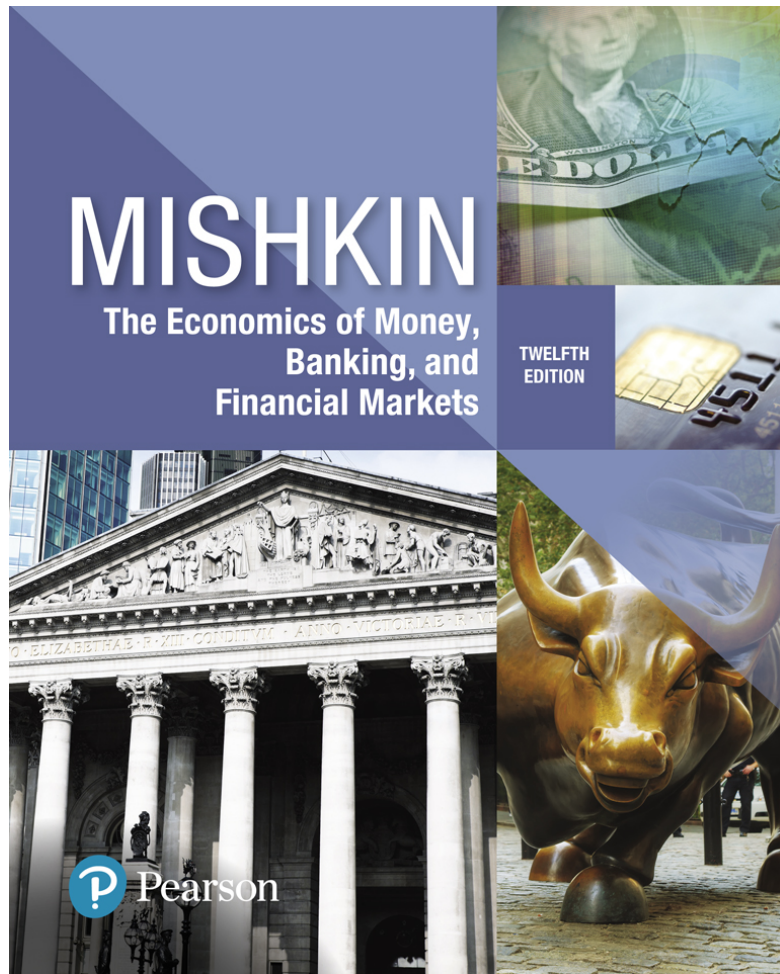


# The Economics of Money, Banking, and Financial Markets

Twelfth Edition



## Chapter 22

### Aggregate Demand and Supply Analysis

# Preview

- This chapter develops the aggregate demand-aggregate supply framework, which will allow for an examination of the effects of monetary policy on output and prices.

# Learning Objectives (1 of 2)

- Summarize and illustrate the aggregate demand curve and the factors that shift it.
- Illustrate and interpret the short-run and long-run aggregate supply curves.
- Illustrate and interpret shifts in the short-run and long-run aggregate supply curves.
- Illustrate and interpret the short-run and long-run equilibria, and the role of the self-correcting mechanism.

# Learning Objectives (2 of 2)

- Illustrate and interpret the short-run and long-run effects of a shock to aggregate demand.
- Illustrate and interpret the short-run and long-run effects of temporary and permanent supply shocks.
- Explain business cycle fluctuations in major economies during the 2007–2009 financial crisis.

# Aggregate Demand (1 of 3)

- Aggregate demand is made up of four component parts:
  - **consumption expenditure**: the total demand for consumer goods and services
  - **planned investment spending**: the total planned spending by business firms on new machines, factories, and other capital goods, plus planned spending on new homes
  - **government purchases**: spending by all levels of government (federal, state, and local) on goods and services
  - **net exports**: the net foreign spending on domestic goods and services

# Aggregate Demand (2 of 3)

$$Y^{ad} = C + I + G + NX$$

The aggregate demand curve is downward sloping because

$$P \downarrow \Rightarrow M / P \uparrow \Rightarrow i \downarrow \Rightarrow I \uparrow \Rightarrow Y^{ad} \uparrow$$

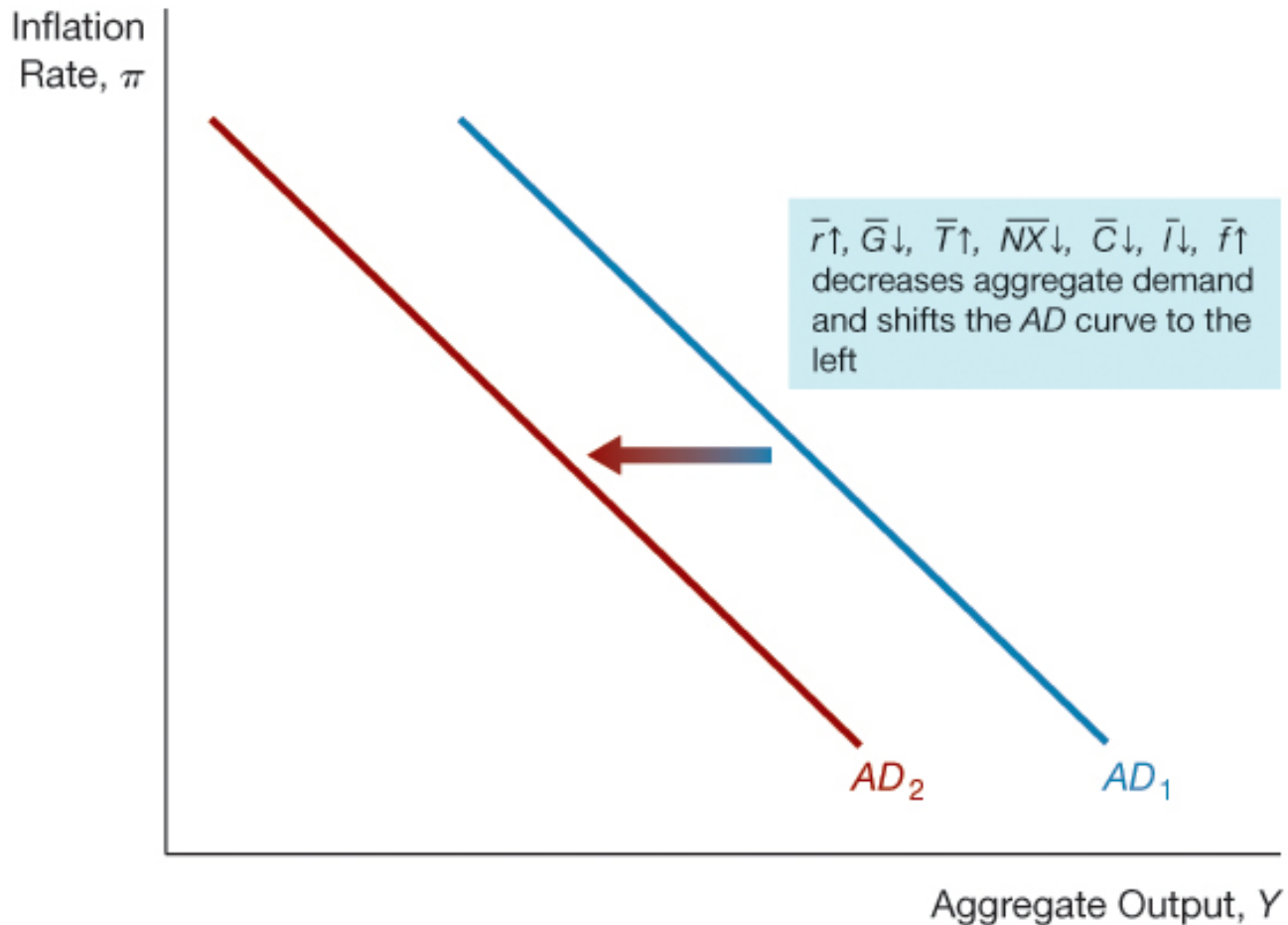
and

$$P \downarrow \Rightarrow M / P \uparrow \Rightarrow i \downarrow \Rightarrow E \downarrow \Rightarrow NX \uparrow \Rightarrow Y^{ad} \uparrow$$

