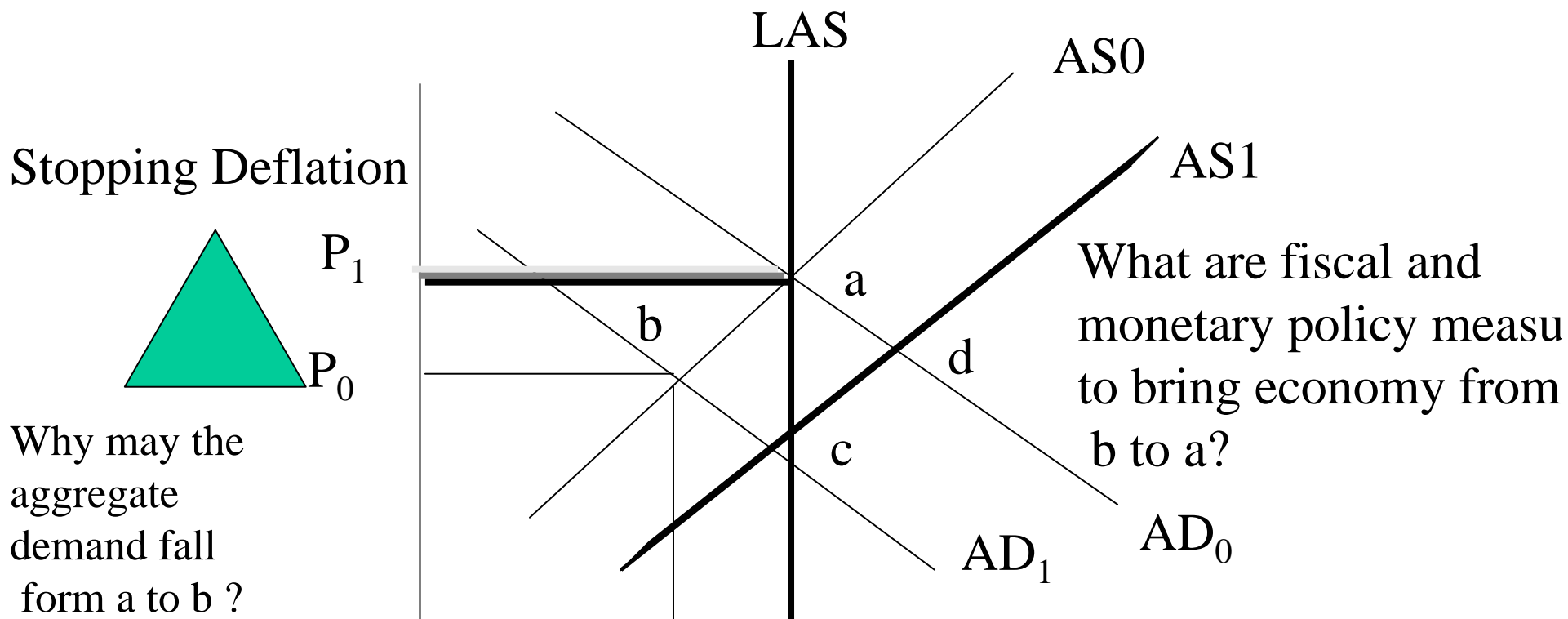


Macroeconomic Theory and Policy

Lecture 8

Output, Inflation and Unemployment

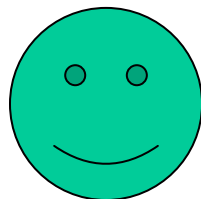
Short Run Fluctuations: Some Questions



Why the aggregate supply shifts to AS1 if there is no policy interventions?

