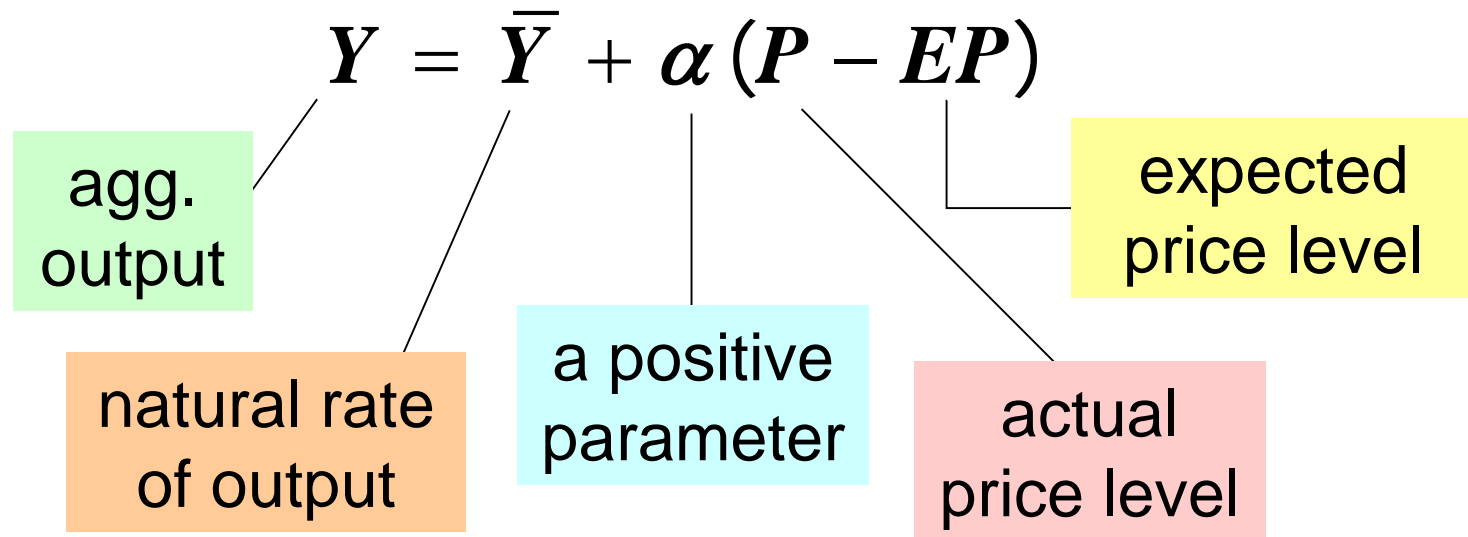# ECON 3010
Intermediate Macroeconomics

Chapter 14

Aggregate Supply and the Short-Run
Tradeoff Between Inflation and Unemployment

Introduction

- In previous chapters, we assumed the price level P was "stuck" in the short run.
  - This implies a horizontal SRAS curve.

- Now, we consider a prominent model of aggregate supply in the short run:
  - "Sticky-price" model

Introduction

- Both models imply:

$$Y = \overline{Y} + \alpha\,(P - EP)$$

agg. output

natural rate of output

a positive parameter

actual price level

expected price level

- Other things equal, **Y** and **P** are positively related, so the SRAS curve is upward sloping.

The sticky-price model

- Reasons for sticky prices:
  - long-term contracts between firms & 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).

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 prices in advance:

$$p \;=\; EP + a(EY - E\bar{Y})$$

The sticky-price model

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

price set by sticky-price firms

price set by flexible-price firms

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

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

- Divide both sides by s:

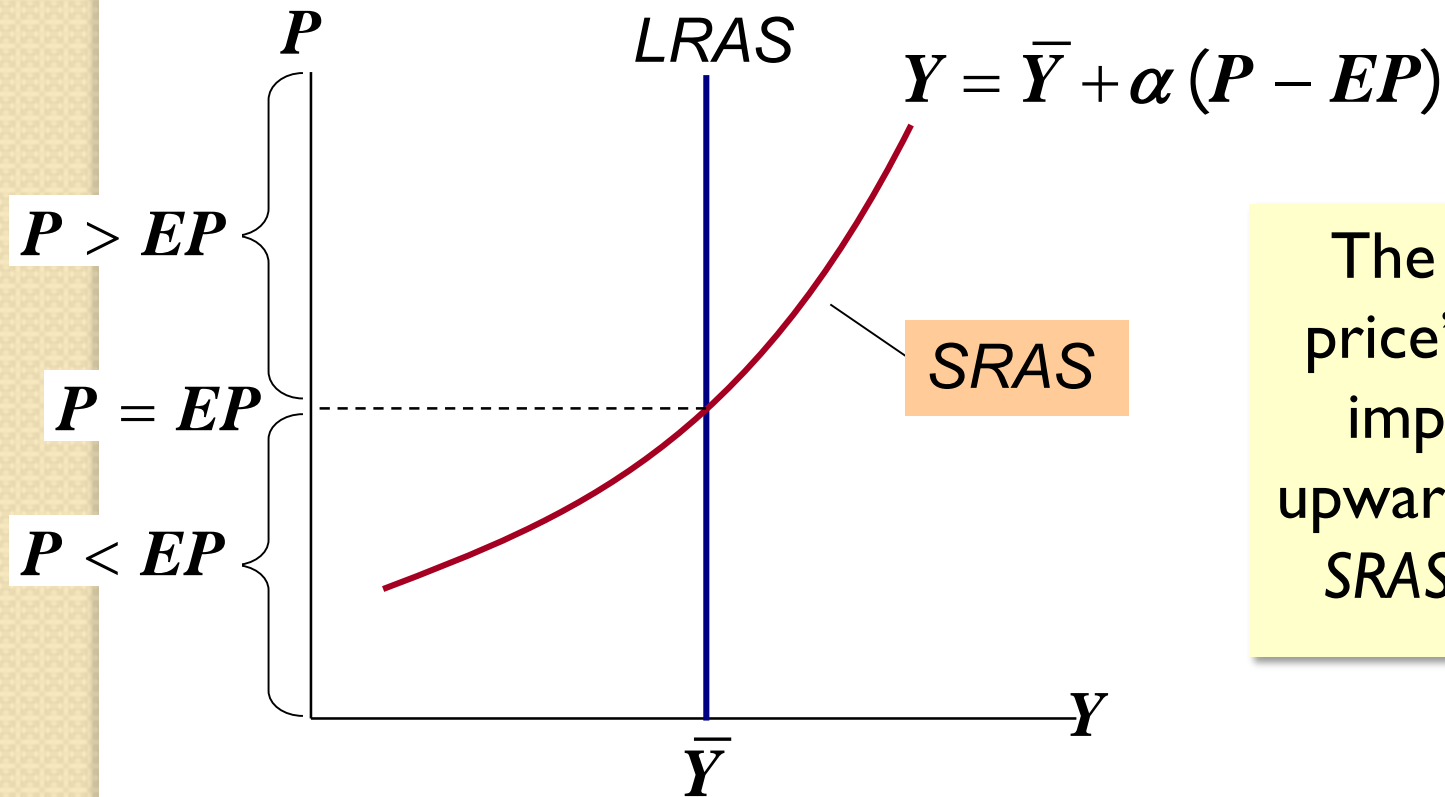$$P = EP + \frac{(1-s)a}{s}(Y - \bar{Y})$$

The sticky-price model

$$P = EP + \frac{(1-s)a}{s}(Y - \bar{Y})$$

Finally, derive AS equation by solving for Y:

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

$$\text{where } \alpha = \frac{s}{(1-s)a} > 0$$

Summary & implications

P

LRAS

$$Y = \overline{Y} + \alpha\,(P - EP)$$

$P > EP$

$P = EP$

$P < EP$

SRAS

The "sticky price" model implies an upward sloping *SRAS* curve.