# Aggregate Demand (3 of 3)

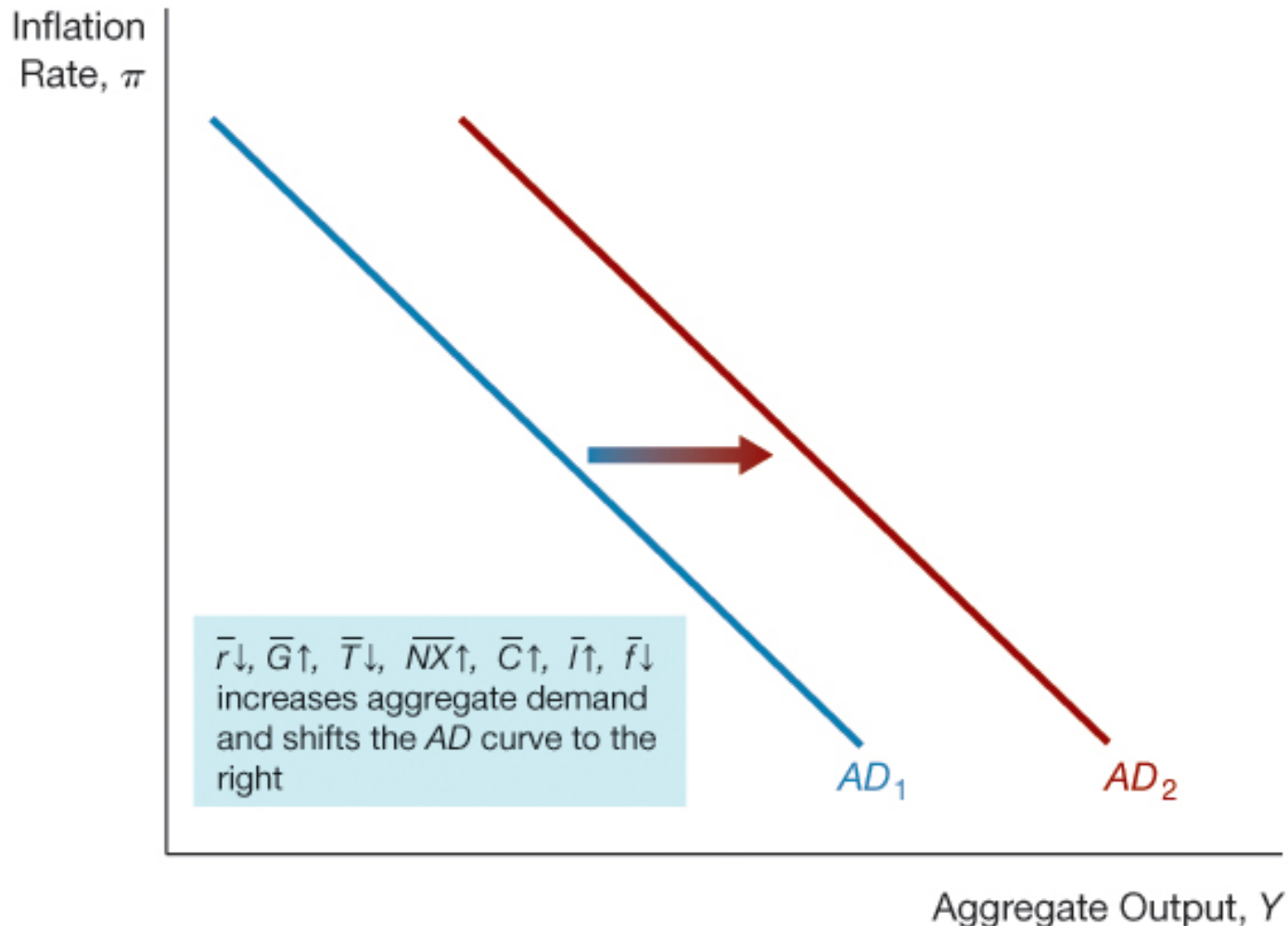
- The fact that the aggregate demand curve is downward sloping can also be derived from the quantity theory of money analysis.
- If velocity stays constant, a constant money supply implies constant nominal aggregate spending, and a decrease in the price level is matched with an increase in aggregate demand.
- Meaning of the term **autonomous**.

# Figure 1 Leftward Shift in the Aggregate Demand Curve





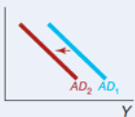
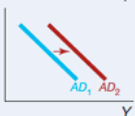
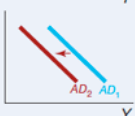
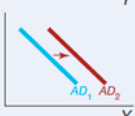



# Figure 2 Rightward Shift in the Aggregate Demand Curve



# Factors That Shift the Aggregate Demand Curve

- An increase in the money supply shifts AD to the right: holding velocity constant, an increase in the money supply increases the quantity of aggregate demand at each price level.
- An increase in spending from any of the components  $C$ ,  $I$ ,  $G$ ,  $NX$  will also shift AD to the right.

# Summary Table 1 Factors That Shift the Aggregate Demand Curve

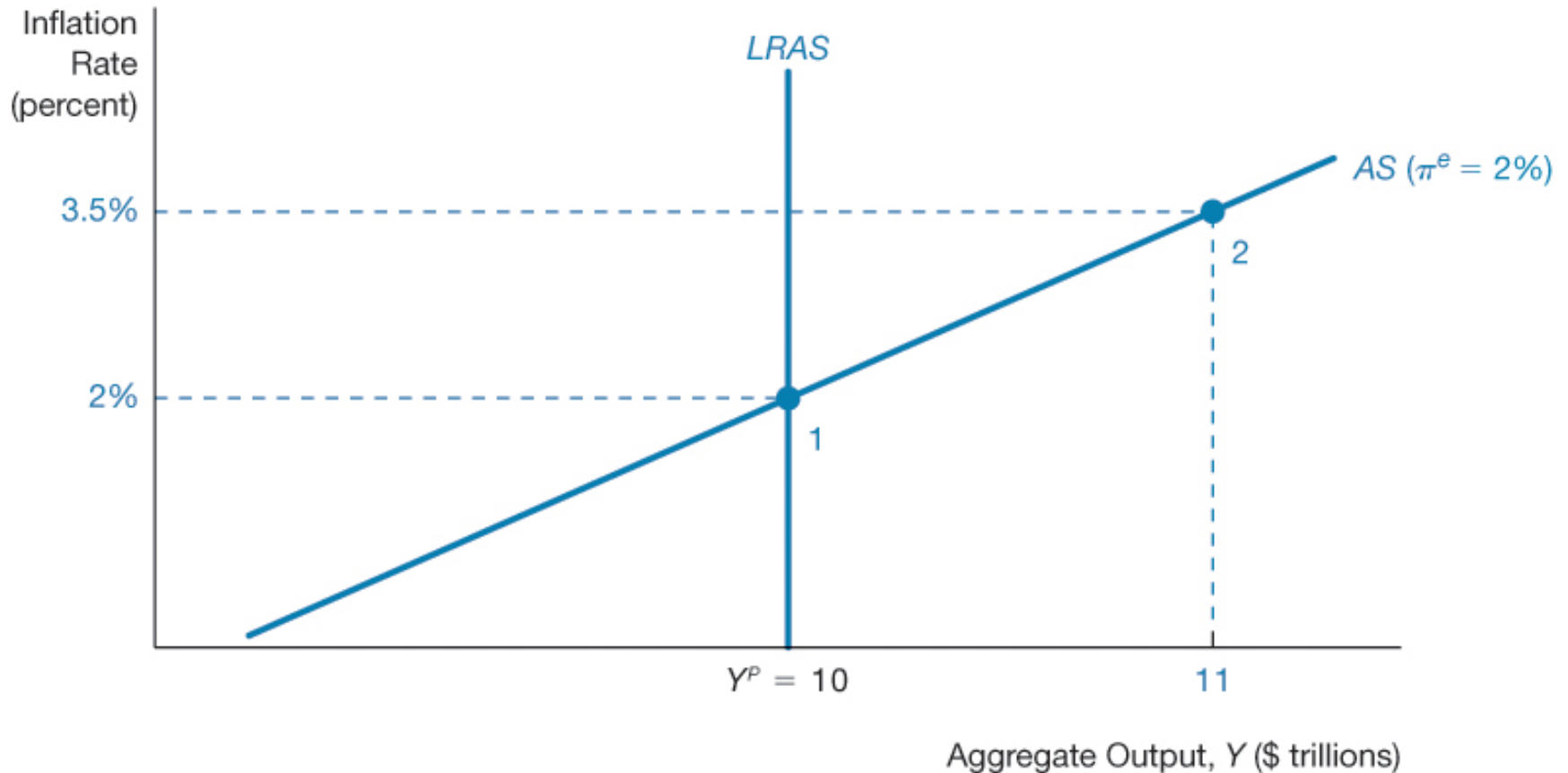
Factors That Shift the Aggregate Demand Curve		
Factor	Change	Shift in Aggregate Demand Curve
Autonomous monetary policy, $\bar{r}$	↑	
Government purchases, $\bar{G}$	↑	
Taxes, $\bar{T}$	↑	
Autonomous net exports, $\bar{NX}$	↑	
Autonomous consumption expenditure, $\bar{C}$	↑	
Autonomous investment, $\bar{I}$	↑	
Financial frictions, $\bar{f}$	↑	

Note: Only increases (↑) in the factors are shown. The effect of decreases in the factors would be the opposite of those indicated in the "Shift" column.