Y_1 Y_n → natural rate of output

Stopping



slowdown of output growth₂

Derivation of Expectation Augmented Phillips Curve from Aggregate Supply

AS:
$$P_t = P_t^e + a(Y_t - Y_n) \quad (1)$$

Subtract P_{t-1} from both sides:

$$P_t - P_{t-1} = P_t^e - P_{t-1} + a(Y_t - Y_n) \quad (2)$$

$$\pi_t = \pi_t^e + a(Y_t - Y_n) \quad (3)$$

OKun's Curve:
$$(Y_t - Y_n) = -k(u_t - u_n) \quad (4)$$

Expectation Augmented Phillips' Curve:

$$\pi_t = \pi_t^e - ak(u_t - u_n) \quad (5) \quad 3$$

Origin of the Phillips Curve

Keynesian model assumes prices to be constant in the short run.

Phillips (1958) estimated a negative relation between the wage rate and unemployment rate using the data set for the UK economy from 1861-1957.

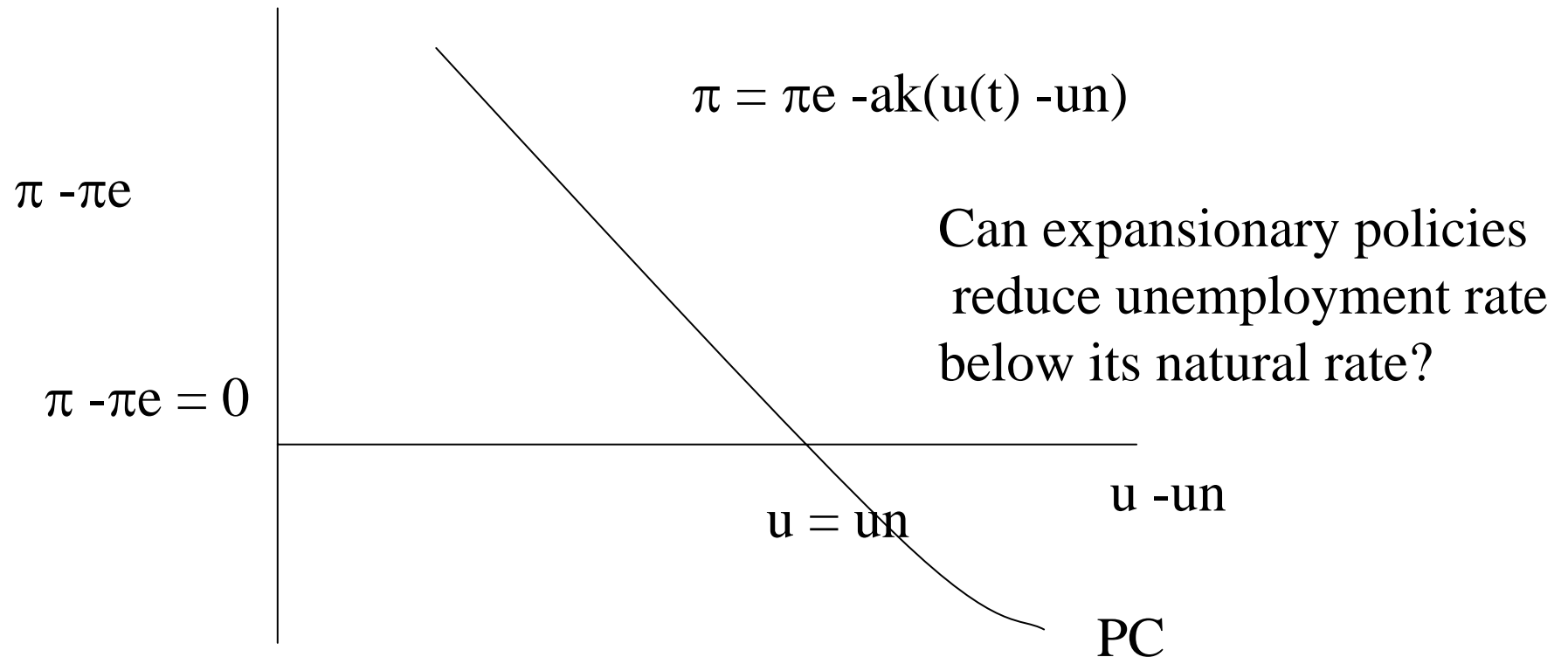
$$\frac{\dot{w}}{w} = g(u) \quad (1)$$

where $g < 0$, where

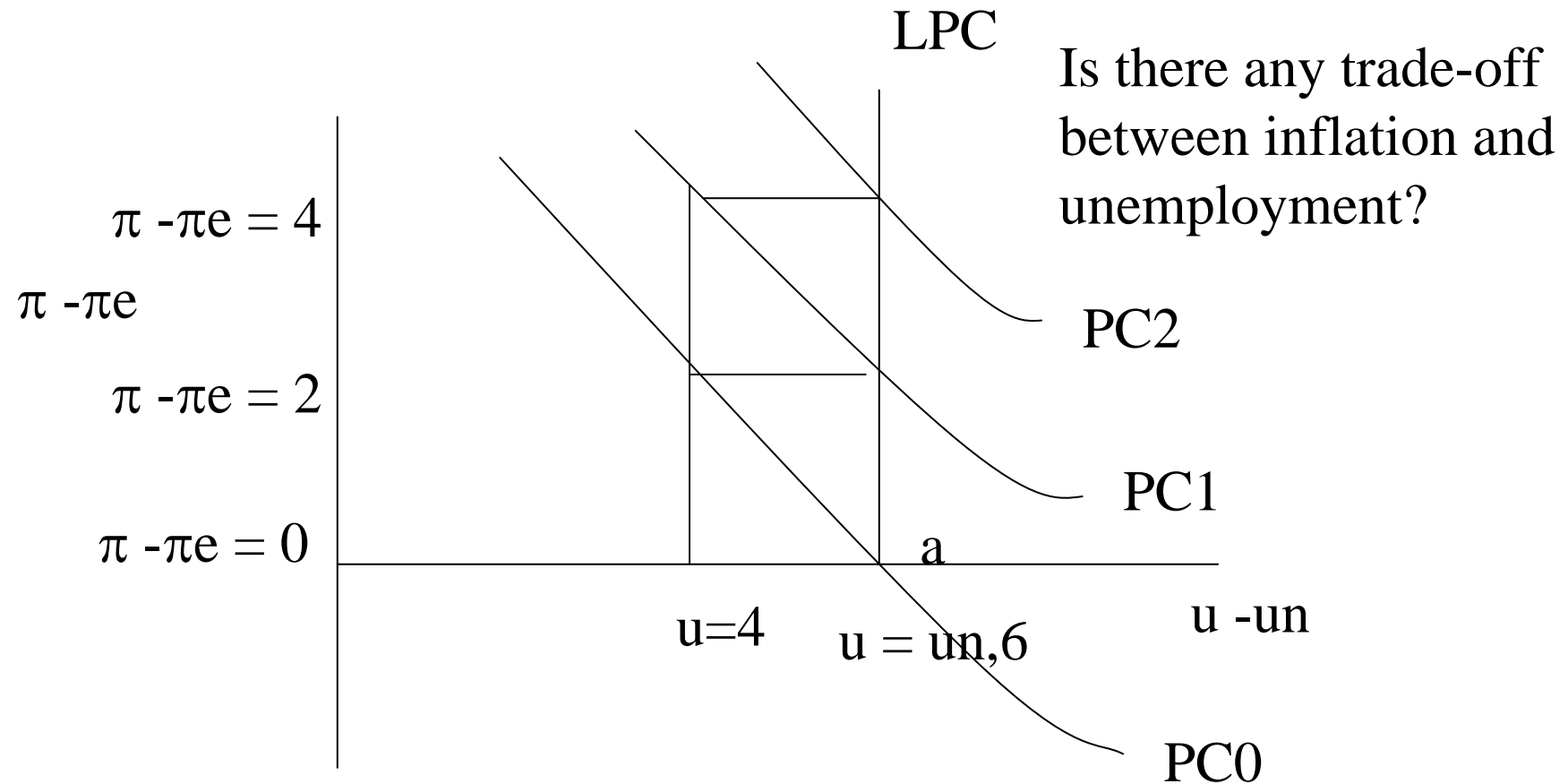
$\frac{\dot{w}}{w}$ is the change in the unemployment rate and
 u is the unemployment rate

Lipsey (1960) slightly altered this relation including excess labour supply in relation to labour force $\frac{\dot{w}}{w} = g\left(\frac{NS - ND}{LF}\right)$.

