

CHAPTER 14

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

Presentation Slides

Macroeconomics

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IN THIS CHAPTER, YOU WILL LEARN:

A graphic for Chapter 14. The word "CHAPTER" is in white capital letters on a dark blue background. Below it, the number "14" is displayed in large white digits. The digit "1" is on a yellow background, and the digit "4" is on a dark blue background. The entire graphic has a textured, slightly distressed appearance.

CHAPTER 14

About two models of aggregate supply in which output depends positively on the price level in the short run

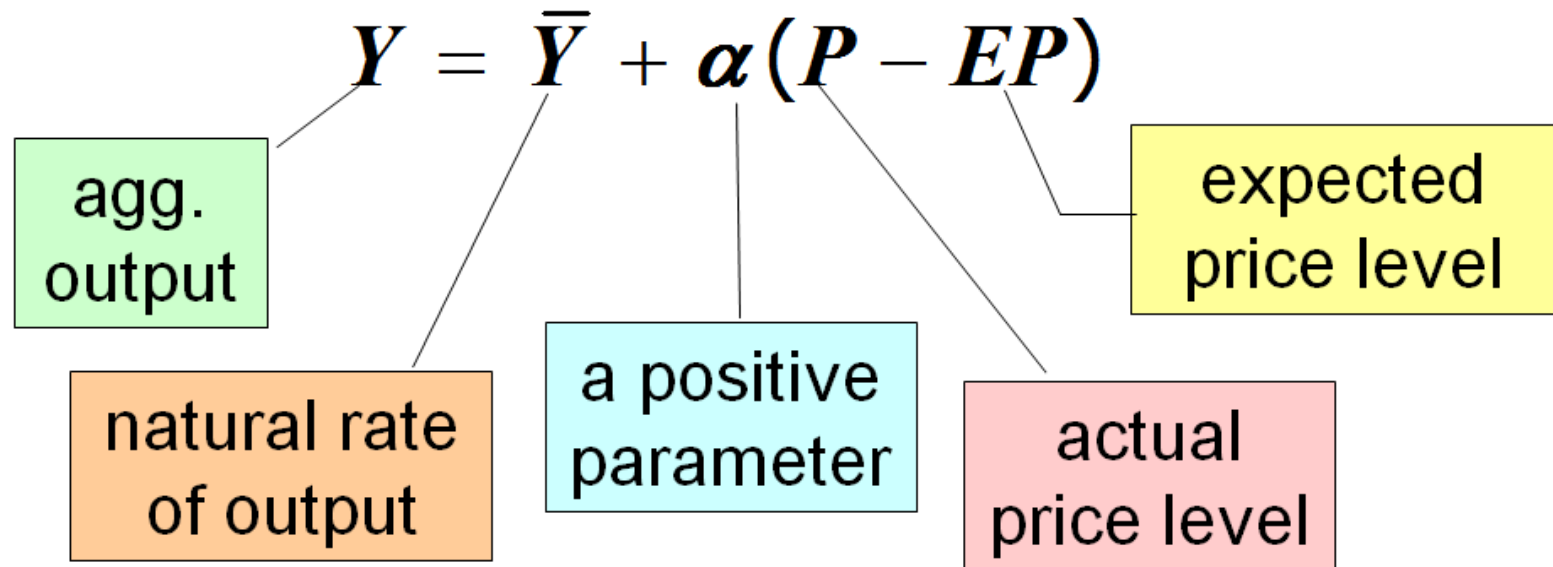
About the short-run tradeoff between inflation and unemployment, known as the Phillips curve

Introduction, part 1

- In previous chapters, we assumed that the price level P was “stuck” in the short run.
 - This implies a horizontal *SRAS* curve.
- Now, we consider two prominent models of aggregate supply in the short run:
 - Sticky-price model
 - Imperfect-information model

Introduction, part 2

Both models imply:



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

The sticky-price model, part 1

- 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 (as in monopolistic competition).

The sticky-price model, part 2

- An individual firm's desired price is:

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

where $a > 0$.

