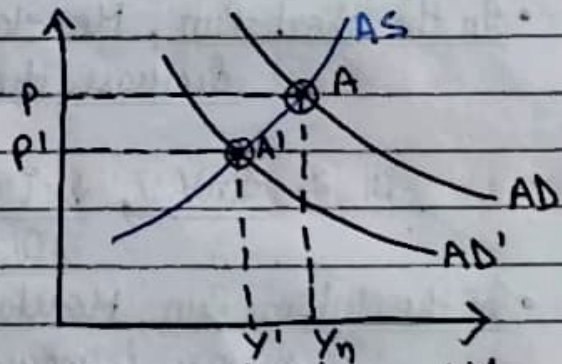
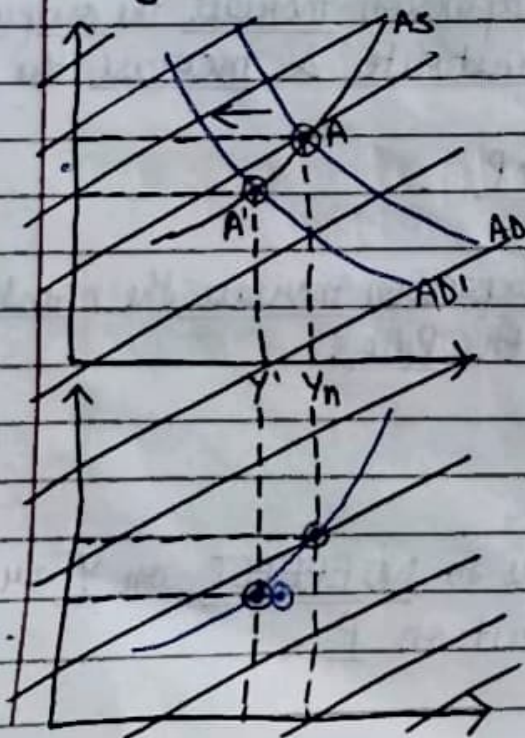


» Decrease in the budget deficit leads to a $\downarrow Y$ and $\left(\begin{array}{l} \text{Expenses are more} \\ \text{than the incomes} \end{array} \right)$ then after some time in medium run the Y returns to its Y_n (natural form of Y).

* Macroeconomics models tells us the version of AS and AD Curve in a larger version.

It tells us how it effects by the real money.

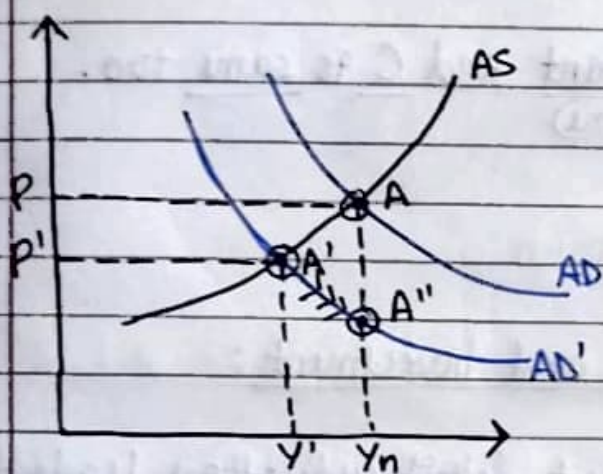
» Deficit Reduction, Output and the Interest rates:



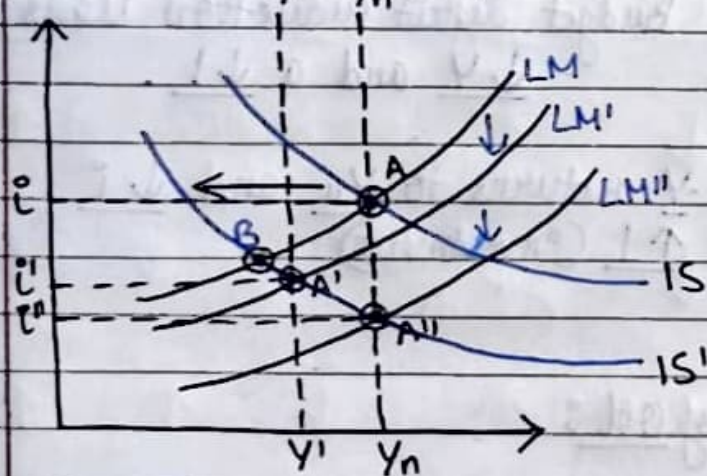


→ Price level ↓ because of ↓ Y, ↑ Money Stock.
• This cause LM shift to LM', curve shifts down.

→ Y and i are lower.



» LM curve continues to shift down until Y goes back to its natural form i.e. Yn.



» Interest Rate is lower than before deficit reduction.

∴ In short Run: ↓ Y and ↓ i.

∴ In medium Run: Y returns to Yn and i ↓ more.