Expectation Augmented Phillips Curve in the Short Run



Non-Accelerating Inflationary Rate of Unemployment (NAIRU) or Natural Rate of Unemployment



Unemployment in Inflation in the UK

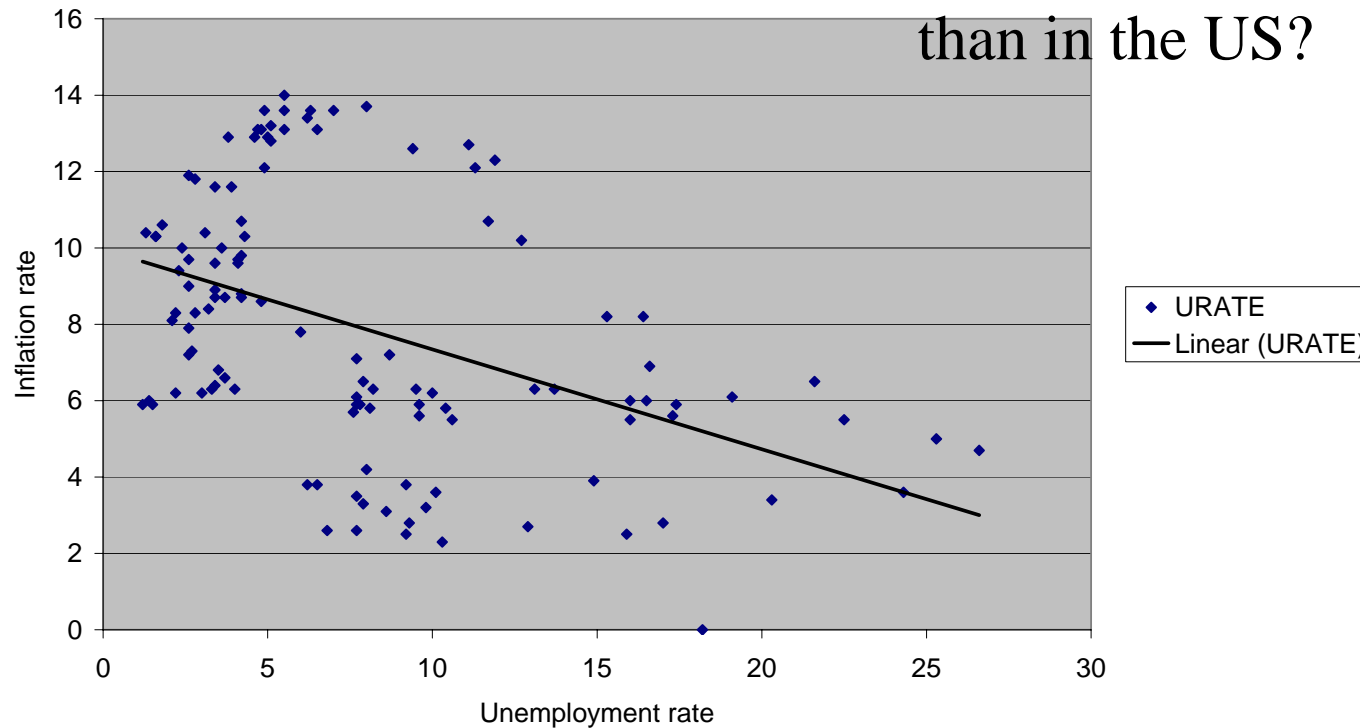


Why the MPC should target inflation rather than economic growth rate or unemployment rate?

Evidence of the Phillips Curve in the UK

Why is unemployment rate higher in the European countries than in the US?

