

# Economic Text: Converging World

1. Summarize the text in a few sentences
2. Explain the drivers of cyclical effects in taxes and government spending
3. Explain why European countries are able to have a consistently higher tax take as a percentage of GDP than the U.S., despite capital mobility.
4. How does the spread between highest and lowest taxing jurisdictions develop over time? Why would one expect that the same development also takes place as regards government spending?
5. Is there a consensus on the optimal tax regime with respect to economic growth? What is the empirical evidence?
6. What is the outlook on the spread of countries' fiscal policies?

# Chapter 13: AS & Short-run Tradeoff Between Inflation & Unemployment\*

MACROECONOMICS

Seventh Edition

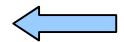
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\* Slides based on Ron Cronovich's slides, adjusted for course in Macroeconomics for International Masters Program at the Wang Yanan Institute for Studies in Economics at Xiamen University.

# Learning Objectives

This chapter introduces you to understanding:

- The basic theory of aggregate supply
- The short-run tradeoff between inflation and unemployment known as the Phillips curve

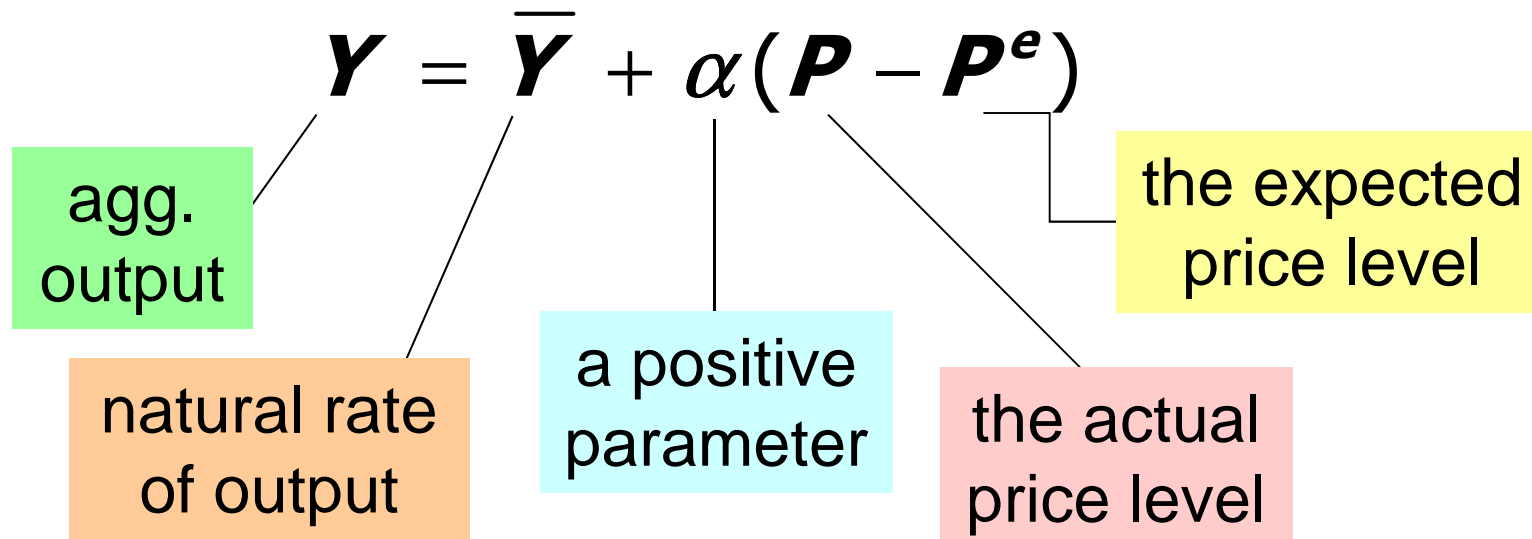


# 13.1) Theory of Aggregate Supply

## → Two Models of Aggregate Supply

1. The sticky-price model
2. The imperfect-information model

Both models imply:

$$Y = \bar{Y} + \alpha(P - P^e)$$


agg. output

natural rate of output

a positive parameter

the actual price level

the expected price level

# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

- Reasons for sticky prices:
  - long-term contracts between firms and customers
  - menu costs
  - firms not wishing to annoy customers with frequent price changes
- Assumption:
  - Firms set their own prices  
(*e.g.*, as in monopolistic competition).

# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

- An individual firm's desired price is

$$p = P + a(Y - \bar{Y})$$

where  $a > 0$ .

Suppose two types of firms:

- firms with flexible prices, set prices as above
- firms with sticky prices, must set their price before they know how  $P$  and  $Y$  will turn out:

$$p = P^e + a(Y^e - \bar{Y}^e)$$

# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

$$p = P^e + a(Y^e - \bar{Y}^e)$$

- For simplicity, assume sticky price firms expect that output will equal its natural rate. Then,

$$p = P^e$$

- To derive the aggregate supply curve, we first find an expression for the overall price level.
- Let  $s$  denote the fraction of firms with sticky prices. Then, we can write the overall price level as...

# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

$$P = s P^e + (1 - s)[P + a(Y - \bar{Y})]$$

price set by sticky  
price firms

price set by flexible  
price firms

- Subtract  $(1-s)P$  from both sides:

$$sP = sP^e + (1 - s)[a(Y - \bar{Y})]$$

- Divide both sides by  $s$  :

$$P = P^e + \left[ \frac{(1 - s)a}{s} \right] (Y - \bar{Y})$$



# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

$$P = P^e + \left[ \frac{(1-s)a}{s} \right] (Y - \bar{Y})$$

- High  $P^e \Rightarrow$  High  $P$

If firms expect high prices, then firms that must set prices in advance will set them high. Other firms respond by setting high prices.

- High  $Y \Rightarrow$  High  $P$

When income is high, the demand for goods is high. Firms with flexible prices set high prices.

The greater the fraction of flexible price firms, the smaller is  $s$  and the bigger is the effect of  $\Delta Y$  on  $P$ .

# 13.1) Theory of Aggregate Supply

## → The Sticky-price Model

$$P = P^e + \left[ \frac{(1-s)a}{s} \right] (Y - \bar{Y})$$

- Finally, derive AS equation by solving for  $Y$ :

$$Y = \bar{Y} + \alpha(P - P^e),$$

$$\text{where } \alpha = \frac{s}{(1-s)a}$$

# 13.1) Theory of Aggregate Supply

→该你们了

In the sticky-price model, describe the aggregate supply curve in the following special cases. How do these cases compare to the short-run aggregate supply curve we discussed in Chapter 9?

- a. No firms have flexible prices ( $s = 1$ ).
- b. The desired price does not depend on aggregate output ( $a = 0$ ).

# 13.1) Theory of Aggregate Supply

## → The Imperfect-Information Model

Assumptions:

- All prices are perfectly flexible, all markets clear.
- Each supplier produces one good, consumes many goods.
- Each supplier knows the nominal price of the good she produces, but does not know the overall price level.

→ LRAS and SRAS differ because of temporary price misperceptions.