$\overline{Y}$

Y

Inflation, Unemployment, & Phillips curve

The **Phillips curve** states that π depends on

- expected inflation, $E\pi$
- **cyclical unemployment**: the deviation of the actual rate of unemployment from the natural rate
- supply shocks, v

$$\pi = E\pi - \beta(u - u^n) + v$$

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

Comparing *SRAS* and the Phillips curve

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

$$\text{Phillips curve:} \quad \pi = E\pi - \beta(u - u^n) + \nu$$
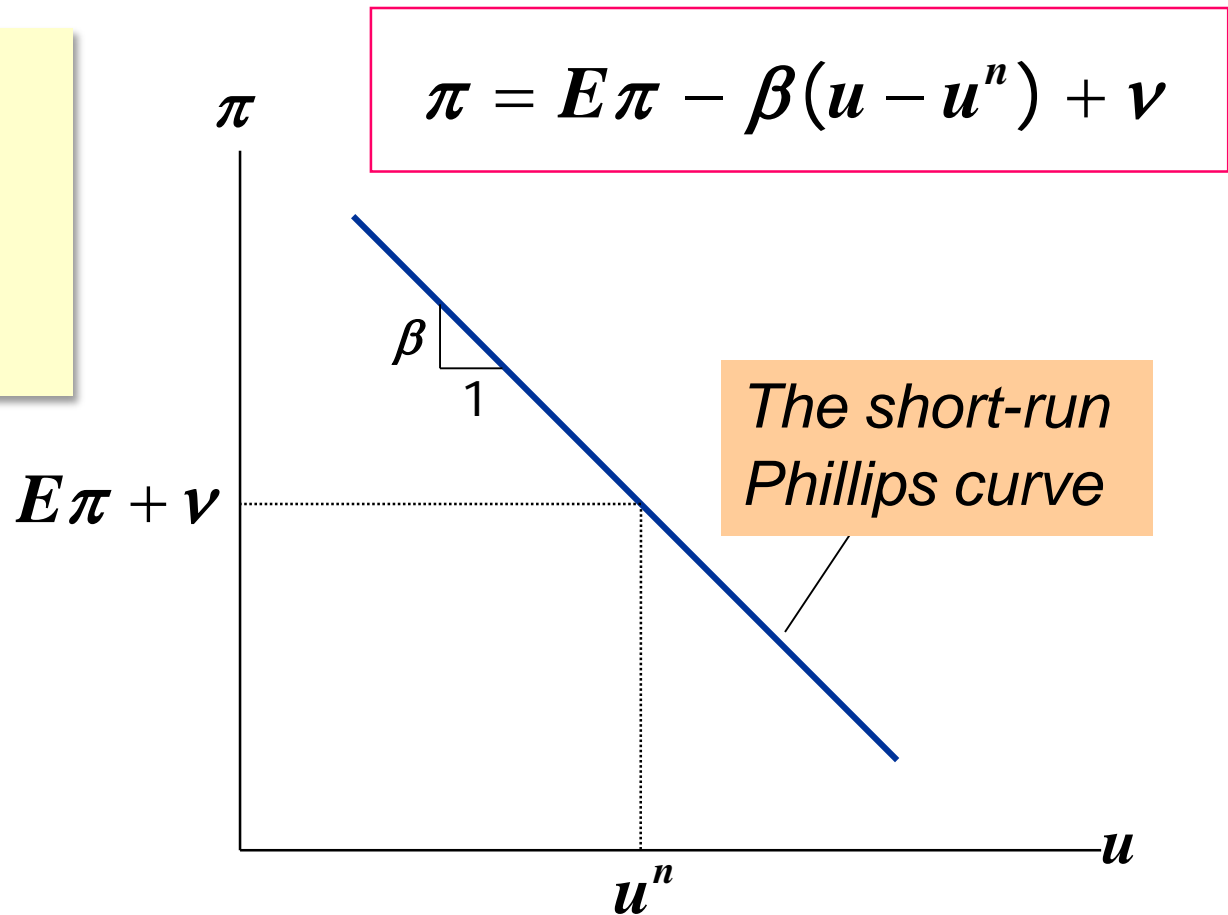
- *SRAS* curve:
  Output is related to unexpected movements in the price level.