# Aggregate Supply

- **Long-run aggregate supply curve:**
  - Determined by the amount of capital and labor and the available technology
  - Vertical at the natural rate of output generated by the natural rate of unemployment
- **Short-run aggregate supply curve:**
  - Wages and prices are sticky
  - Generates an upward sloping *SRAS* as firms attempt to take advantage of short-run profitability when price level rises

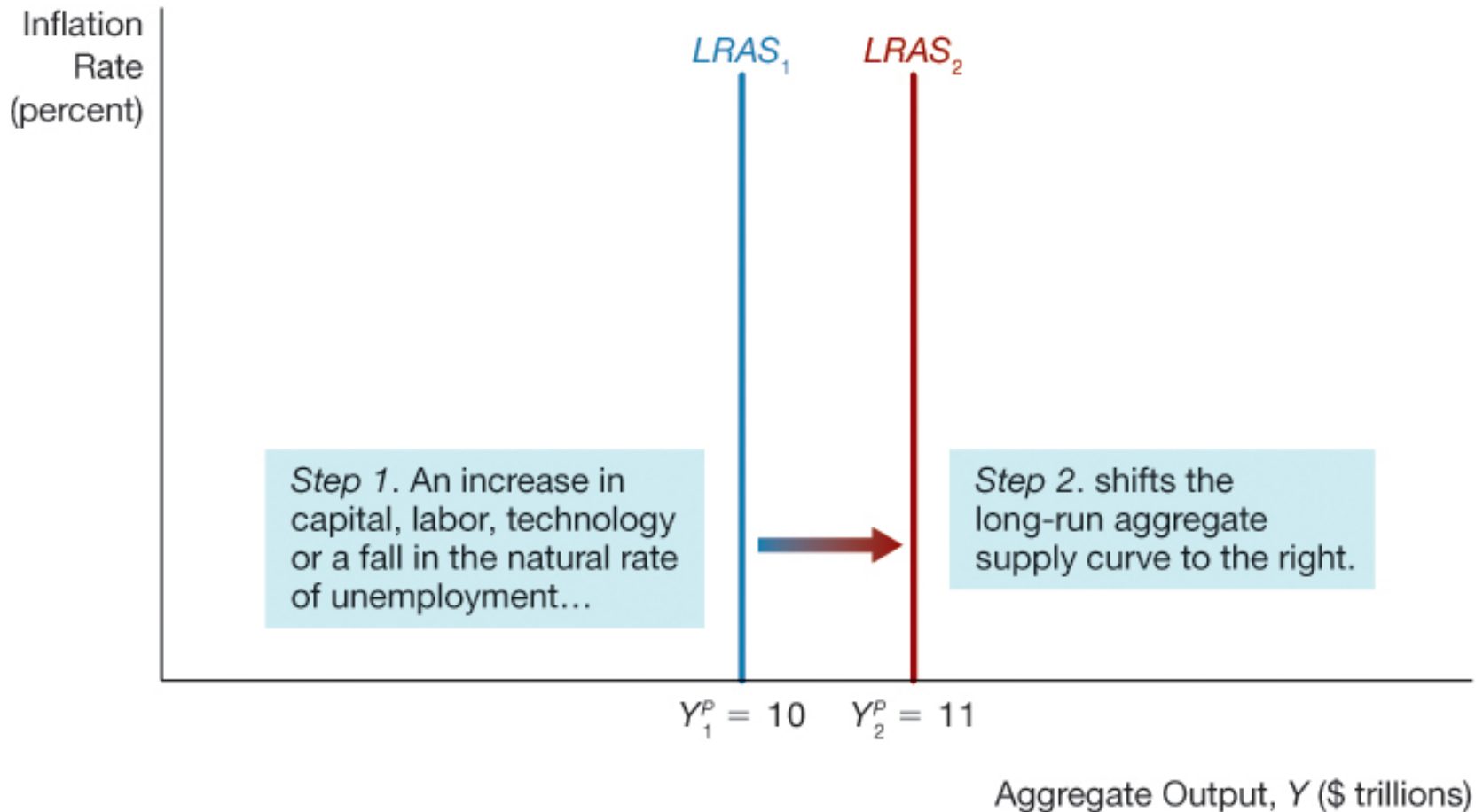
# Figure 3 Long- and Short-Run Aggregate Supply Curves



# Shifts in Aggregate Supply Curves

- Shifts in the long-run aggregate supply curve
  - The long-run aggregate supply curve shifts to the right from when there is
    1. An increase in the total amount of capital in the economy
    2. An increase in the total amount of labor supplied in the economy
    3. An increase in the available technology, or
    4. A decline in the natural rate of unemployment
  - An opposite movement in these variables shifts the LRAS curve to the left.

# Figure 4 Shift in the Long-Run Aggregate Supply Curve

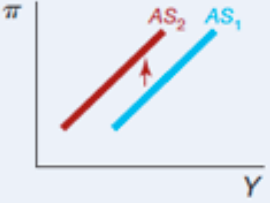
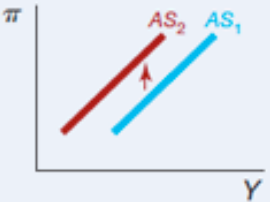
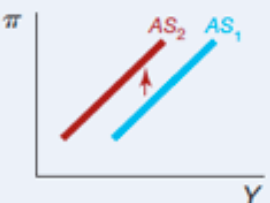


# Shifts in the Short-Run Aggregate Supply Curve

- There are three factors that can shift the short-run aggregate supply curve:
  1. Expected inflation
  2. Price shocks
  3. A persistent output gap