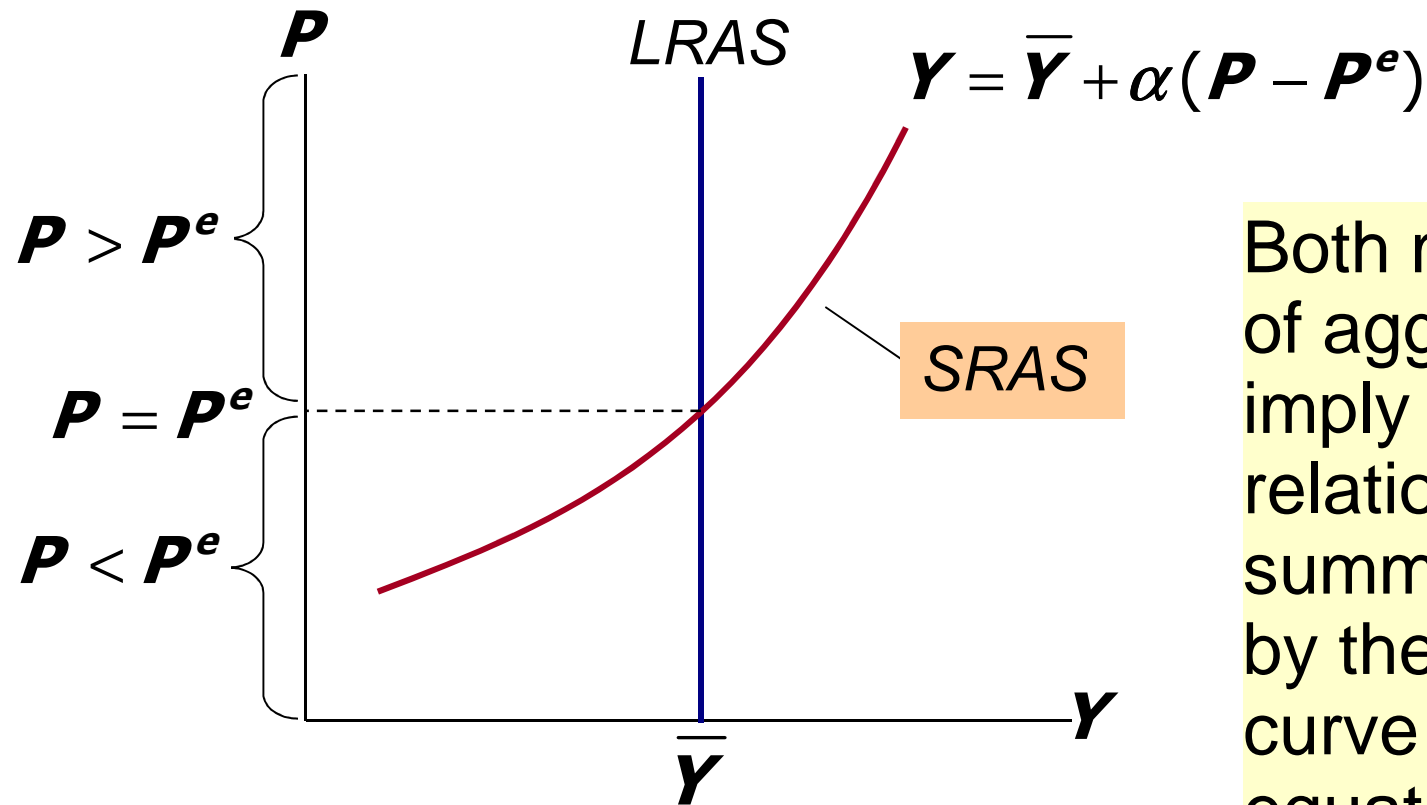
# 13.1) Theory of Aggregate Supply

## → The Imperfect-information Model

- Supply of each good depends on its relative price: the nominal price of the good divided by the overall price level.
- Supplier does not know price level at the time she makes her production decision, so uses the expected price level,  $P^e$ .
- Suppose  $P$  rises but  $P^e$  had not risen, that is, the rise in prices comes unexpected.
  - Supplier thinks her relative price has risen, so she produces more.
  - With many producers thinking this way,  $Y$  will rise whenever  $P$  rises above  $P^e$ .

# 13.1) Theory of Aggregate Supply

## → Summary & Implications



Both models of agg. supply imply the relationship summarized by the SRAS curve & equation.