- Phillips curve:
  Unemployment is related to unexpected movements in the inflation rate.
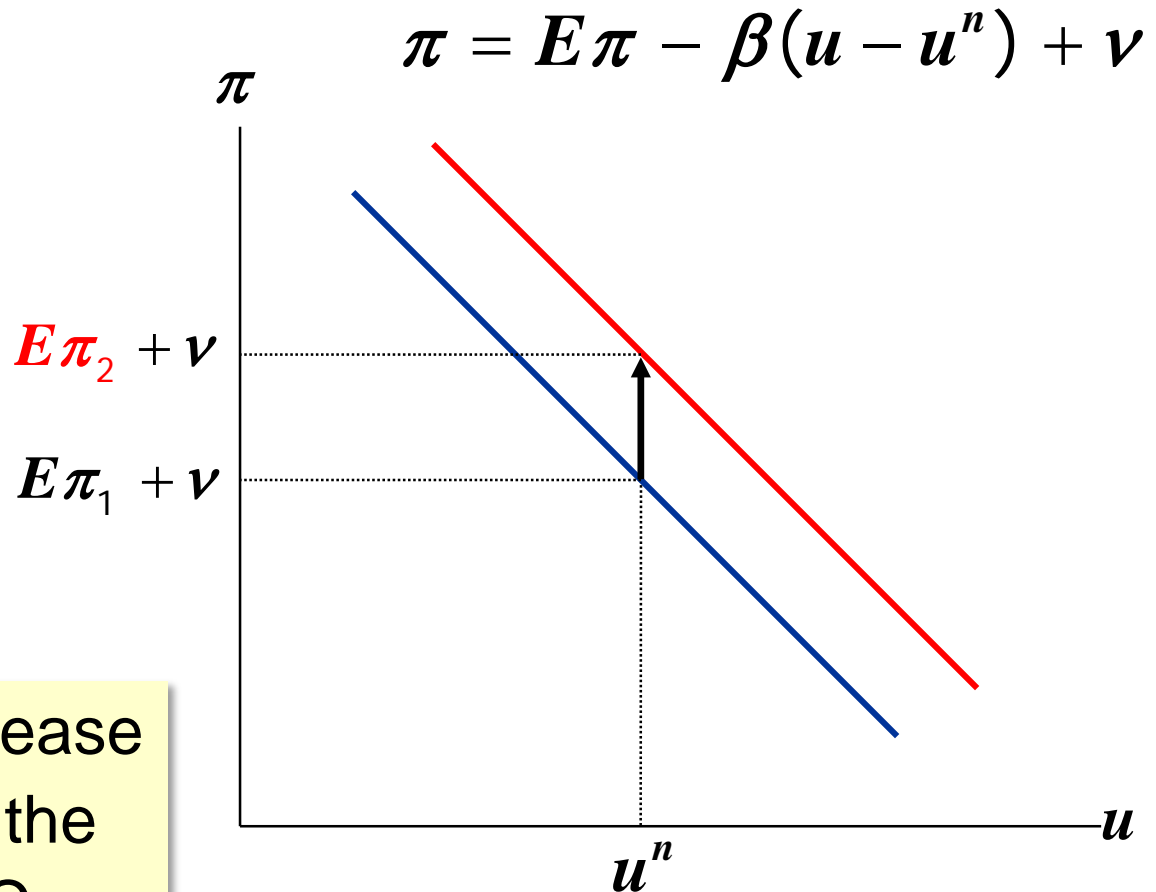
Graphing the Phillips curve

In the short run, policymakers face a tradeoff between π and u.