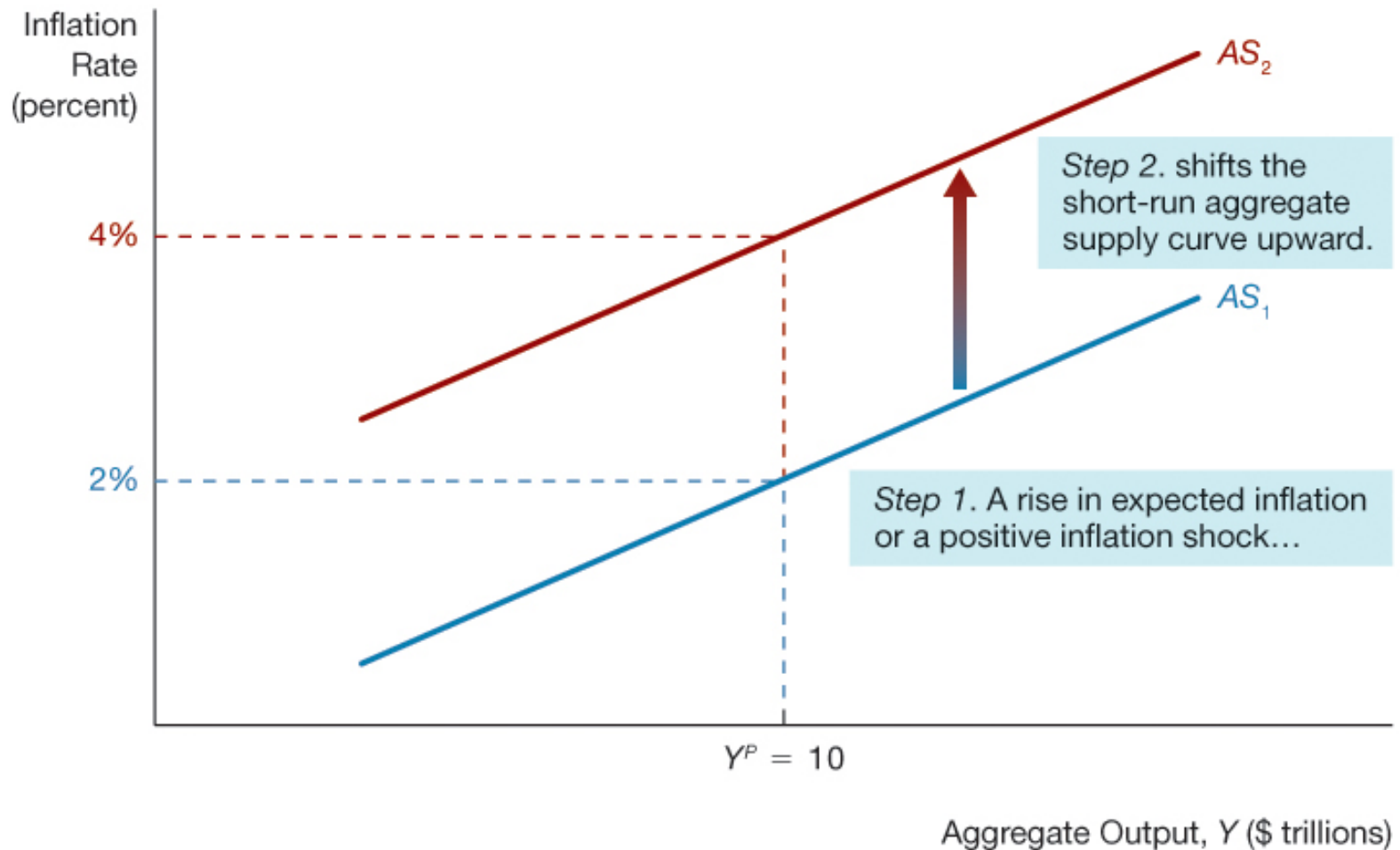


# Summary Table 2 Factors That Shift the Short-Run Aggregate Supply Curve

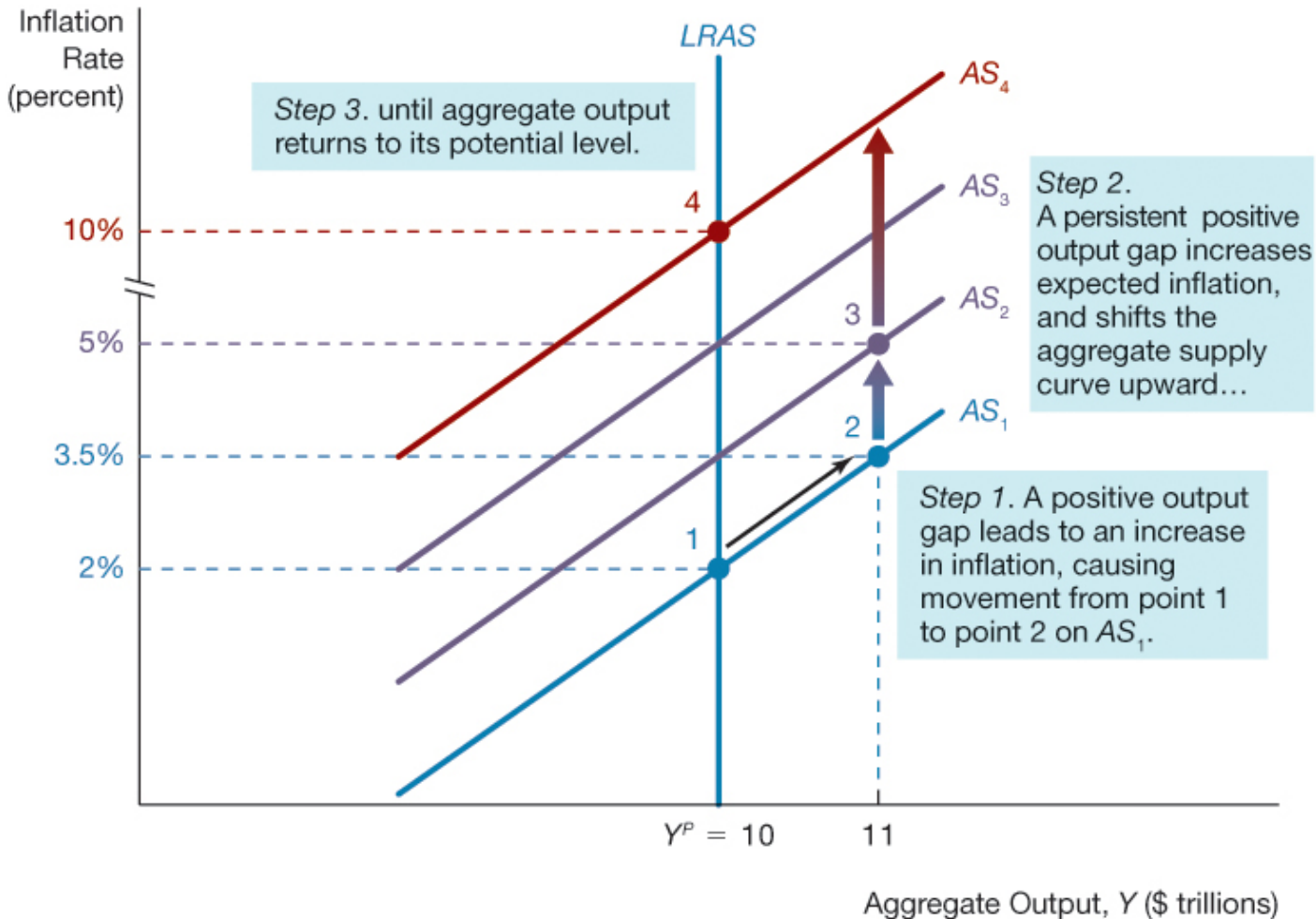
Factors That Shift the Short-Run Aggregate Supply Curve		
Factor	Change	Shift in Supply Curve
Expected inflation, $\pi^e$	↑	 <p>A graph with inflation (<math>\pi</math>) on the vertical axis and output (<math>Y</math>) on the horizontal axis. Two upward-sloping lines are shown: a blue line labeled <math>AS_1</math> and a red line labeled <math>AS_2</math>. An upward-pointing arrow between the lines indicates a rightward shift from <math>AS_1</math> to <math>AS_2</math>.</p>
Inflation shock, $\rho$	↑	 <p>A graph with inflation (<math>\pi</math>) on the vertical axis and output (<math>Y</math>) on the horizontal axis. Two upward-sloping lines are shown: a blue line labeled <math>AS_1</math> and a red line labeled <math>AS_2</math>. An upward-pointing arrow between the lines indicates a rightward shift from <math>AS_1</math> to <math>AS_2</math>.</p>
Persistent output gap, $(Y - Y^P)$	↑	 <p>A graph with inflation (<math>\pi</math>) on the vertical axis and output (<math>Y</math>) on the horizontal axis. Two upward-sloping lines are shown: a blue line labeled <math>AS_1</math> and a red line labeled <math>AS_2</math>. An upward-pointing arrow between the lines indicates a rightward shift from <math>AS_1</math> to <math>AS_2</math>.</p>

Note: Only increases (↑) in the factors are shown. The effect of decreases in the factors would be the opposite of those indicated in the "Shift" column.