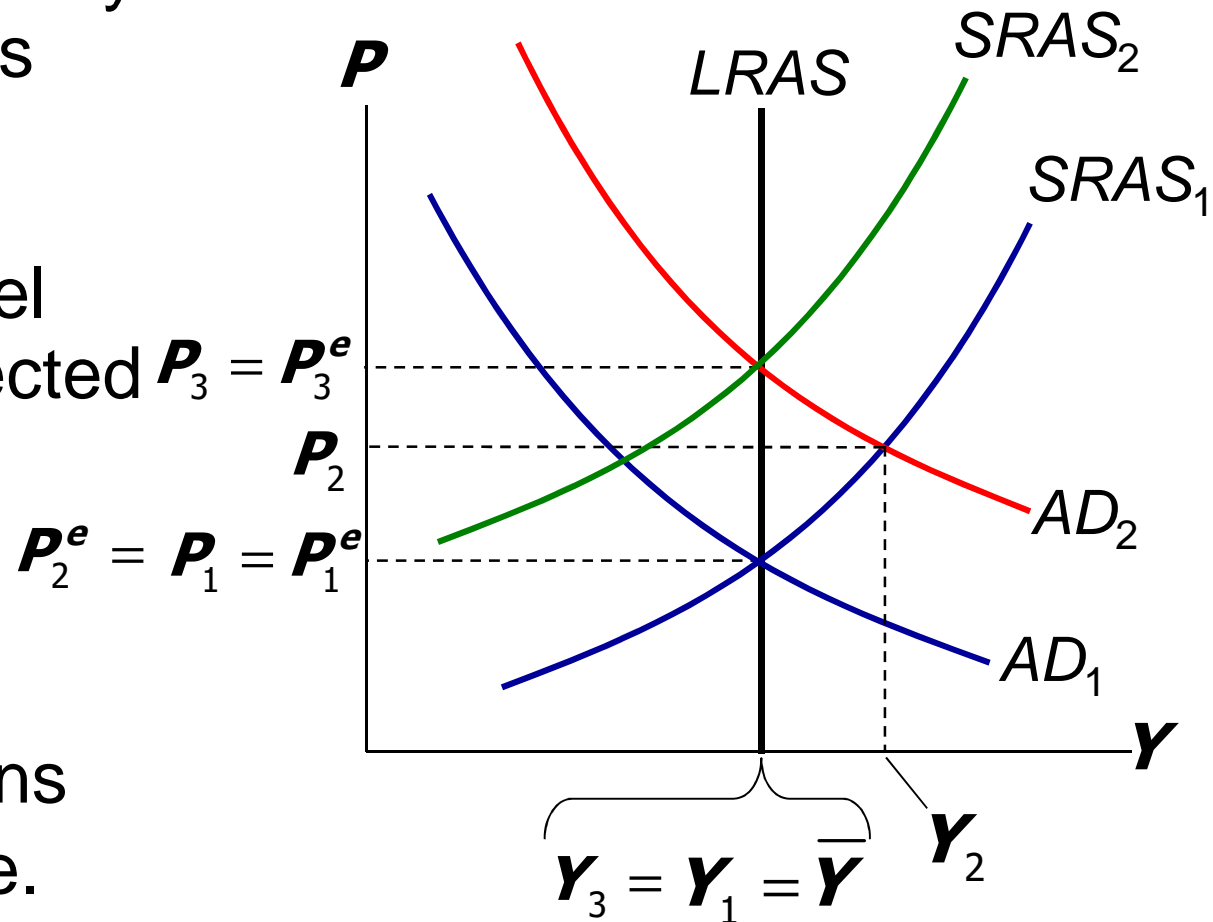
# 13.1) Theory of Aggregate Supply

## → Summary & Implications (ctd.)

Suppose a monetary expansion moves output above its natural rate and  $P$  above the level people had expected  $P_3 = P_3^e$



Over time,  $P^e$  rises,  $SRAS$  shifts up, and output returns to its natural rate.

$$SRAS \text{ equation: } Y = \bar{Y} + \alpha(P - P^e)$$



# Learning Objectives

This chapter introduces you to understanding:

- The basic theory of aggregate supply 
- The short-run tradeoff between inflation and unemployment known as the Phillips curve 



# 13.2) The Phillips Curve

## → Inflation, Unemployment & Phillips Curve

The **Phillips curve** states that  $\pi$  depends on

- expected inflation,  $\pi^e$ .
- **cyclical unemployment**: the deviation of the actual rate of unemployment from the natural rate
- supply shocks,  $\nu$  (Greek letter “nu”).

$$\pi = \pi^e - \beta(u - u^n) + \nu$$

where  $\beta > 0$  is an exogenous constant.

# 13.2) The Phillips Curve

→ Deriving the Phillips Curve from SRAS

$$(1) \quad \mathbf{Y} = \bar{\mathbf{Y}} + \alpha(\mathbf{P} - \mathbf{P}^e)$$

$$(2) \quad \mathbf{P} = \mathbf{P}^e + (1/\alpha)(\mathbf{Y} - \bar{\mathbf{Y}})$$

$$(3) \quad \mathbf{P} = \mathbf{P}^e + (1/\alpha)(\mathbf{Y} - \bar{\mathbf{Y}}) + \nu$$

$$(4) \quad (\mathbf{P} - \mathbf{P}_{-1}) = (\mathbf{P}^e - \mathbf{P}_{-1}^e) + (1/\alpha)(\mathbf{Y} - \bar{\mathbf{Y}}) + \nu$$

$$(5) \quad \pi = \pi^e + (1/\alpha)(\mathbf{Y} - \bar{\mathbf{Y}}) + \nu$$

$$(6) \quad (1/\alpha)(\mathbf{Y} - \bar{\mathbf{Y}}) = -\beta(\mathbf{u} - \mathbf{u}^n)$$

$$(7) \quad \pi = \pi^e - \beta(\mathbf{u} - \mathbf{u}^n) + \nu$$

# 13.2) The Phillips Curve

## → The Phillips Curve and SRAS

$$\text{SRAS: } Y = \bar{Y} + \alpha(P - P^e)$$

$$\text{Phillips curve: } \pi = \pi^e - \beta(u - u^n) + v$$

- *SRAS* curve:  
Output is related to unexpected movements in the price level.
- Phillips curve:  
Unemployment is related to unexpected movements in the inflation rate.