Suppose there are two types of firms:

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

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

The sticky-price model, part 3

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

Assume that sticky-price firms expect that output will equal its natural rate. Then,

$$p = EP$$

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

The sticky-price model, part 4

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

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, part 5

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

- High $EP \rightarrow$ high P
If firms expect high prices, then firms that must set prices in advance will set them high.
Other firms respond by setting prices high.
- High $Y \rightarrow$ high P
When income is high, the demand for goods is high.
Firms with flexible prices set prices high.
The greater the fraction of flexible-price firms, the smaller is s and the bigger the effect of ΔY on P .

The sticky-price model, part 6

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

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

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

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

The imperfect-information model, part 1

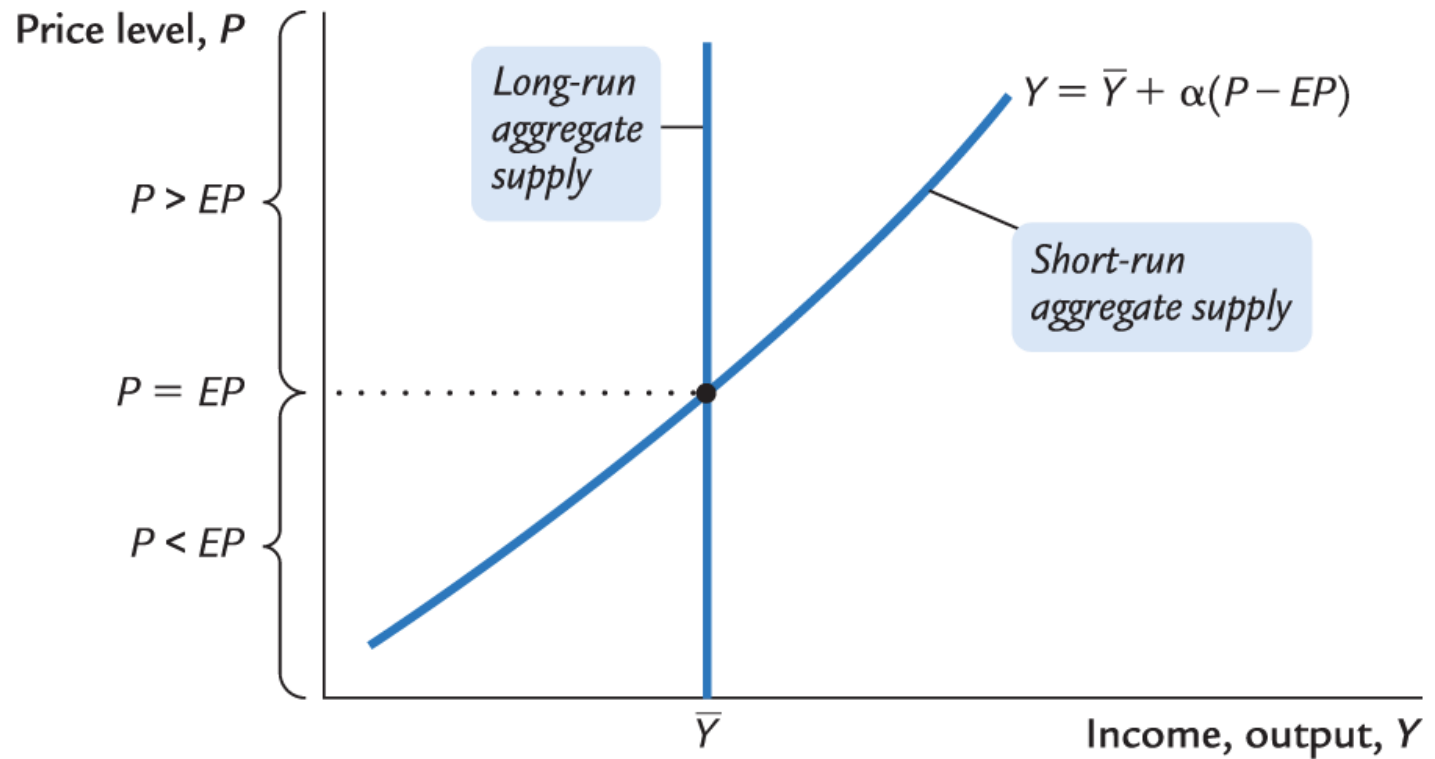
Assumptions:

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

The imperfect-information model, part 2

- The supply of each good depends on its relative price: the nominal price of the good divided by the overall price level.
- The supplier doesn't know price level at the time she makes her production decision so uses **EP** .
- Suppose **P** rises but **EP** does not.
 - Supplier thinks her relative price has risen, so she produces more.
 - With many producers thinking this way, **Y** will rise whenever **P** rises above **EP** .

