



## ECONOMICS

### Unit-12. "Unemployment and Inflation"

» Unemployment and Inflation are referred to as "twin evils" of macroeconomics.

» The effects of these two issues are clearly visible to everyone and are hard to resolve.

» According to Phillips Curve: Inflation  $\uparrow$  (high) when Unemployment is  $\downarrow$  (low)  
: Negative relation b/w them.

#### 12.1 Unemployment and Inflation: Is there a Trade-off?

» Trade-off: giving up of one thing in return for another.

» The idea of this trade off between unemployment and inflation was an idea by A.W. Phillips in 1958 article.

» He examined when nominal wages grew, unemployment tends to be low.

» Many economists examined these two problems and found a negative relation which is known as the Phillips Curve.

» Phillips Curve was proved in the US economy in 1960's where Inflation rose rapidly and Unemployment fell which hence proved, Phillips Curve; that is the relationship between these two is negatively sloping, confirming Phillips findings.

» In 1960's, economists had debates about this and thought that by accepting a modest / average amount of inflation, policy makers could keep unemployment low.  
(In this era)



>> But this relation ~~was~~ turned out wrong in the 1970's and was very confusing decade where both inflation & Unemployment was high causing STAGFLATION.

>> This caused to say Phillips curve inconsistent.

>> Phillips Curve collapsed after 1970 and this prediction of collapsing was done in 1960 before it actually broke.  
∴ No Trade off.

>> The Expectations - Augmented Phillips Curve:

• Augmented (increasing the amount of something).

• Phillips Curve was described to be very precise in 1960's but resulted to broke in 1970 (inconsistent).

• In second half of the decade, some Economists questioned this Curve.

• These economists were "Nobel Laureates Melton Friedman" of "University of Chicago" AND "Edmund Phelps" of "Columbia University".

• They argued that there shouldn't be any negative relation between these two problems.

instead → • There should be a negative relation between "UNANTICIPATED (not planned) INFLATION" and "CYCLICAL UNEMPLOYMENT".

• To analyse Friedman and Phelps arguments; ∴ (to confirm there's (-ve) relation

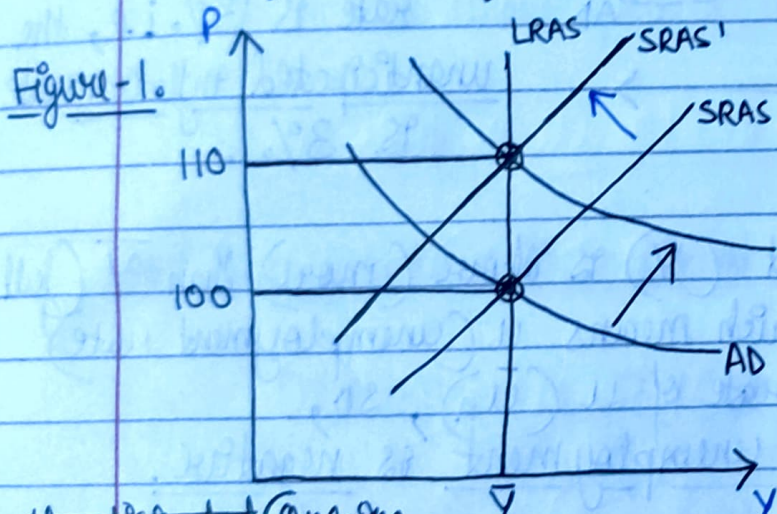
First: We consider full unemp. and anticipated inflation where cyclical unemployment & unanticipated inflation are "ZERO".  
b/w unanticipated inflation & cyclical unemployment



Second : Consider what happens when AD increase / grows :  
This leads to grow inflation than expected (unanticipated inflation  $\uparrow$ ) and lowers cyclical unemployment.

$\therefore$  Hence, there's negative relation between unanticipated inflation & cyclical unemployment, proving Friedman-Phelps point.

• When there's full employment and the inflation is anticipated i.e. it rises by 10% every year : (faster)



$\gg$  LRAS & SRAS is Long Run and Short Run Aggregate Supply respectively.

$\gg$   $\bar{Y}$  is full employment output.

$\gg$  Price increases by 10% each year i.e. SRAS to SRAS' i.e. 100 to 110.