# Figure 5 Shift in the Short-Run Aggregate Supply Curve from Changes in Expected Inflation and Price Shocks



# Figure 6 Shift in the Short-Run Aggregate Supply Curve from a Persistent Positive Output Gap



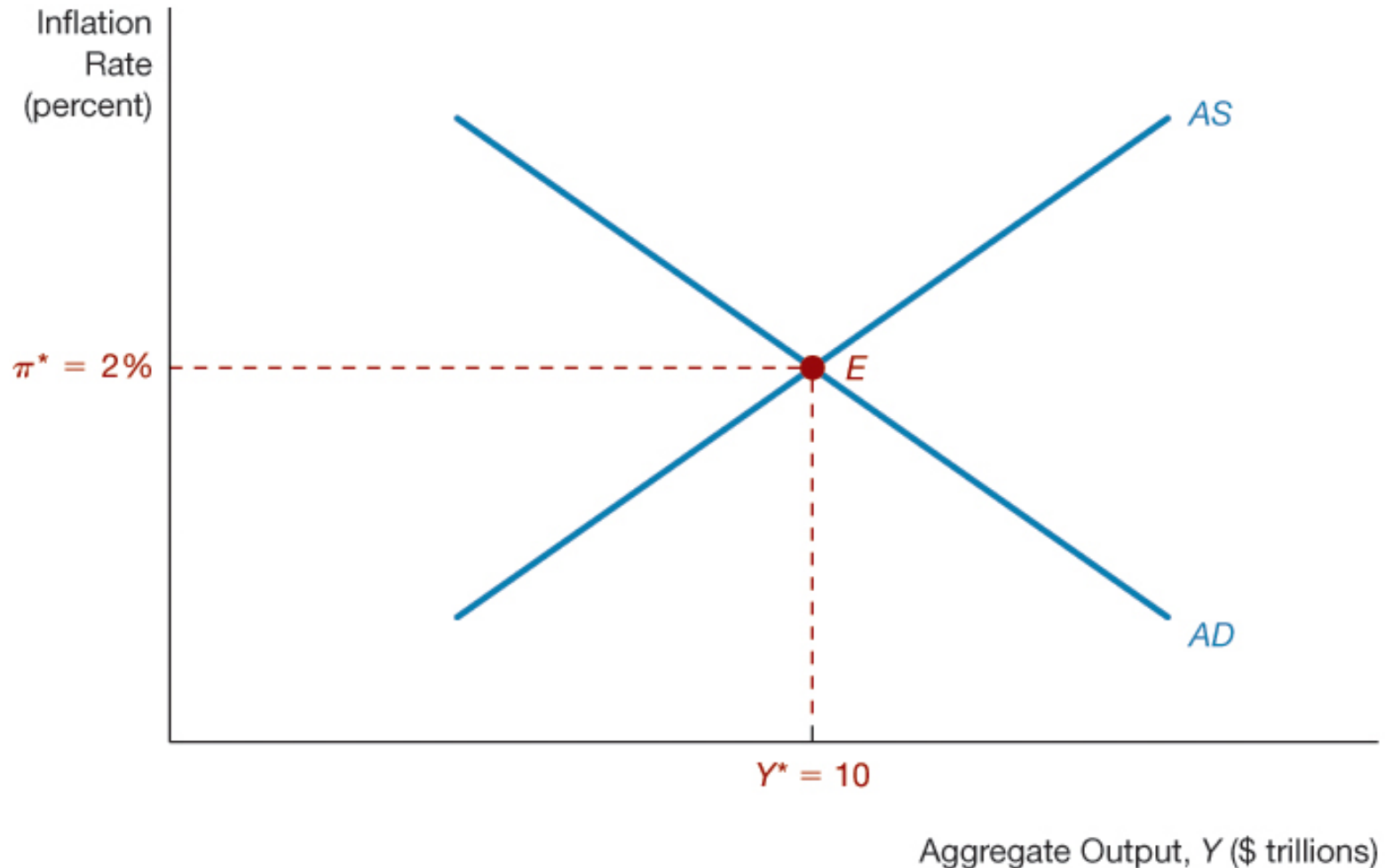
# Equilibrium in Aggregate Demand and Supply Analysis

- We can now put the aggregate demand and supply curves together to describe **general equilibrium** in the economy, when all markets are simultaneously in equilibrium at the point where the quantity of aggregate output demanded equals the quantity of aggregate output supplied.

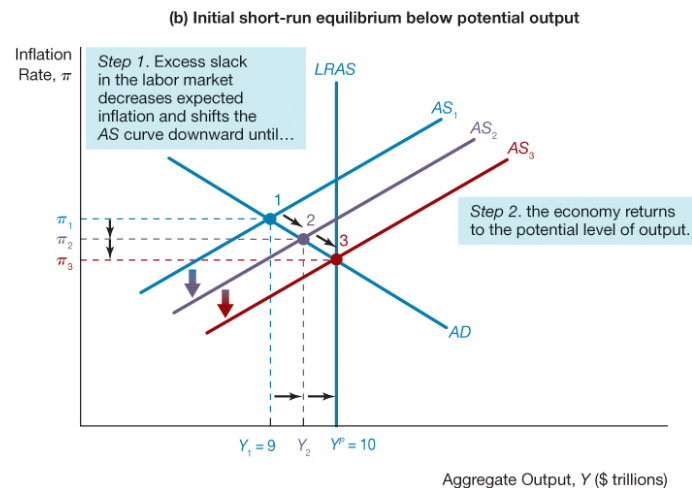
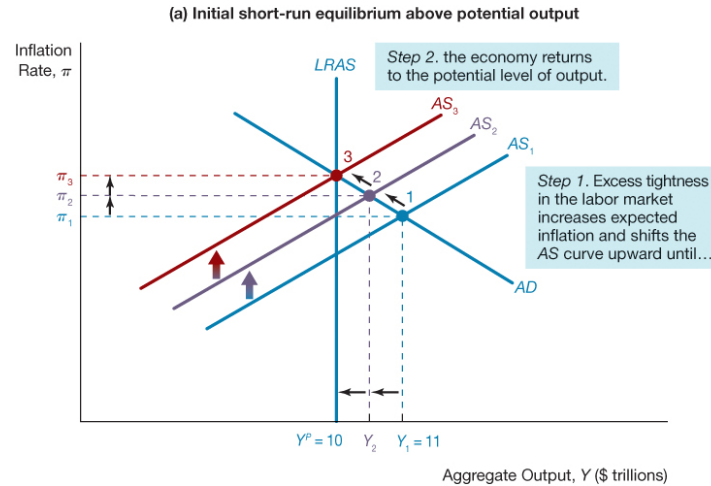
# Short-Run Equilibrium

- Figure 7 illustrates a short-run equilibrium in which the quantity of aggregate output demanded equals the quantity of output supplied.
- In Figure 8, the short-run aggregate demand curve  $AD$  and the short-run aggregate supply curve  $AS$  intersect at point  $E$  with an equilibrium level of aggregate output at  $Y^*$  and an equilibrium inflation rate at  $\pi^*$ .