Phillips Curve in the UK, 1970-2002



Cost of Inflation

- Resources are transferred from creditors to debtors, as borrowers pay less to lenders in real terms. Try some examples with fixed tax rates, inflation and nominal and real interest rates.
- Inflation redistributes income from fixed income groups to property holders. For instance wages do not increase but rents rise; pensions do not rise but the commodity prices rise.
- Tax systems are not indexed for inflation. Unfavourable to low income people who artificially may cross the tax threshold because of inflation.
- There is no compensation for inflation in bank deposits. Shoe leather cost of inflation rises. Bookkeeping rises unnecessarily.
- Menu costs rise with inflation rises. More catalogue need to be printed and more advertisements to be made higher is the frequency of price changes.
- Reduces the efficiency of the price system. Market prices of goods and services cannot signal scarcity correctly. Relative prices become distorted as price changes do not occur uniformly for all goods.
- Inflation hurts consumers whose income rise slowly than the prices of goods.
- Inflation causes uncertainty. Contracts cannot be written precisely. Retired people and all other fixed income group loose from inflation.
- Inflation is harmful for growth. Investment slows down.
- It creates illusions, confusions, and complicates economic calculations.

Natural Rate of Unemployment Hypothesis

- The natural rate of output and employment “ground out” by the equilibrium in goods, labour and money markets (Friedman (1968))
- The economies converges to the natural rate in the long run.
- Nothing in the economy guarantees that actual output and employment do not deviate from such natural rates in the short run.
- When consumers and producers have good confidence about the status of the economy they are likely to spend more and the economic growth rate higher than the natural rate.
- A reverse process operates in the downturn.
- A smooth functioning of the economy requires stabilising the economy around these natural rates.

Friedman (1966, 1968) and Phelps (1967) natural rate of unemployment hypothesis

$$\pi_t = \alpha(u_t - u_N) + \pi_t^e \quad \text{where } \alpha < 0 \quad (2)$$

where π_t is the actual inflation, π_t^e is the expected inflation u_N is the natural rate of unemployment that is ground out by the Walrasian system of the general equilibrium, and u_t is the actual unemployment rate.

Since $\pi_t - \pi_t^e = \alpha(u_t - u_N)$ and $\alpha < 0$ the inverse relation between unemployment and inflation implies

$$\begin{aligned} \pi_t > \pi_t^e &\Rightarrow u_t < u_N \Rightarrow y_t > y^* \\ \pi_t < \pi_t^e &\Rightarrow u_t > u_N \Rightarrow y_t < y^* \\ \pi_t = \pi_t^e &\Rightarrow u_t = u_N \Rightarrow y_t = y^* \end{aligned} \quad (3)$$

Stabilisation Programme: Output, Inflation and Unemployment

Unemployment and output gap (Okun's law)

$$u_t - u_{t-1} = -a(g_{y,t} - g_{y,n}) \quad (1)$$

Phillip's curve (expectation augmented):

$$\pi_t - \pi_{t-1} = -b(u_t - u_n) \quad (2)$$

Relation between growth rates of money, output and inflation

$$g_{y,t} = g_{m,t} - \pi_t \quad (3)$$

$g_{y,t}$ is actual growth rate of output; $g_{y,n}$ is natural growth rate of output

$g_{m,t}$ is growth rate of money supply

π_t is inflation rate; u_t is actual unemployment rate; u_n natural rate of unemployment

Parametric Specification and solution steps for inflation reduction Programme

Suppose that $g_{y,n} = 2\%$; $u_n = 3\%$; current $\pi_t = 9\%$; let target $\pi^* = 2\%$; $a = 0.5$; $b = 1$.

Steps:

1. Stick the current and past inflation rates π_t and π_{t-1} in equation (2) and solve that equation for actual unemployment rate u_t . The current inflation rate π_t can be obtained using information on π_{t-1} and desired decrease in the annual inflation rate.
2. Use this unemployment rate in equation (1) and solve for the actual growth rate, $g_{y,t}$.
3. Use this growth rate of output in equation (3) to solve for growth rate of money supply $g_{m,t}$. Repeat this process until target rate of inflation is achieved.