~~Short Run~~ (ongoing inflation)

$\gg$   $\bar{Y}$  is constant (assuming),

unemployment remains at its natural form and Cyclical Unemployment is zero.

$\gg$  Inflation is anticipated to rise by 10%, so unanticipated inflation is also zero.

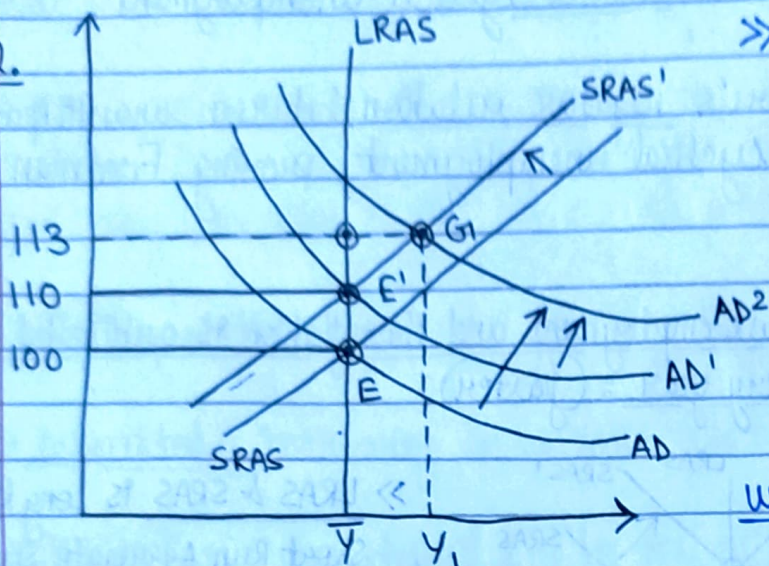
$\therefore$  Cyclical Unemployment & Unanticipated Inflation  
 $= 0$





- When there's full employment and the inflation rises unexpectedly by 15% : (shower)

Figure-2.



» In 3<sup>rd</sup> year, instead of 10%, the price increases by 15%, unanticipated inflation increases.

» 3<sup>rd</sup> price level is 113 so actual price rate is 13% i.e., the unanticipated inflation rate is 3%.

» Because of this, output ( $Y$ ) is above (more) than  $\bar{Y}$  (full employment output), which means  $u$  (unemployment rate) is below the natural rate of  $u(\bar{u})$ , so, cyclical unemployment is negative.

» 13% of increase in rates increases AD & AS Curve, so,  $Y$  is above full employment output ( $\bar{Y}$ ), fooling the producers that prices of products have increased.

» In the long run, producers get to know the true price, & economy returns to full employment & inflation rate equals to the expected inflation rate (100, 110).

» When  $Y$  is higher than  $\bar{Y}$  and  $u$  is below the  $u_n$ , the actual  $P^e$  gets higher.

» ~~When~~ So,  $Y$  can be higher than  $\bar{Y}$  only when  $P$  is higher the expected.



- : Inflation rate rises than expected.
- $\therefore$  When public predicts AD & inflation growth, then unanticipated inflation & Cyclical Unemployment is zero. [Figure-1.]

- $\therefore$  If AD grows unexpectedly further, it grows faster, this leads to grow unanticipated inflation & lower cyclical unemployment.
- $\therefore$  If AD grows unexpectedly slower, this leads to lower the unanticipated inflation & grow cyclical unemployment. [Figure-2.]

$\rightarrow$  Relationship b/w Unanticipated Inflation & Cyclical Unemployment:

$\pi$ : Inflation,  $\pi^e$ : Expected Inflation  
 $\therefore \pi - \pi^e$ : Unanticipated Inflation.

$u$ : Unemployment Rate,  $\bar{u}$ : Natural Unemployment Rate  
 $\therefore u - \bar{u}$ : Cyclical Unemployment.

$h$ : A Positive no. of measuring the slope of relationship b/w  $(\pi - \pi^e)$  and  $(u - \bar{u})$ .

$$\therefore (\pi - \pi^e = -h(u - \bar{u})) \text{ --- (1)}$$

$\rightarrow$  This equation confirms that  $(\pi - \pi^e)$  is a positive term (rising) which equals to negative term (lowering) i.e.  $(u - \bar{u})$  because  $-h$  is  $(-)(+) = (-)$ .