# Figure 7 Short-Run Equilibrium



# Figure 8 Adjustment to Long-Run Equilibrium in Aggregate Supply and Demand Analysis



# Self-Correcting Mechanism

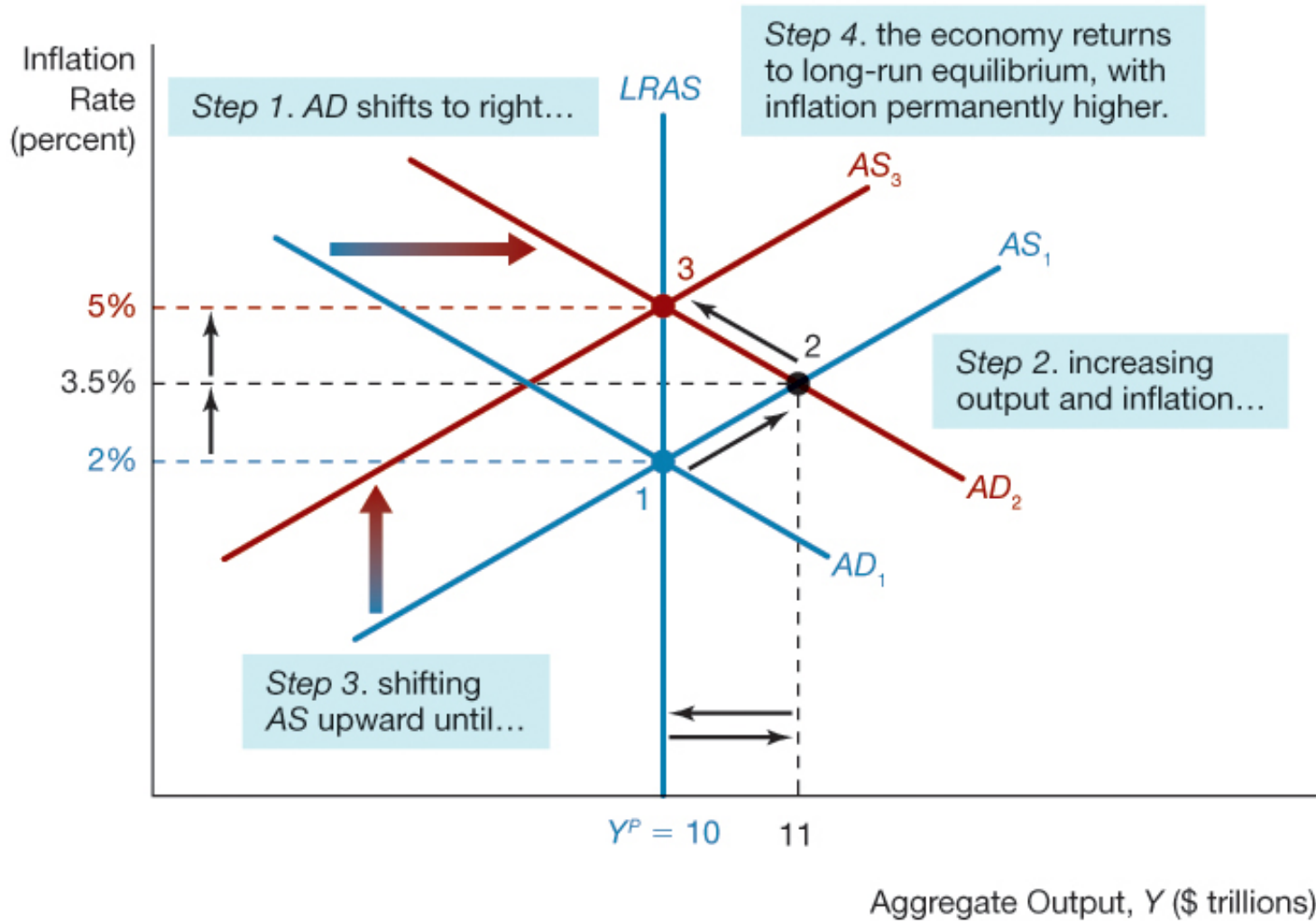
- Regardless of where output is initially, it returns eventually to the natural rate.
- **Slow:**
  - Wages are inflexible, particularly downward
  - Need for active government policy
- **Rapid:**
  - Wages and prices are flexible
  - Less need for government intervention



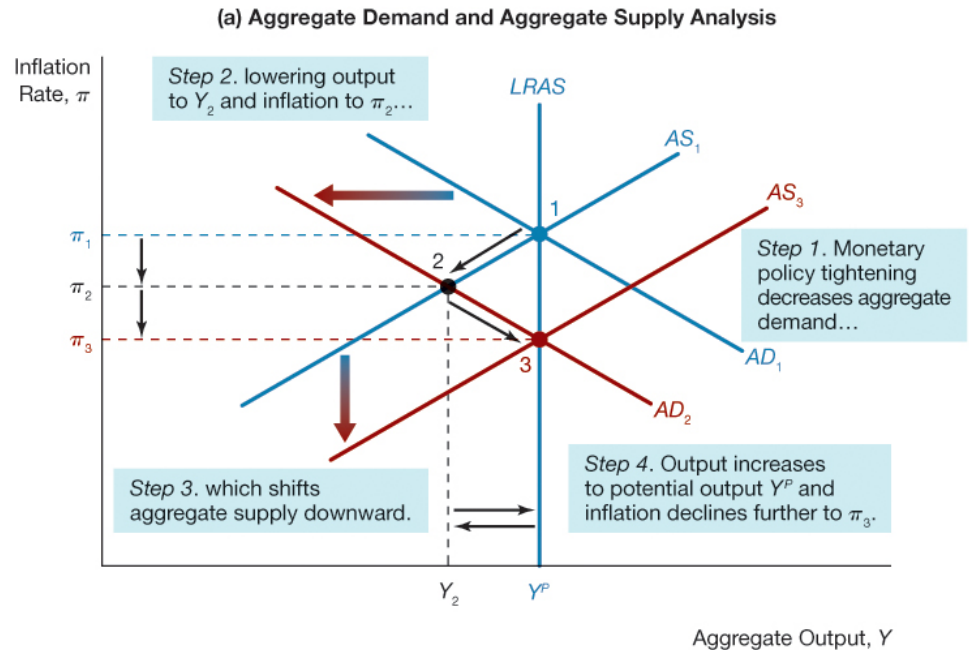
# Changes in Equilibrium: Aggregate Demand Shocks

- With an understanding of the distinction between the short-run and long-run equilibria, you are now ready to analyze what happens when there are demand shocks, shocks that cause the aggregate demand curve to shift.

# Figure 9 Positive Demand Shock



# Figure 10 The Volcker Disinflation: 1980–1986

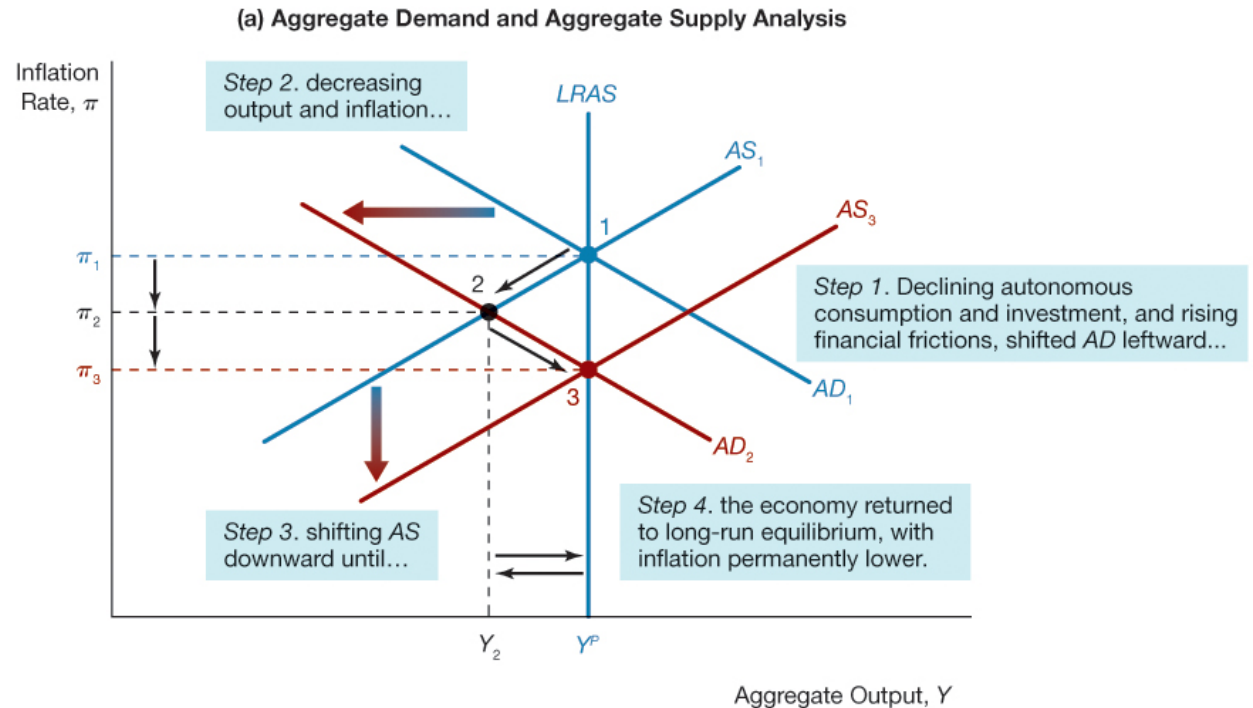


(b) Unemployment and Inflation, 1980–1986

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
1980	7.1	13.5
1981	7.6	10.3
1982	9.7	6.2
1983	9.6	3.2
1984	7.5	4.3
1985	7.2	3.6
1986	7.0	1.9

Source: *Economic Report of the President.*

# Figure 11 Negative Demand Shocks, 2000–2004



(b) Unemployment and Inflation, 2000–2004

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
2000	4.0	3.4
2001	4.7	2.8
2002	5.8	1.6
2003	6.0	2.3
2004	5.5	2.7

Source: Economic Report of the President.