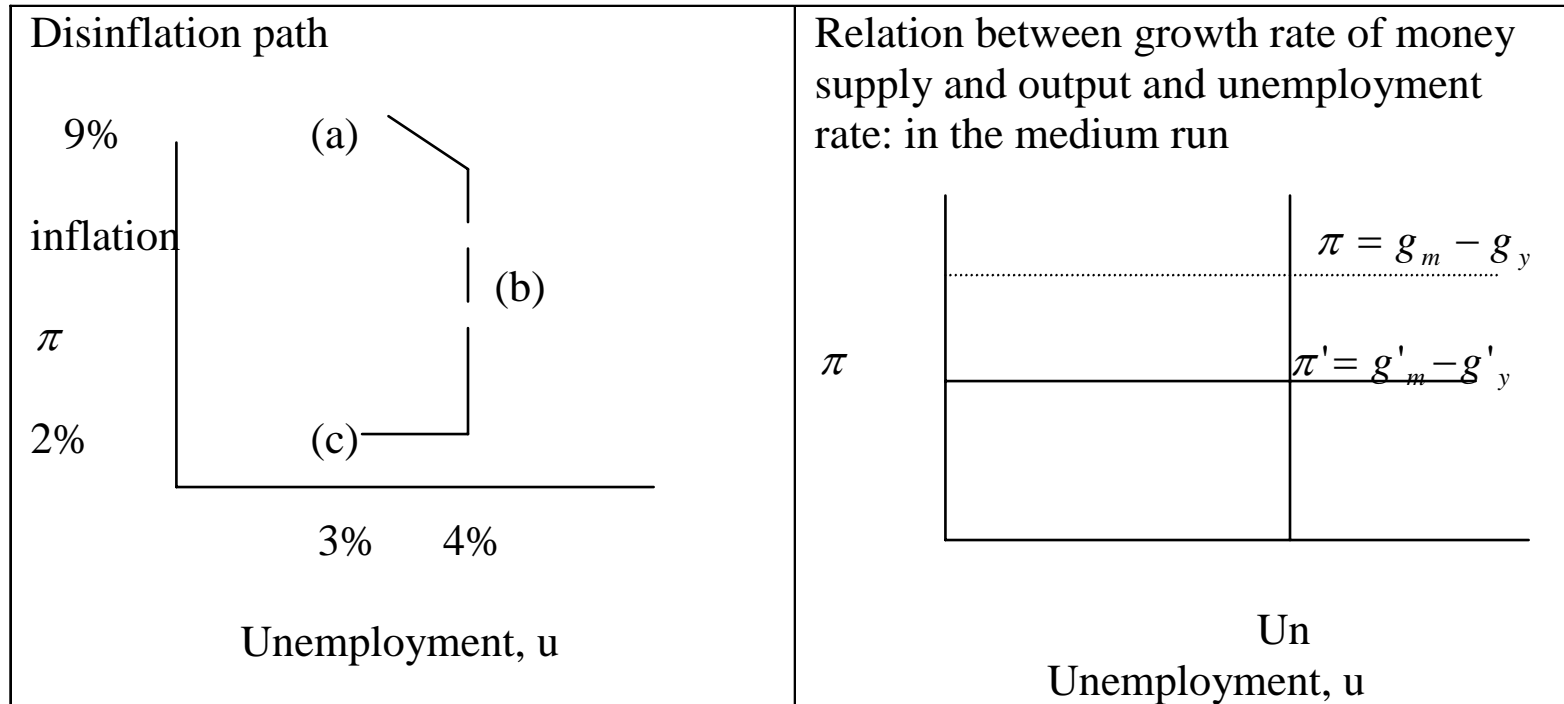
Transitional path of output and money growth and unemployment rate in the inflation reduction programme