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

π

β

1

$E\pi + \nu$

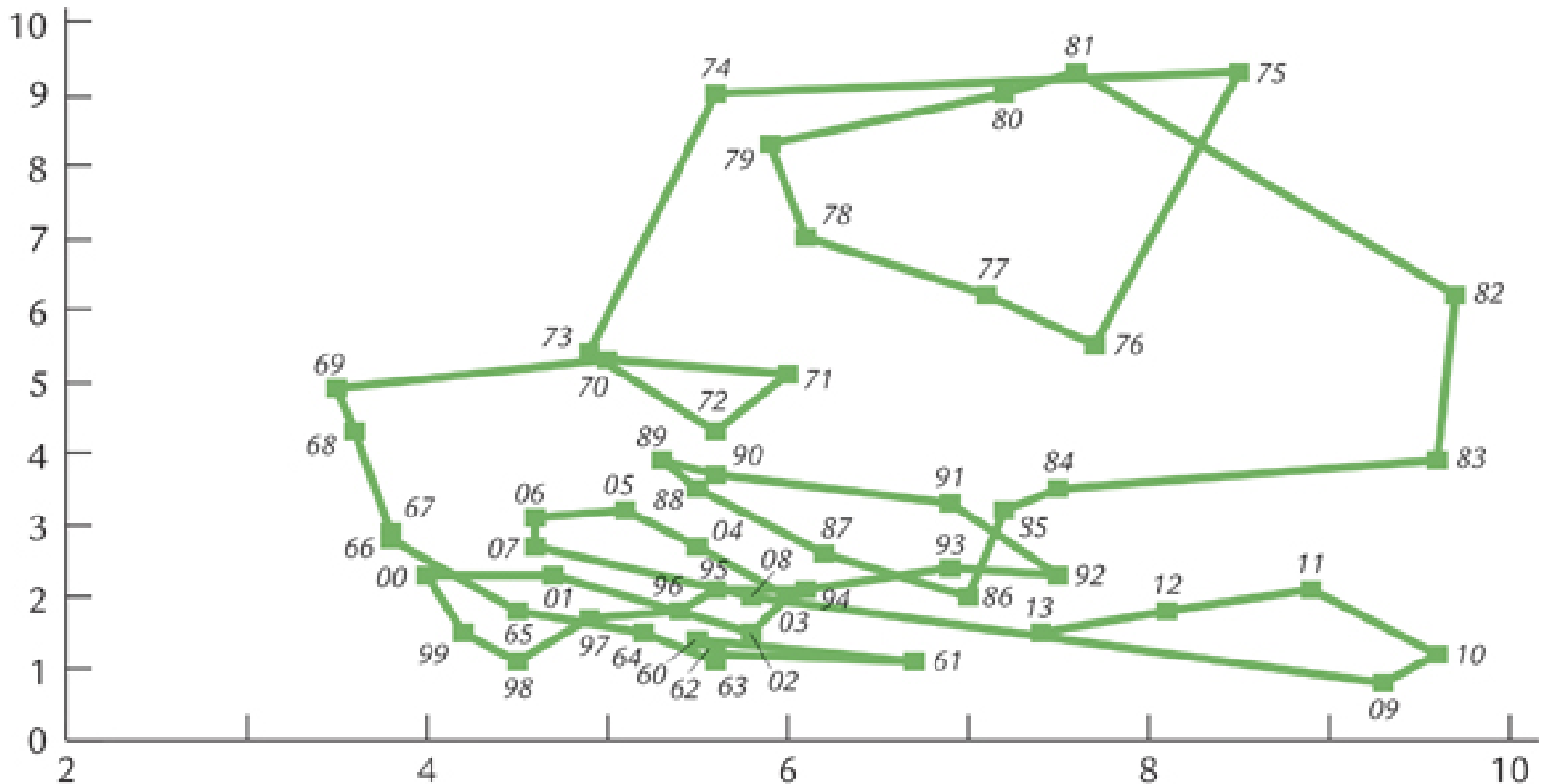*The short-run Phillips curve*

u^n

u

Shifting the Phillips curve

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

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

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

The sacrifice ratio

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

Expectations and the Sacrifice Ratio

Ways of forming expectations:

- **adaptive expectations**:
  People base expectations of future inflation on recently observed inflation. Policymakers can continually manipulate public to reach desired outcome.

- **rational expectations**:
  People base expectations on all available information, including current and possible future policies. Implies painless disinflation and a small sacrifice ratio.

Calculating the sacrifice ratio for the Volcker disinflation

1981: $\pi = 9.7\%$

1985: $\pi = 3.0\%$

Total disinflation = 6.7%

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

Total 9.5%

Calculating the sacrifice ratio for the Volcker disinflation

- Inflation fell by 6.7%, total cyclical unemployment was 9.5%.

- Okun's law:
  1% of unemployment = 2% of lost output.

- Thus, 9.5% cyclical unemployment = 19.0% of a year's real GDP.

- **Sacrifice ratio** = 19%/6.7% = 2.8 percentage points of GDP were lost for each percentage point reduction in inflation.

The natural-rate hypothesis

Changes in aggregate demand affect output and employment only in the short run (Chaps. 10-12).

In the long run, the economy returns to the levels of output, employment, and unemployment described by the classical model (Chaps. 3–9).