$\begin{matrix} \text{h} \\ \downarrow \end{matrix} \therefore \begin{matrix} \uparrow \pi - \pi^e = \downarrow u - \bar{u} \\ \downarrow \pi - \pi^e = \uparrow u - \bar{u} \end{matrix}$



and if  $u - \bar{u}$  is 0 so,  $\pi - \pi^e$  is also 0.

: We add  $\pi^e$  to both the sides, we get :-

$$\therefore (\pi - \pi^e) + \pi^e = \pi^e - h(u - \bar{u})$$

$$\therefore \pi = \pi^e - h(u - \bar{u}) \quad \text{--- (2)}$$

: This equation (1) describes/refers to the "Expectations - Augmented Phillips Curve".

>> Expectations - Augmented Phillips Curve tells us that:

$$\text{When/if } (u < \bar{u} = \pi > \pi^e) \text{ --- (a)}$$

$$(u > \bar{u} = \pi < \pi^e) \text{ --- (b)}$$

(a). If, unemployment rate ( $u$ ) is less than the natural unemployment rate ( $\bar{u}$ ), then, actual inflation is higher than the ( $\pi$ ) expected inflation rate ( $\pi^e$ ).

& Vice Versa for (b).

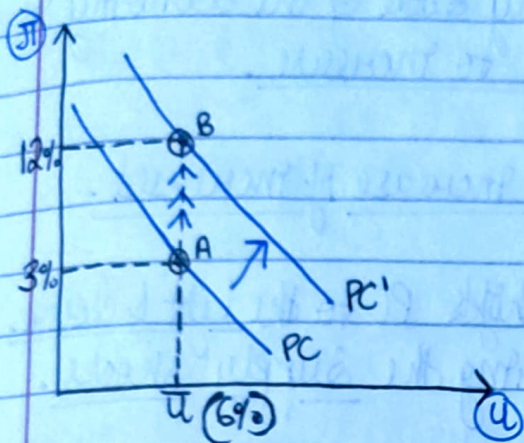
>> Shifting Phillips Curve :

• Phillips Curve depends on the -

- > Expected rate of inflation,
- > Natural Rate of unemployment.



• If there's any change in these two, it will shift the Phillips Curve.



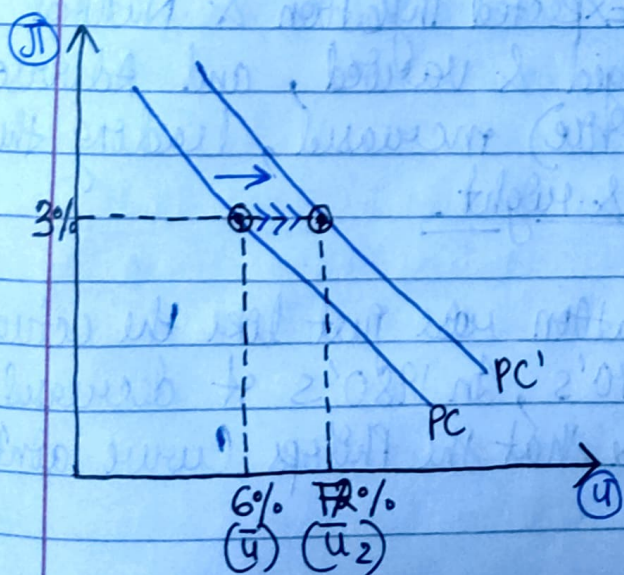
> Changes in the Expected Rate of Inflation:

• Here, the  $\bar{u}$  (natural rate of unemployment) is 6%, and is assumed to be constant.

• The expected rate of Inflation ( $\pi^e$ ) firstly is 3% and then when it increases to 12%. [ $\pi = \pi^e$ ]

• When  $\pi^e$  increases, the Phillips Curve goes UP as the  $\bar{u}$  remains constant here. [ $u = \bar{u}$ ]

∴ ↑ in  $\pi^e$  = Curve shifts "up" (to the right)  
(Relationship b/w Inflation & Unemployment up)



> Changes in the Natural Rate of Unemployment:

• Here,  $\bar{u}$  is 6% and increases to 7%.

•  $\pi^e$  is 3% and is constant.