Years	Inflation rate π_t	Unemployment rate u_t	growth of output $g_{y,t}$	Growth of money $g_{m,t}$
0	9	3	2	11
1	8	4	0	8
2	7	4	2	9
3	6	4	2	8
4	5	4	2	7
5	4	4	2	6
6	3	4	2	5
7	2	4	2	4
8	2	3	4	6
9	2	3	2	4
10	2	3	2	4

The stabilisation programme itself can be divided in three phases

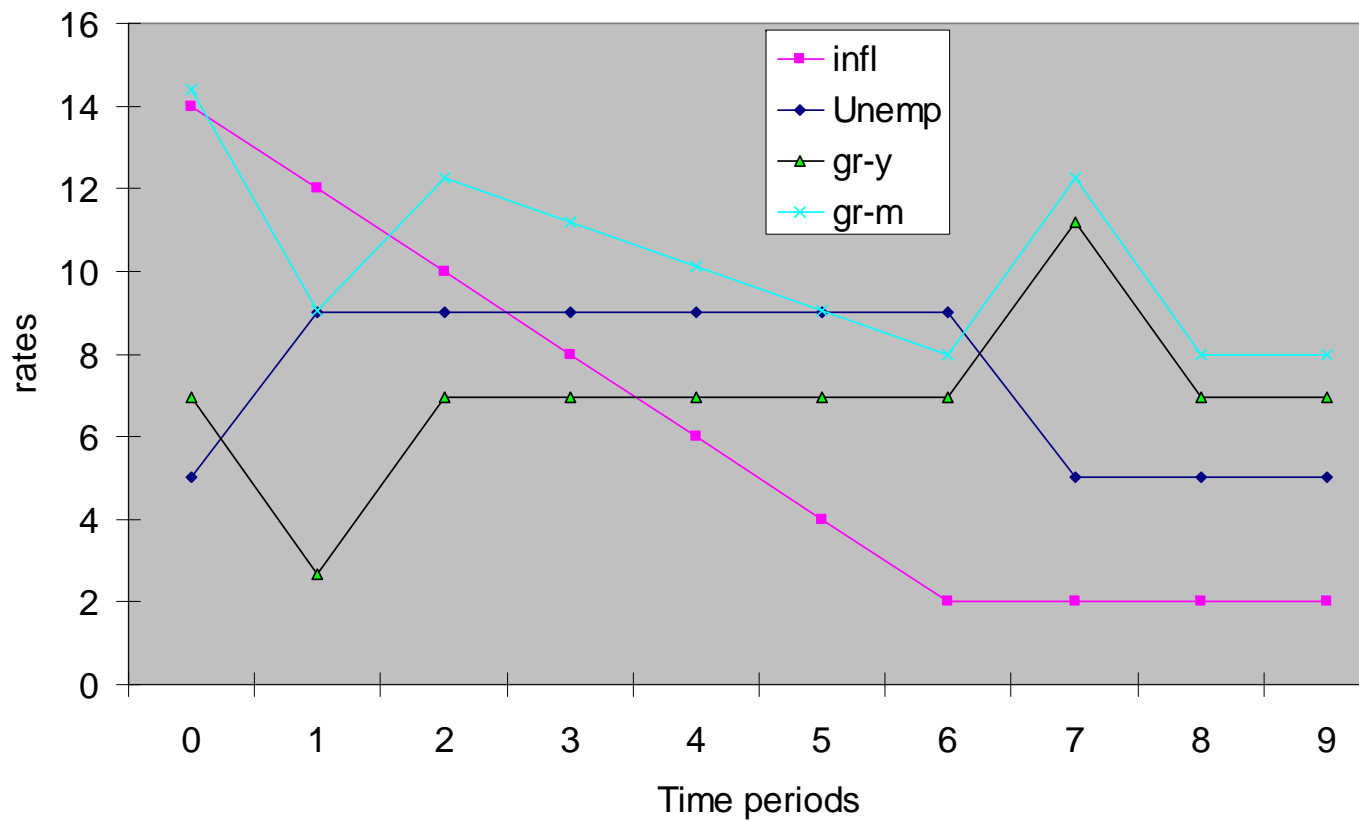
(a) initial phase; (b) intermediate phase; (c) final phase