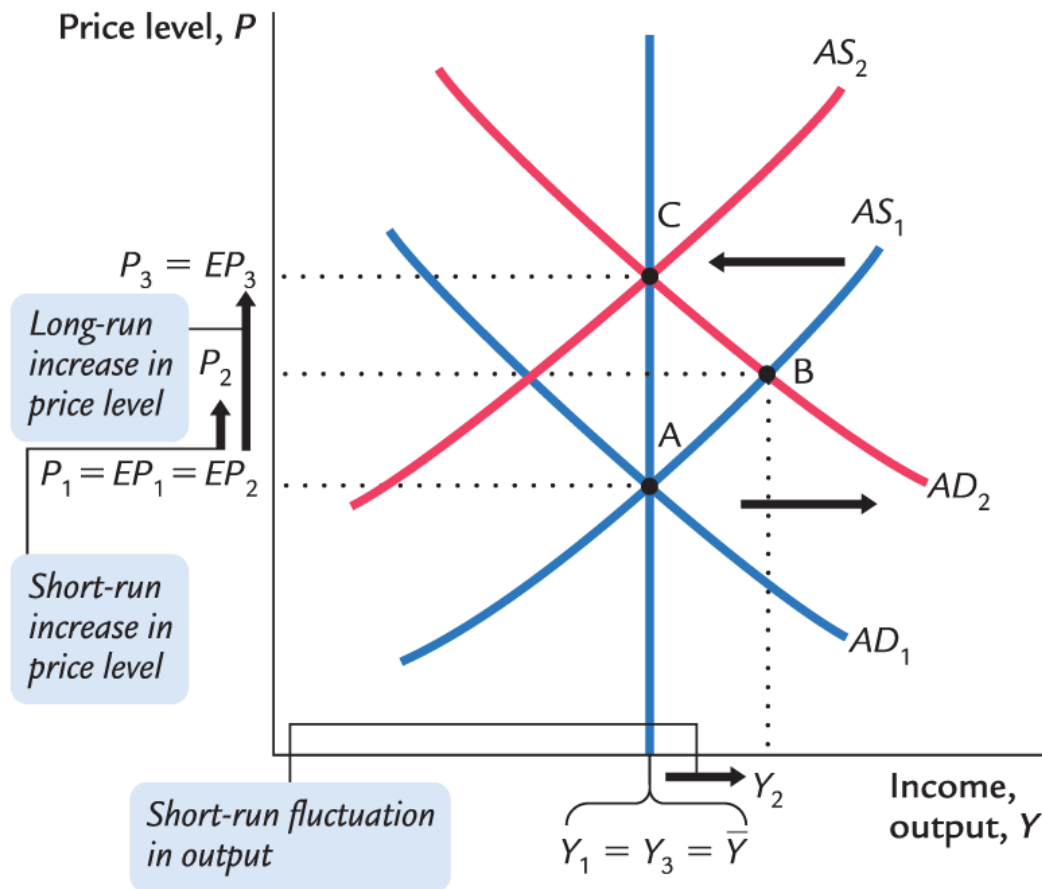
Summary and implications, part 1



Mankiw, *Macroeconomics*, 10e, © 2019 Worth Publishers

Summary and implications, part 2

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



Inflation, unemployment, and the Phillips curve

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

- expected inflation, $E\pi$
- **cyclical unemployment**: the deviation of the actual rate of unemployment (u) from the natural rate (u^n)
- supply shocks, v (Greek letter nu).

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

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

Deriving the Phillips curve from SRAS

$$(1) Y = \bar{Y} + \alpha(P - EP)$$

$$(2) P = EP + (1/\alpha)(Y - \bar{Y})$$

$$(3) P = EP + (1/\alpha)(Y - \bar{Y}) + v$$

$$(4) (P - P_{-1}) = (EP - P_{-1}) + (1/\alpha)(Y - \bar{Y}) + v$$

$$(5) \pi = E\pi + (1/\alpha)(Y - \bar{Y}) + v$$

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

$$(7) \pi = E\pi - \beta(u - u^n) + v$$

Comparing *SRAS* and the Phillips curves

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

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

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

Adaptive expectations

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

$$E\pi = \pi_{-1}$$

- Then, Phillips curve equation becomes

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

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 and prices that people set.