• When  $\bar{u}$  increases, the Phillips Curve shifts right as  $\pi^e$  remains constant here.

∴ ↑ in  $\bar{u}$  = Curve moves "right"



## > Supply Shocks and the Phillips Curve:

• Changes (unexpected) in the supply side of the economy is a Supply Shock affecting Inflation to increase.

• Supply Shocks shifts the PC to increase of increased.

• So, benign supply shocks shifts PC to the left & down.

• So, it should be unstable during the Supply Shocks.

• Different effects of this is seen in Classical & Keynesian theory.

## > The Shifting Phillips Curve in Practice:

• There is a negative relationship between inflation and unemployment as long as expected inflation and the natural level of unemployment are constant.

• After 1960's, in 1970's Expected Inflation & Natural Rate of Unemployment changed & varied, and Adverse Supply Shocks (like Oil Price) increased, leading the Phillips Curve to move up & right.

• In 1970's expected inflation rose just like the actual inflation rate & after 1970's, in 1980's it decreased, leading our analysis to be that the Phillips Curve isn't stable over the years.

• According to the analysis, there should be a negative relation between Unanticipated Inflation & Cyclical Unemployment even if expected inflation & natural rate of unemployment changes.





- We use surveys to find estimated inflation (expected) and natural rate of unemployment.
- At last, Despite the instability of inflation & unemployment relation, there is a negative relation between unanticipated inflation & cyclical unemployment, during 1970 - 2005.

### > Macroeconomic Policy and the Phillips Curve :

"(Can we shift PC by moving it up & left)" "(Can policymakers reduce unemployment rate & by increasing rate of inflation)"

- According to the Expectations - Augmented Phillips Curves :

> Unemployment will fall below the natural rate of unemployment ONLY when inflation is unanticipated/ unexpected.

> "(Can macroeconomic policy be used systematically to create unanticipated inflation)"

- Classical & Keynesian economists argue.

- Classicals argue that people make intelligent predictions to future policy changes.

— that wages & prices adjust quickly.

— Policies that increase AD growth acts mainly to  $\uparrow$  actual & expected inflation to not  $\downarrow$  the unemploy.

— If  $\downarrow$  unemployment occurs, it will be of no use, as  $\pi^e$  (expected inflation) will be adjusted rapidly.

∴ Classicals does not represent a Trade-off for policymakers. They think PC depends upon unanticipated inflation & cyclical unemployment in Short Run but NOT in Long Run.



- In Contrast, Keynesians argue that policymakers do have some ability in short-run,
  - to create unanticipated inflation & to bring unemployment below the natural rate.
  - Although they accept people have can predict the future, this argues, policymakers when cause  $AS$  to  $\uparrow$ , the prices need time to fully reflect the new info.
  - Some shows older info so, inflation is higher than  $\pi^e$ .

∴  $\uparrow$  of inflation  $\rightarrow$  Unemployment may remain below the natural rate for awhile.

## I. LUCAS CRITIQUE:

Robert E. Lucas Jr., was a critique. Many economists, policymakers assume that every macroeconomic variables will be the same after new policies comes, then too.

Lucas objected to this assumption, known as "Lucas Critique". According to "Lucas Critique", new policies changes when "economic rules" also should change, thus no macroeconomic variables will not be the same, when policies change.

There seemed a stable relationship between inflation & unemployment, which led policymakers to think that they could PERMANENTLY reduce unemployment by increasing inflation. But this resulted in raising the expectations of inflation too, which broke down the relationship b/w inflation & unemployment.



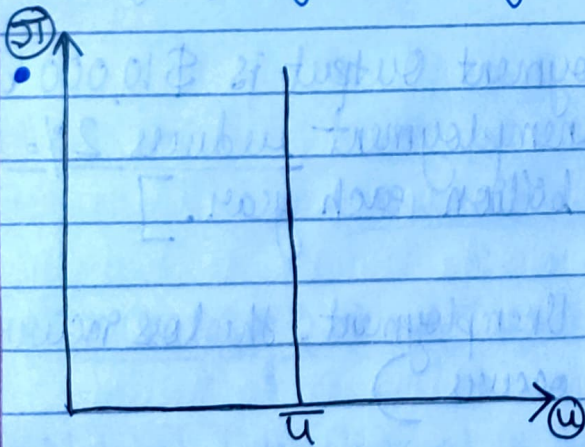
∴ Main message of Lucas Critique is, policymakers should understand How economic behaviour will change under new policies.