∴ Remember the IS Relation:

$$Y = C(Y, T) + I(Y, I) + G.$$

So, after deficit reduction:

$$\Rightarrow Y_n = C(Y_n - T) + I(Y_n, i) + G$$

- : Income & Taxes remain unchanged, so C is same.
~~(T)~~
- : G is \downarrow than before, ~~then~~ I \uparrow than before.
- \therefore T is constant and C is same too.
(same)

- \rightarrow G \downarrow
- \rightarrow I \uparrow

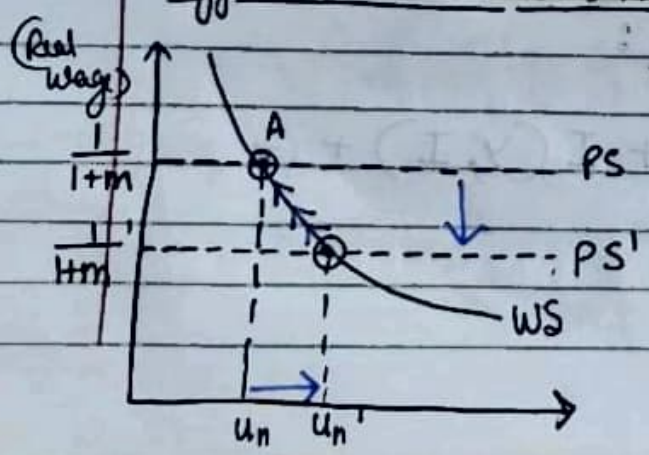
Budgets Deficits, Output and Investment:

- In Short Run, Budget deficit reduction leads to $\downarrow Y$ and a $\downarrow I$.
- In Medium Run, Y returns to Y_n and $\downarrow i$ and $\uparrow I$ (investment)

7.6 Changes in the Price of Oil:

- Price of the crude petroleum oil increased 1970s and decreased in 1980s and 1990s.

Effects on the Natural Rate of Unemployment:



\gg Increase of the prices of oil, \uparrow the markup, \uparrow the natural level of employment and PS goes downward.

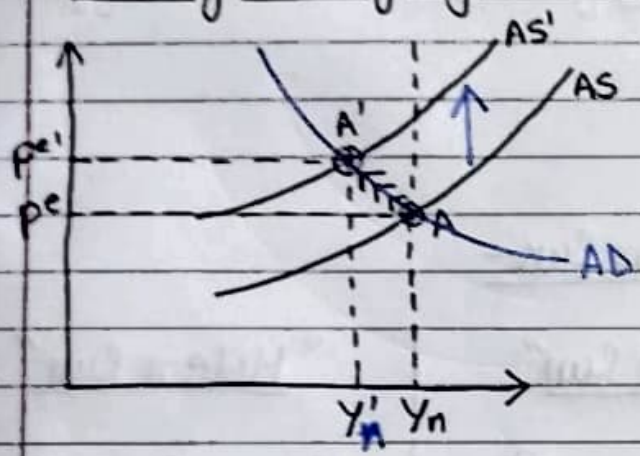


• ↑ m markup : ↑ P at any level of Y.

∴ AS Curve shifts up.

» The Dynamics of Adjustment:

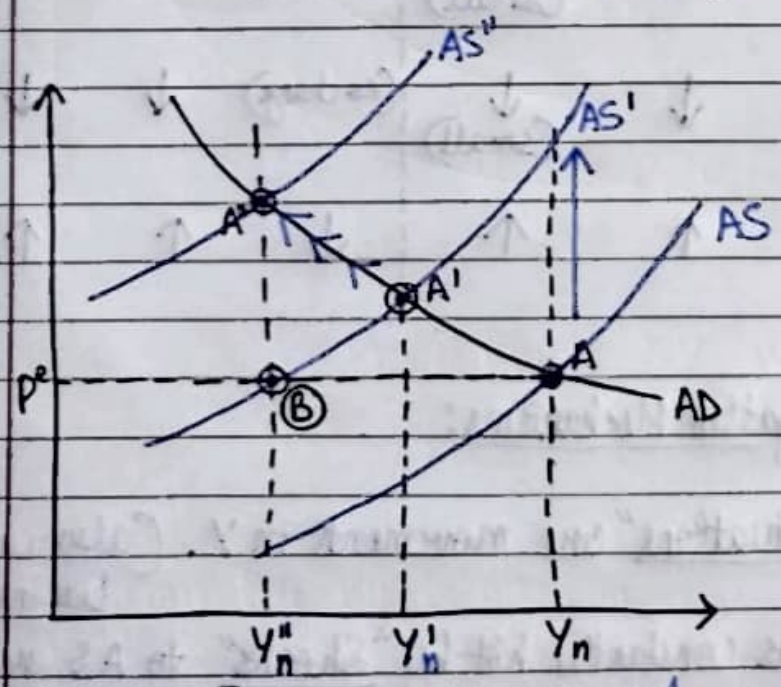
$$[P = P^e(1+m)F\left[1 - \frac{Y}{L}, z\right]]$$



» ↑ Price of oil = AS curve shifts up to AS' and A points to A' equals to a lower level of natural form.

» AD curve → from A to A'

» Y ↓ → from Y_n to Y'_n



» Over time AD curve moves from A' to A''.

» At point A'', Y goes from Y'_n to Y''_n.

and the price level increase:

∴ In short run, ↑ P of oil ⇒ ↓ Y and ↑ P.

∴ In medium run, Y decreases further and P increases further.



- Stagflation: Slow growth, high unemployment and (Stagnation) rising prices, when occurs together is Stagflation. (inflation)

7.7 Conclusion:

» Short Run Vs Medium Run -

	<u>"Short Run"</u>			<u>"Medium Run"</u>		
	<u>Y</u>	<u>i</u>	<u>P</u>	<u>Y</u>	<u>i</u>	<u>P</u>
(Monetary Expansion)	↑	↓	↑ (small)	(no change)	(no change)	↑
(Fiscal Reduction)	↓	↓	↓ (small)	(no change)	↓	↓
(Increase in oil price)	↓	↑	↑	↓	↑	↑

» Shocks and Propagation Mechanisms:

- "Output Fluctuations" are movements in Y . (also called business cycle)
- The economy is constantly hit by "Shocks" to AS or AD or both.
- Thus "shocks" has dynamic effects on Y and this is called "Propagation Mechanism".