Two causes of rising and 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.

The sacrifice ratio, part 1

- To reduce inflation, policymakers can contract aggregate demand, 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.

The sacrifice ratio, part 2

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

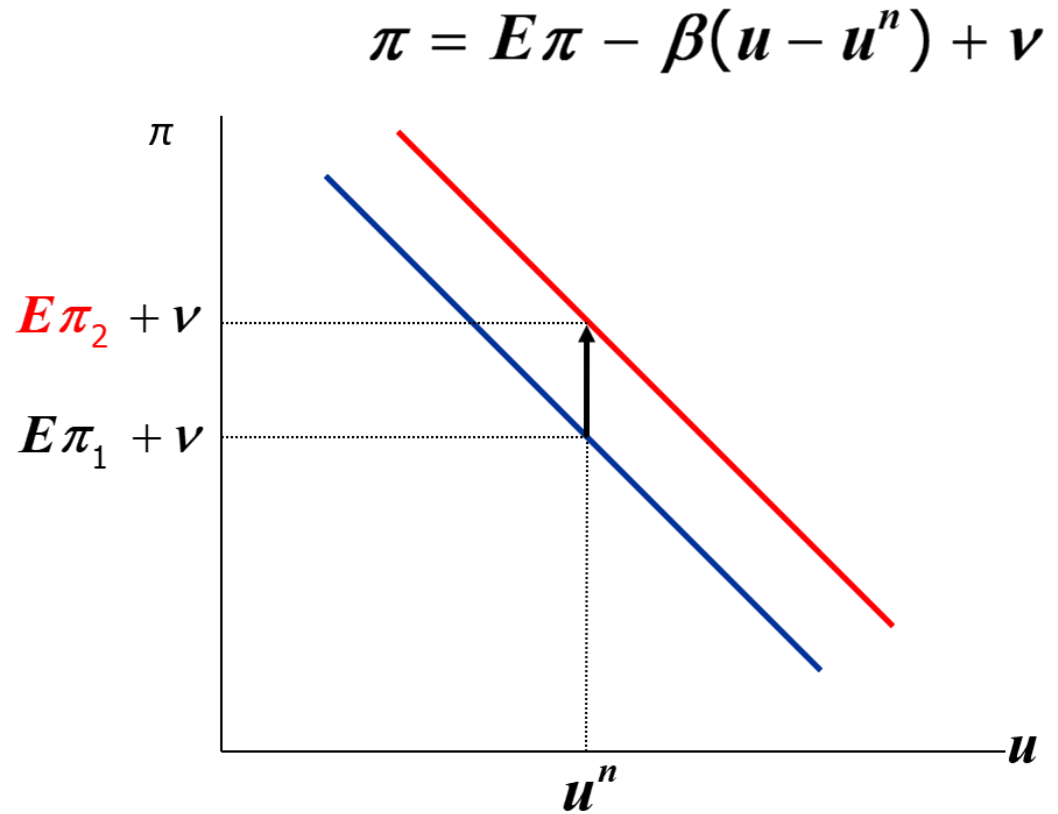
$$\begin{aligned}\text{GDP loss} &= (\text{inflation reduction}) \times (\text{sacrifice ratio}) \\ &= 4 \times 5\end{aligned}$$

- This loss could be incurred in 1 year or spread over several (example: 5% loss for each of 4 years).
- The cost of disinflation is lost GDP.
One could use Okun's law to translate this cost into unemployment.

Shifting the Phillips curve

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

Example: an increase in $E\pi$ shifts the short-run Phillips curve upward.



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.

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 (Chapters 3–9).

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 the economy may not fully recover.

Hysteresis: Why negative shocks may increase the natural rate

- While workers are cyclically unemployed, their skills may deteriorate, 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.

CHAPTER SUMMARY, PART 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, PART 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, PART 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, PART 4

- The natural rate hypothesis and hysteresis:
 - the natural rate hypotheses
 - changes in aggregate demand can affect output and employment only in the short run
 - hysteresis
 - aggregate demand can have permanent effects on output and employment