### > The Long Run Phillips Curve:

- Classicals & Keynesians agree that policymakers cannot keep the unemployment low & inflation to increase permanently.
- Inflation eventually adjusts so that actual & expected inflation are equal. ( $\pi = \pi^e$ ) [Expectation-Augmented PC]

• When  $\pi^e = \pi$ ,  $u = \bar{u}$ .

∴  $u = \bar{u}$  in the long run, regardless of the inflation rate  $\uparrow$  or  $\downarrow$  long.



> The long-run Phillips Curve.  
> An long-run PC,  $u = \bar{u}$ , regardless of the  $\pi$  (inflation rate). So, the long-run Phillips Curve is vertical line.

> The long run PC will moderate that growth of money, leading to changes in inflation rate, will have no effects in the long run.





## 12.2 The Problem in Unemployment :

### » The Costs of Unemployment :

#### - Two principal costs of unemployment :

I.

• Loss of output occurs, because very less people are employed who produce outputs. This is covered by the unemployed who are losing the opportunity to earn money.

• Taxpayers then bears some output cost of unemployment, because unemployed people may stop paying taxes & get unemployment insurance benefits.

• There's an Okun's Law which states that each % point of unemployment comes with a 2% of loss for full employment output.

[Ex: If Full Employment Output is \$10,000 billion, each percentage point of unemployment reduces 2% i.e. \$200 billion of \$10,000 billion each year.]

(This is the Output Cost of Unemployment, the loss incurred whenever Unemployment occurs.)

• Okun's Law also reflects the problems occurring during recessions (decline of economy) in labour force like skilled participation in labour, lower productivity etc.

∴ Output Cost of Unemployment is too ↑ reflected by Okun's Law.

• Other cost of unemployment increment is personal cost



faced by unemployed workers & families.

- Unemployed workers for long periods lose job skills & suffer from stress.
- Workers engage in productive activities like searching for a job or learning new skills, to compensate unemployed loss with future employment & increased output, leading economic gain.

II - Second offsetting factor, having more breaks!

- This leads to income lossing.

(macroeconomic

» The Long-Term Behavior of the Unemployment: adjusting unemployment)

- Classical & Keynesians agree that, In Short Run, the actual unemployment rate may deviate / change from the natural unemployment rate.

But, they (In Long Run), the actual unemployment rate equals to the natural unemployment rate.  $[u = \bar{u}]$

> The Changing Natural Rate -

- Natural Unemployment is equal to / same as full employment output.
- We can't know when the economy is full, so we estimate to observe the natural rate.
- Uncertainty about the natural rate.
- In 1960s,  $\bar{u}$  was below the labor force [5-5.5%]
- In 1970s & 1980s,  $\bar{u}$  exceeded the labor force [6%]
- The natural rate of unemployment changes over time.



• For ex: Women's unemployment rate rose more than men in 1960's, Teenagers unemployment rate are high because they move, they have school & can't employed (be), work with low skill jobs.

- In World War II, Teenagers & Women made the unemployment rate reduce in 1980s, i.e. reduced unemployment natural rate.

- Younger workers were in account of declining in unemployment rate, declining natural rate of u in 1980s.

- Labor Market became efficient, matching workers & jobs.
- Some agencies helps firms fill their temporary vacancies in vacancies.
- These temporary jobs become permanent.

∴ This Declined the natural rate of unemployment ( $\bar{u}$ ).

- Workers increased their productivity leading  $\bar{u}$  to decline.
- Productivity can be rising more than the real wage, firms will hire more workers, again leading  $\bar{u}$  to decline.

> Measuring the Natural Rate of Unemployment -

- To set up / indicate the setting policies, policymakers needs good measures of natural rate of unemployment.
- Estimating natural rate of unemployment is not possible, it's never accurate, it's inconsistent.
- Policymakers should be less aggressive for policy changes.



- Measures of full employment output was also more imprecise.
- So even though economic theory are based on the full-employment output & natural level of unemployment, policymakers find it difficult in making policies & to measure them precisely.