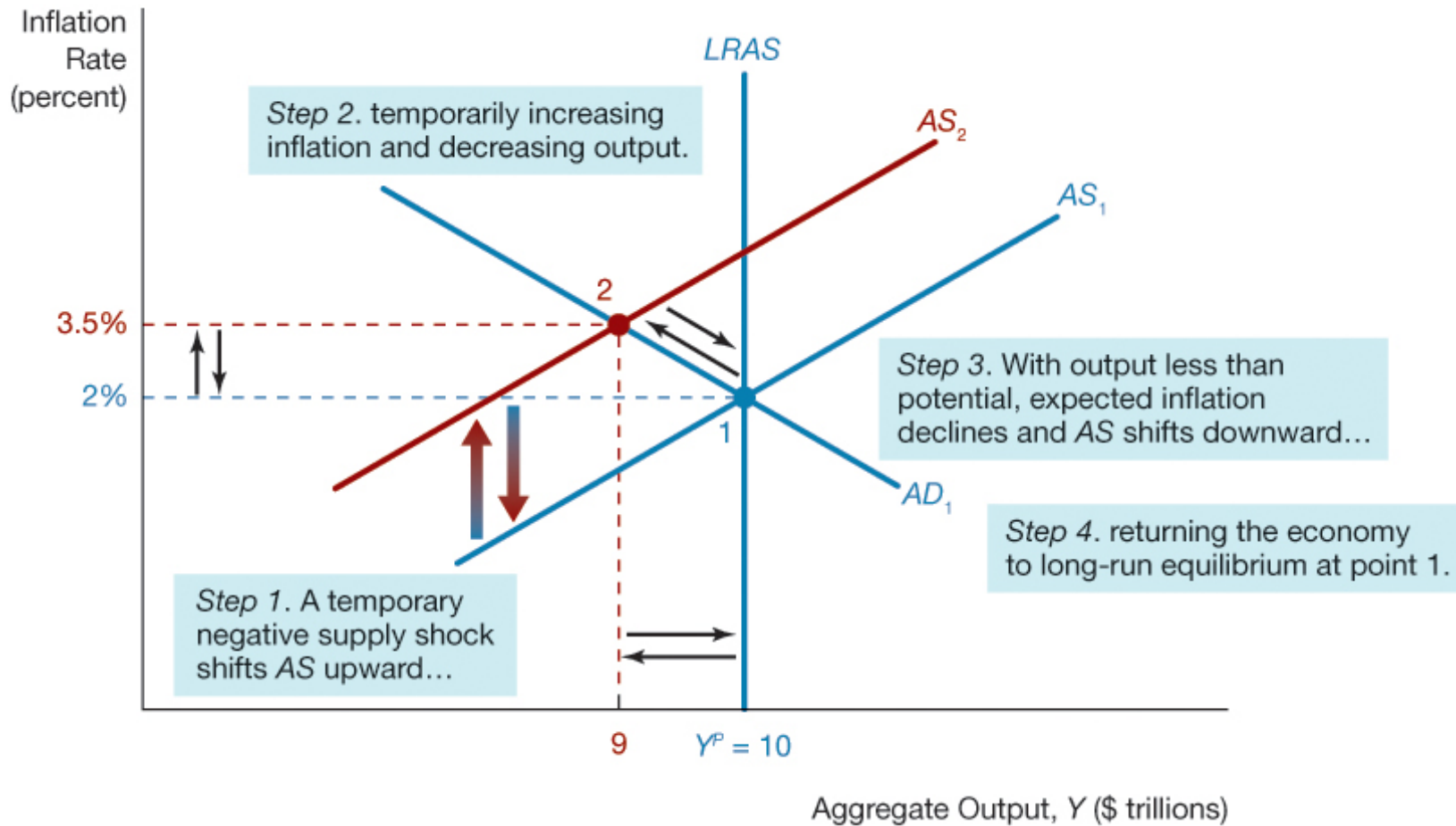
# Changes in Equilibrium: Aggregate Supply (Price) Shocks (1 of 2)

- The aggregate supply curve can shift from temporary supply (price) shocks in which the long-run aggregate supply curve does not shift, or from permanent supply shocks in which the long-run aggregate supply curve does shift.

# Changes in Equilibrium: Aggregate Supply (Price) Shocks (2 of 2)

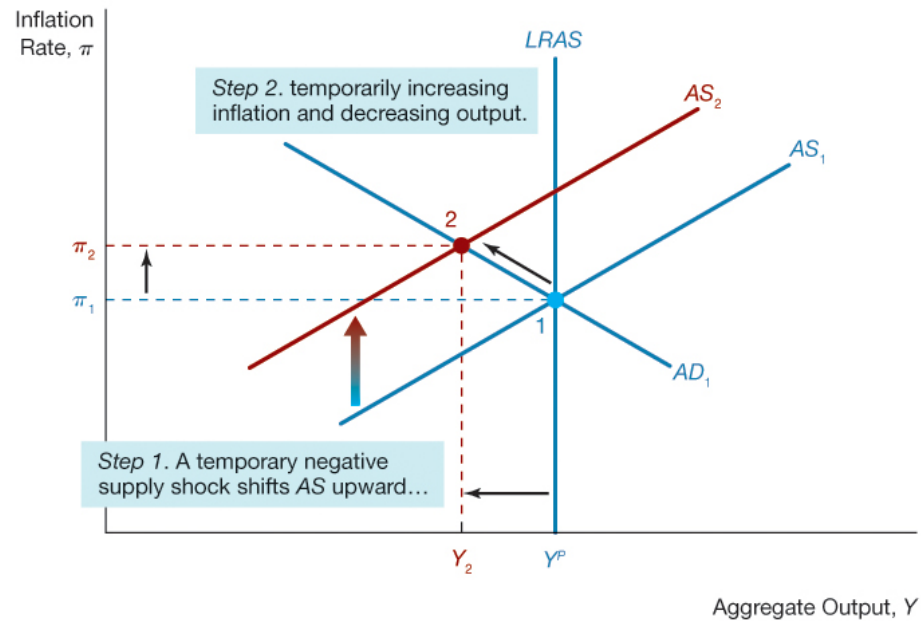
- **Temporary Supply Shocks:**
  - When the temporary shock involves a restriction in supply, we refer to this type of supply shock as a negative (or unfavorable) supply shock, and it results in a rise in commodity prices.
  - A temporary positive supply shock shifts the short-run aggregate supply curve downward and to the right, leading initially to a fall in inflation and a rise in output. In the long run, however, output and inflation will be unchanged (holding the aggregate demand curve constant).

# Figure 12 Temporary Negative Supply Shock



# Figure 13 Negative Supply Shocks, 1973–1975 and 1978–1980

(a) Aggregate Demand and Aggregate Supply Analysis



(b) Unemployment and Inflation, 1973–1975 and 1978–1980

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
1973	4.8	6.2
1974	5.5	11.0
1975	8.3	9.1
1978	6.0	7.6
1979	5.8	11.3
1980	7.1	13.5