# 13.2) The Phillips Curve

## → Adaptive Expectations

- **Adaptive expectations**: an approach that assumes people form their expectations of future inflation based on recently observed inflation.
- A simple example:  
Expected inflation = last year's actual inflation

$$\pi^e = \pi_{-1}$$

- Then, the P.C. becomes

$$\pi = \pi_{-1} - \beta(\mathbf{u} - \mathbf{u}^n) + v$$

# 13.2) The Phillips Curve

## → Inflation Inertia

$$\pi = \pi_{-1} - \beta(u - u^n) + v$$

In this form, the Phillips curve implies that inflation has inertia:

- In the absence of supply shocks or cyclical unemployment, inflation will continue indefinitely at its current rate.
- Past inflation influences expectations of current inflation, which in turn influences the wages & prices that people set.

# 13.2) The Phillips Curve

## → Two Causes of Rising & Falling Inflation

$$\pi = \pi_{-1} - \beta(u - u^n) + v$$

- **cost-push inflation:**

inflation resulting from supply shocks

Adverse supply shocks typically raise production costs and induce firms to raise prices, “pushing” inflation up.

- **demand-pull inflation:**

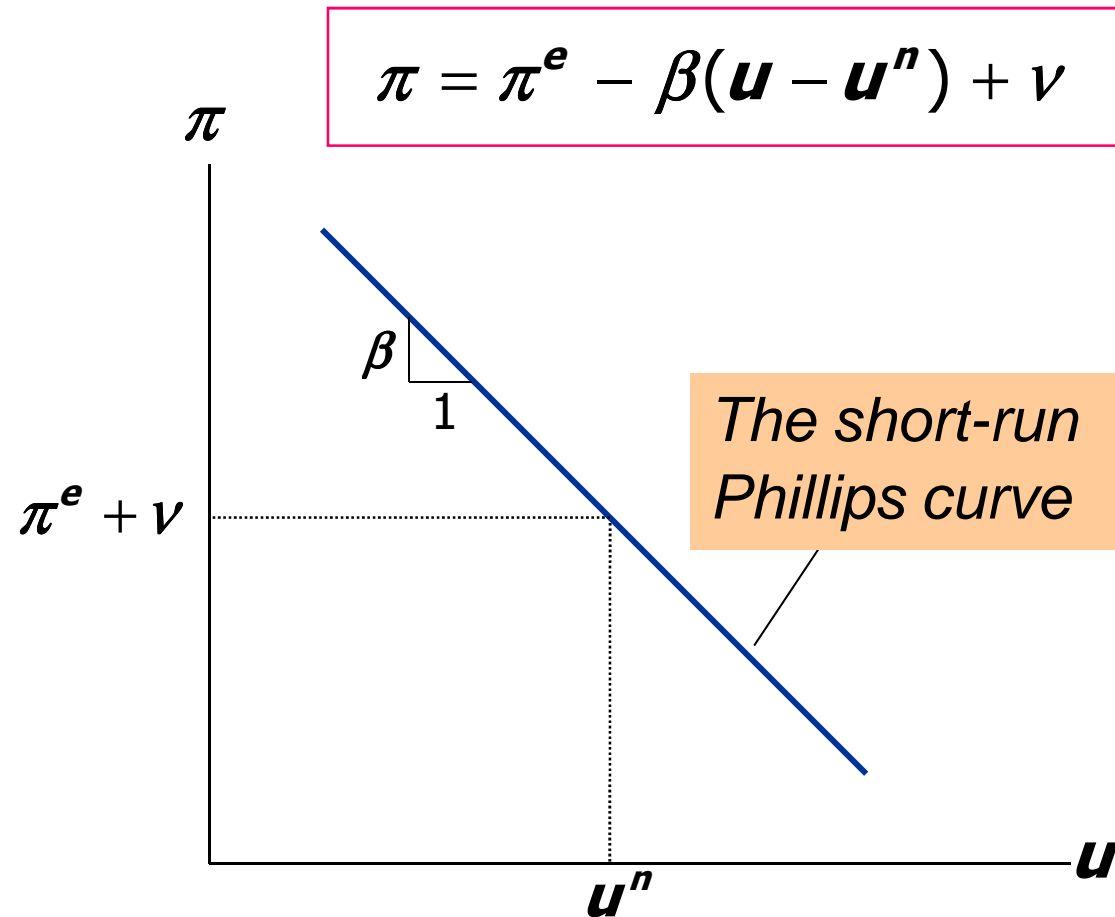
inflation resulting from demand shocks

Positive shocks to aggregate demand cause unemployment to fall below its natural rate, which “pulls” the inflation rate up.