### 12.3 The Problem of Inflation:

> Some strong measures were taken to reduce inflation even though it was already low at that time (1970s)

- President Jimmy Carter, lost his bid to Ronald Reagan when he was unable to control Inflation.

#### >> The Costs of Inflation:

- This depends on consumers, investors, workers & firms. (are able to predict the inflation)

#### > Perfectly Anticipated Inflation:

- Perfectly anticipated as in perfectly predicted by public.

Ex: Public knows that inflation rate will be 4% that year, all other factors are same (assuming)

- Inflation  $\uparrow$  = Nominal Wages  $\uparrow$

- Nominal Wages  $\uparrow$  = Purchasing power won't be changed. (It less as always)  $\downarrow$

- Perfectly anticipated inflation won't affect your savings account.

- If inflation rate is 3%, and it rises to 4% as perfectly anticipated the nominal interest rate is 7%, the real interest rate is not changed i.e. 3%.

— Because Bank & savers only care abt Real i.

∴ Bank & Savers should be not be hurt by anticipated inflation.



I. Economic Cost - Comparing any loss of a good which is attached to another good.

- Inflation destroys value of currency, keeping less currency on hand, Ex: By going to bank or ATM every week instead of months.
- The cost of time & effort people spend to reduce their holdings of cash is Shoe leather Costs. (Efforts to exchange the future currency with another foreign currency).

- II.
- Perfectly anticipated inflation rises by Menu Costs (Costs occurring when a firm changes its prices).
  - When inflation rises, sellers raise their prices of goods.
  - By installing electronic scanners on markets, ↓ (reduces) these costs for changing prices.

> Unanticipated Inflation:

- Public doesn't like unexpected inflation. Ex: Expected 4%  $\pi^e$ , but  $\pi$  is 6% next year.

• (The actual real  $i$  = nominal  $i$  -  $\pi$ )  
(savings acc.)

•  $i$  on Savings's acc.  $\Rightarrow 7\% - 6\% \Rightarrow 1\%$

Instead of 3% i.e.  $7\% - 4\%$

- Lower  $i$  is our loss, but bank's gain, as it will have to pay less  $i$ . [Vice Versa]

• Suppose your real (nominal) salary is set in advance.

• If  $\pi^e \uparrow$ , the nominal salary is less & your employer's gain.





- These examples show the effects by unanticipated inflation on wealth by transferring it from one person to another.
- People who lend (creditors)  $i$ , are hurt by unanticipated inflation.
- People who borrow (debtors)  $i$ , are helped by unanticipated inflation.
- This transferring of wealth is a loss for an individual but not a loss for an economy as a whole.

> For an individual it is a cost of unanticipated inflation.

- Additional Cost: Any resources that people use in predicting the inflation to protect themselves.
- Can be eliminated with the help of Indexed Contracts.

## II. INDEXED CONTRACTS :

These are the contracts linked with inflation. Inflation rises,  $i \uparrow$ .

- Contracts such as loans, mortgages are linked to protect workers against unanticipated inflation.

- Price changes are the signals in market to switch from more expensive one to less expensive. [Relative Prices]
- People gets confused by unanticipated inflation, prices signals may get mixed with inflation price, making the economy work less efficiently.



## > The Costs of Hyperinflation:

- Hyperinflation occurs when inflation rate is extremely high for a period of time.
- Much greater than a modest inflation.
- Higher prices = High incentives.
- In Hyperinflation, workers are paid much more frequently.
- Then they use shop leather costs to exchange their rising currency.
- & the time & energy used in doing all this wastes resources and causes problems in production.
- Taxpayers can pay taxes as long as they can, they can delay that, in hyperinflation, reducing the govt. finances and its ability to provide public services.
- Can't ~~use~~ allocate / use resources efficiently.

## >> Fighting Inflation: The Role of Inflationary Expectations:

- Inflation arises when aggregate demand is rising more quickly than the aggregate supply.
- ↑ in demand and inflation is because of ↑ rate of money growth.
- Somewhere rapid money growth is inflationary, but in some countries, rapid money growth will help to fight recessions, to cover their expenditures.
- To stop inflation - reduce money rate, but this process of disinflation - may result in recession.
- According to the Expectations-Augmented Phillips Curve, macroeconomic policy succeeded to reduce inflation by



below  $\pi^e$  and unemployment will rise above  $\bar{u}$  (natural)

$\therefore u$  will remain above  $\bar{u}$  and until  $\pi^e$  falls  $\downarrow$  by the  $\pi$ .