Disinflation Path and the Steady State



Inflation, Unemployment, Growth Rate of Output and Money Supply

Relation between inflation, unemployment rate, growth rate of output and money supply



Four Theories of Unemployment

- Insider-outsider theory:
individual and collective labour supply -wage setting and price setting
- Efficiency wage theory:
no shirking, no turnover costs, nourishment, adverse selection
- Search and job mismatch theory of frictional unemployment
- Structural unemployment- Labour Market Rigidity

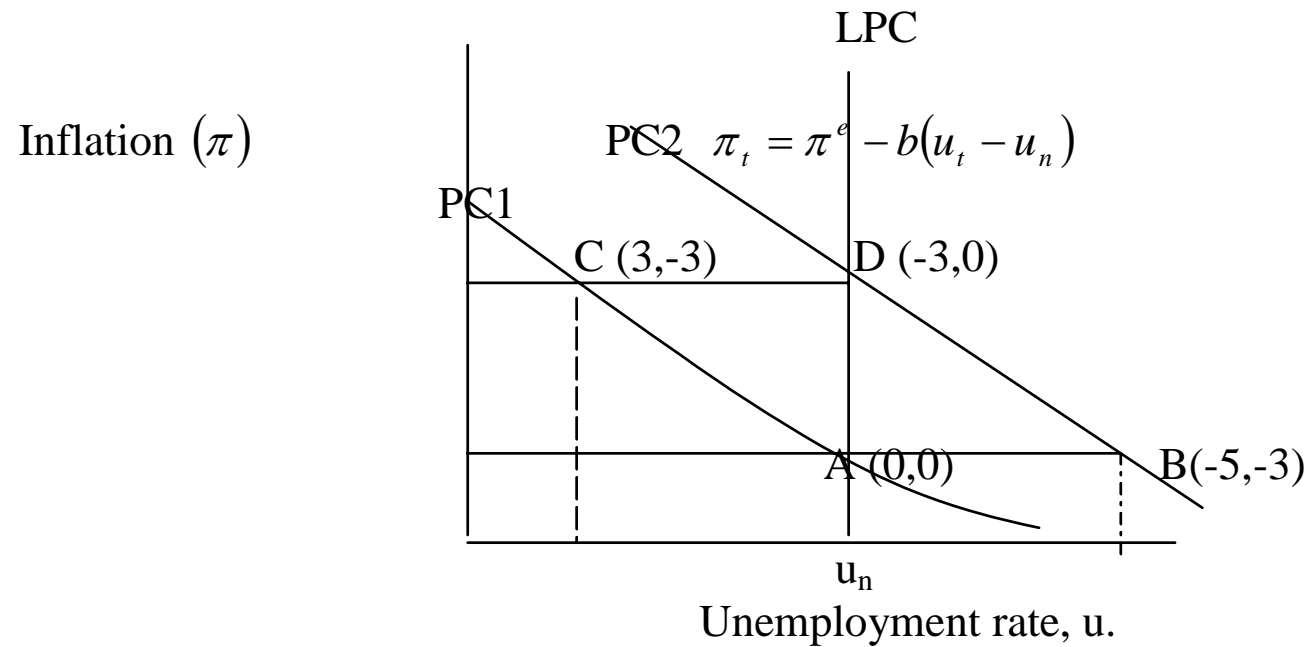
Inflation Policy Game

.....	<i>Private Sector</i>
<i>Government Sector</i>	$\begin{bmatrix} & H & L \\ H & -3,0 & 3,-3 \\ L & -5,-3 & 0,0 \end{bmatrix}$

Policy options and its outcome

Policy Options	Actual inflation	Expected inflation	Unemployment rate
A	Low	Low	$u = u_n$
B	Low	High	$u > u_n$
C	High	Low	$u < u_n$
D	High	High	$u = u_n$

Inflation Policy Game



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