# 13.2) The Phillips Curve

## → Graphing the Phillips Curve

In the short run, policymakers face a tradeoff between  $\pi$  and  $u$ .

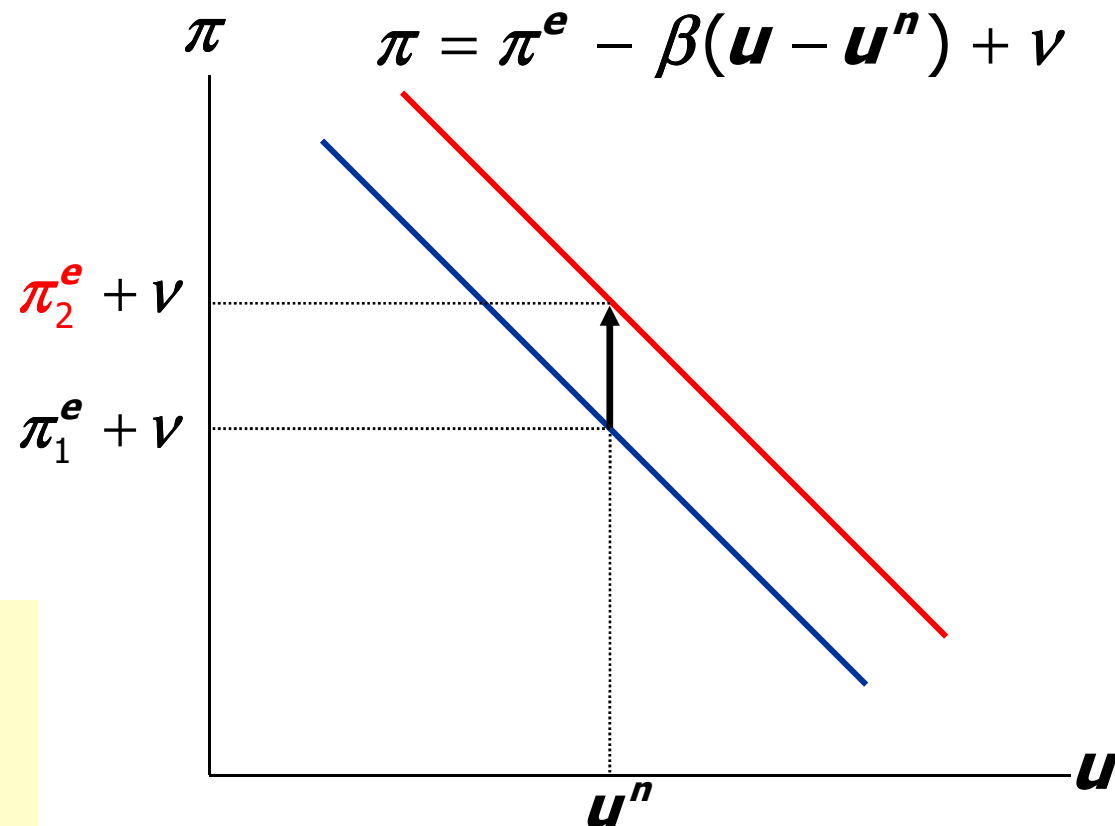


# 13.2) The Phillips Curve

## → Shifting the Phillips Curve

People adjust their expectations over time, so the tradeoff only holds in the short run.

*E.g.*, an increase in  $\pi^e$  shifts the short-run P.C. upward.





# 13.2) The Phillips Curve

## → The Sacrifice Ratio

- To reduce inflation, policymakers can contract agg. demand, causing unemployment to rise above the natural rate.
- The **sacrifice ratio** measures the percentage of a year's real GDP that must be foregone to reduce inflation by 1 percentage point.
- A typical estimate of the ratio is 5.