• Expectations-Augmented PC suggests: If  $\pi^e$  could be  $\downarrow$  because  $\pi$  is already  $\downarrow$ , so  $u$  doesn't have to rise above  $\bar{u}$ .

•  $\pi^e \downarrow =$  PC shifts down & left =  $\downarrow \pi$  (at any level of  $u$ )

• We can reduce inflationary expectation & inflation by:

> Rapid Versus Gradual Disinflation:

Classical

• Some economists suggest a rapid reduction in the growth rate of the money supply. [This strategy is known as Cold Turkey.]

• Quick change in this, will reduce inflationary expectations if this cold turkey policy is announced in advance.

• This will imply that, (Expectations-Augmented PC) if inflation  $\downarrow$ , the  $u \uparrow$  will be minimal (less) and inflation too  $\downarrow$ .  
unemployment cost (higher  $u$ )

Keynesians

• These economists disagree with RAPID disinflation, they disagree that this can be achieved without  $\uparrow$  cyclical unemployment.

• They argue that factors such as menu costs & etc., wage & price adjustment to a disinflationary policy is difficult to achieve easily.

• They also greatly argue that COLD TURKEY Policy may not  $\downarrow$  the  $\pi^e$  as people may expect that the Govt. will abandon this policy if  $u$  reaches to a very  $\uparrow$  level.

• They recommend a policy of reducing the growth rate of money supply Gradually [This policy is known as Gradualism.]



- They argue that this policy will give some to the wages, prices, etc. to adjust to the disinflation.
- They also argue that this will make  $\pi$  less than  $\pi$  raised in the cold turkey policy.
- They argue that this policy will be as effective as the cold turkey policy to reduce inflationary expectations.

### > Wage and Price Controls:

- Polymakers have taken a step like legal limit on firms' ability to raise wages & prices.
- They argue that govt. should use the force of law to stop  $\uparrow$  inflationary expectations, where unemployment will not have serious consequences.

### ① Critics make two points:

- ① — When supply & demand changes, changes prices by rising, one product's price is more than the other product.  
— If price controls prevent the price of a product from  $\uparrow$  to a level, when Supply = Demand, there will be more demand for the product (excess demand), lead to a shortage.  
→ These shortages cause major cost of price controls.

- ② — These wage-price controls effect on inflation (expected).  
— They stop inflation for some time, cause shortages.  
— Knowing these controls are temporary, people expect  $\uparrow$  inflation in future.

- One effect that affects the  $\pi^e$ , while these controls, is how Govt. handles monetary & fiscal policy (AD).



- If macroeconomic policies allow to  $\uparrow$  AD, people will expect inflation (new) when these controls are lifted.
- Nixon Wage-price controls were the controls where AD  $\uparrow$  reduced was a failure.
- If controls are with monetary & fiscal policy (tight), inflation will not resume, when controls are lifted.

### > Credibility and Reputation :

- Classicals & Keynesians agree that, to achieve Disinflation, without  $\uparrow$  unemployment costs, they should  $\downarrow$  people's  $\pi^e$ .
- If Govt. announces a policy to reduce  $\pi$ , and if everyone believes government,  $\pi^e$  will  $\downarrow$  rapidly.
- This believe for the Govt. is Credibility.
- To improve this credibility, govt. should have a reputation.
- To have policy making institutions (well known) with a anti-inflation view.

### >> The U.S. Disinflation of the 1980s and 1990s :

- Chairman Volcker  $\downarrow$  inflation from 1979 to 1982.
- From 1982, Volcker & Greenspan together  $\downarrow$   $\pi$ .
- Their motivation was to keep inflation under control, to not worry.
- Inflation forecasts are done by / from Survey of Professional Forecasters (anyone).
- $\pi^e$  has been stable & low in 1998, since.
- In 1979, it was first unstable (lot), Volcker (chairman) didn't had the credibility then.
- Inflation still is stable from 2004 to 2006, making Volcker's credibility well-established.



### III. SACRIFICE RATIO :

An economic ratio that measures the effect  $\uparrow$  and  $\downarrow$  the inflation on a country's output. If output is slow, inflation will drop.