# 13.2) The Phillips Curve

## → The Sacrifice Ratio

- Example: To reduce inflation from 6 to 2 percent, must sacrifice 20 percent of one year's GDP:

$$\begin{aligned} \text{GDP loss} &= (\text{inflation reduction}) \times (\text{sacrifice ratio}) \\ &= 4 \times 5 \end{aligned}$$

- This loss could be incurred in one year or spread over several, e.g., 5% loss for each of four years.
- The cost of disinflation is lost GDP. One could use Okun's law to translate this cost into unemployment.

# 13.2) The Phillips Curve

## → Rational Expectations

Ways of modeling the formation of expectations:

- **adaptive expectations:**  
People base their expectations of future inflation on recently observed inflation.
- **rational expectations:**  
People base their expectations on all available information, including information about current and prospective future policies.

# 13.2) The Phillips Curve

## → Painless disinflation?

- Proponents of rational expectations believe that the sacrifice ratio may be very small:
- Suppose  $u = u^n$  and  $\pi = \pi^e = 6\%$ ,  
and suppose the Fed announces that it will do whatever is necessary to reduce inflation from 6 to 2 percent as soon as possible.
- If the announcement is credible, then  $\pi^e$  will fall, perhaps by the full 4 points.
- Then,  $\pi$  can fall without an increase in  $u$ .

# 13.2) The Phillips Curve

## → The Sacr. Ratio for the Volcker Disinflation

- 1981:  $\pi = 9.7\%$
  - 1985:  $\pi = 3.0\%$
- } Total disinflation = 6.7 perc. points

year	$u$	$u^n$	$u - u^n$
1982	9.5%	6.0%	3.5 perc. points
1983	9.5	6.0	3.5
1984	7.4	6.0	1.4
1985	7.1	6.0	1.1

Total 9.5 perc. points

# 13.2) The Phillips Curve

## → The Sacr. Ratio for the Volcker Disinflation

- From previous slide: Inflation fell by 6.7 percentage points, total cyclical unemployment was 9.5 percentage points.
- Okun's law:  
1perc. point of unemployment = 2 perc. points of lost output.
- So, 9.5 percentage points of cyclical unemployment = 19.0 % of a year's real GDP.
- **Sacrifice ratio** = (lost GDP)/(total disinflation)  
=  $19/6.7 = 2.8$  percent of GDP were lost for each 1 percentage point reduction in inflation.

# 13.2) The Phillips Curve

## → The Natural Rate Hypothesis

Our analysis of the costs of disinflation, and of economic fluctuations in the preceding chapters, is based on the **natural rate hypothesis**:

Changes in aggregate demand affect output and employment only in the short run.

In the long run, the economy returns to the levels of output, employment, and unemployment described by the classical model (Chaps. 3-8).

# 13.2) The Phillips Curve

## → An Alternative Hypothesis: Hysteresis

- **Hysteresis**: the long-lasting influence of history on variables such as the natural rate of unemployment.
- Negative shocks may increase  $u^n$ , so economy may not fully recover.



## 13.2) → Hysteresis: Why Negative Shocks may Increase the Natural Rate

- The skills of cyclically unemployed workers may deteriorate while unemployed, and they may not find a job when the recession ends.
- Cyclically unemployed workers may lose their influence on wage-setting; then, insiders (employed workers) may bargain for higher wages for themselves.

Result: The cyclically unemployed “outsiders” may become structurally unemployed when the recession ends.

# Economic Text: It doesn't take a village

1. Summarize the text in a few sentences
2. What is the idea behind 'local governance' development aid vs 'government focussed' development aid?
3. What are the biggest problems of development aid project taking place under local governance?
4. Which groups can easily be undermined under local development schemes? Why is this the case?



# Chapter Summary

1. Two models of aggregate supply in the short run:
  - sticky-price model
  - imperfect-information model

Both models imply that output rises above its natural rate when the price level rises above the expected price level.



# Chapter Summary

## 2. Phillips curve

- derived from the SRAS curve
- states that inflation depends on
  - expected inflation
  - cyclical unemployment
  - supply shocks
- presents policymakers with a short-run tradeoff between inflation and unemployment



# Chapter Summary

3. How people form expectations of inflation
  - adaptive expectations
    - based on recently observed inflation
    - implies “inertia”
  - rational expectations
    - based on all available information
    - implies that disinflation may be painless



# Chapter Summary

## 4. The natural rate hypothesis and hysteresis

- the natural rate hypothesis states that changes in aggregate demand can only affect output and employment in the short run
- Hysteresis states that aggregate demand can have permanent effects on output and employment