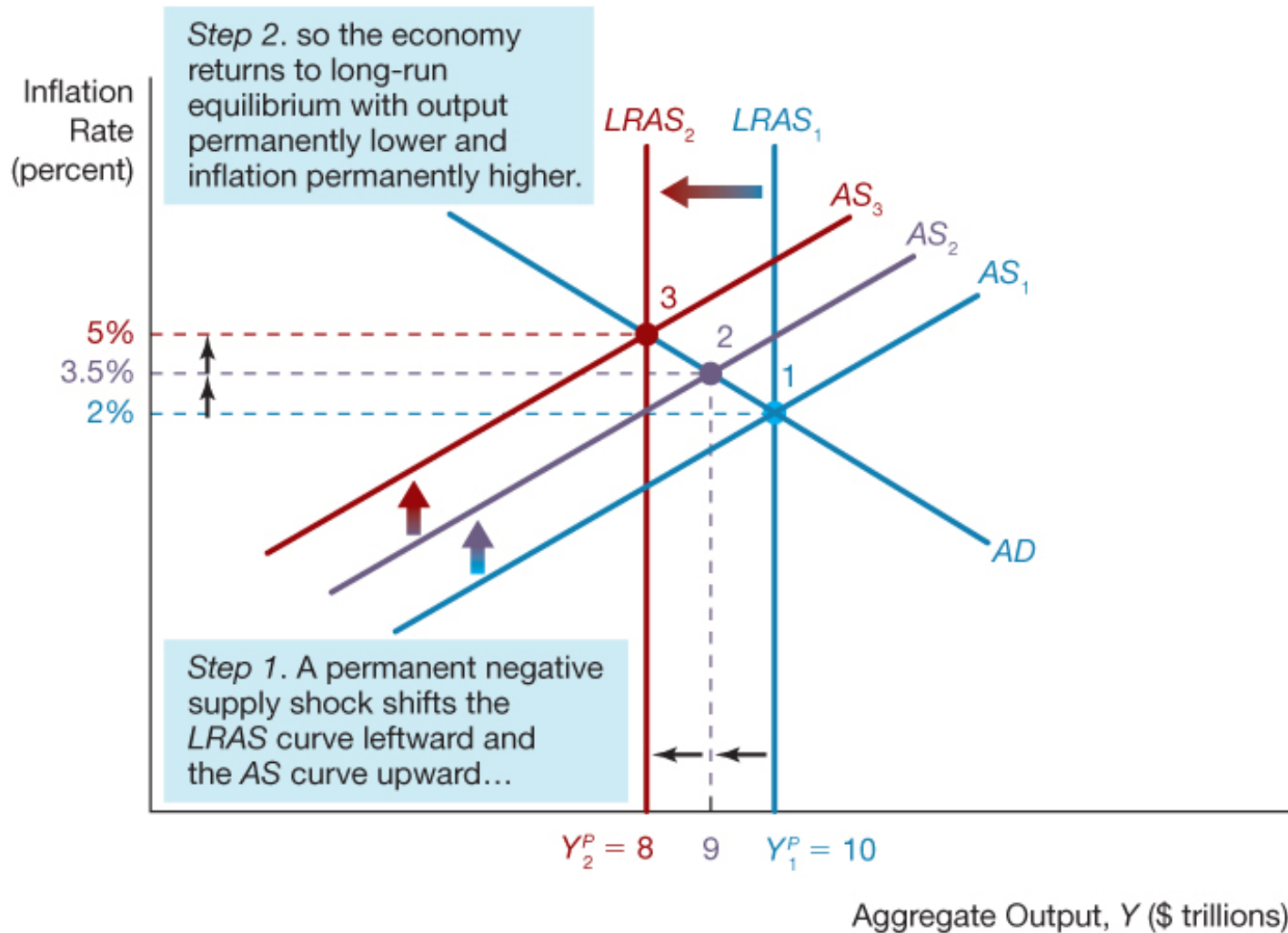
Source: Economic Report of the President.



# Permanent Supply Shocks and Real Business Cycle Theory

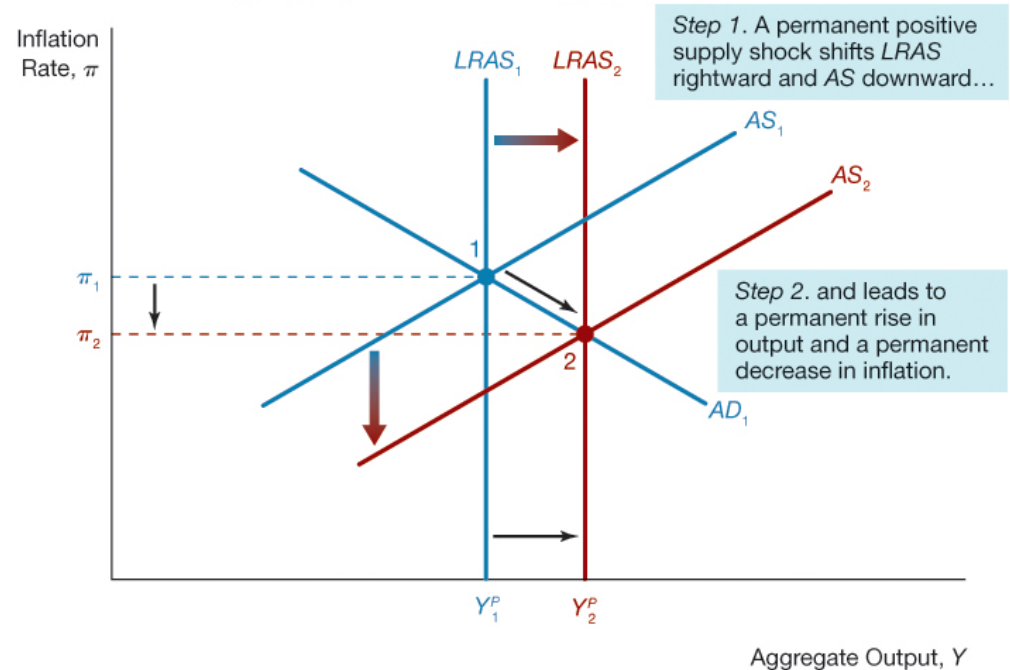
- A permanent negative supply shock—such as an increase in ill-advised regulations that causes the economy to be less efficient, thereby reducing supply—would decrease potential output and shift the long-run aggregate supply curve to the left.
- Because the permanent supply shock will result in higher prices, there will be an immediate rise in inflation and so the short-run aggregate supply curve will shift up and to the left.
- One group of economists, led by Edward Prescott of Arizona State University, believe that business cycle fluctuations result from permanent supply shocks alone and their theory of aggregate economic fluctuations is called **real business cycle theory**.

# Figure 14 Permanent Negative Supply Shock



# Figure 15 Positive Supply Shocks, 1995–1999

(a) Aggregate Demand and Aggregate Supply Analysis



(b) Unemployment and Inflation, 1995–1999

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
1995	5.6	2.8
1996	5.4	3.0
1997	4.9	2.3
1998	4.5	1.6
1999	4.2	2.2

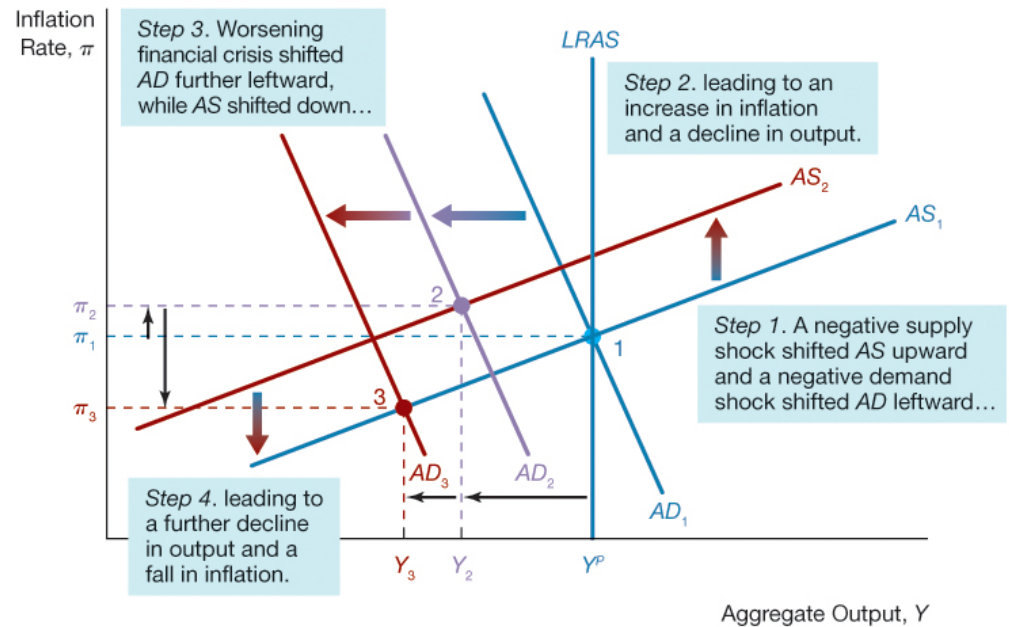
Source: Economic Report of the President.

# Conclusions

- Aggregate demand and supply analysis yields the following conclusions:
  1. A shift in the aggregate demand curve affects output only in the short run and has no effect in the long run.
  2. A temporary supply shock affects output and inflation only in the short run and has no effect in the long run (holding the aggregate demand curve constant).
  3. A permanent supply shock affects output and inflation both in the short and the long run.
  4. The economy has a self-correcting mechanism that returns it to potential output and the natural rate of unemployment over time.

# Figure 16 Negative Supply and Demand Shocks and the 2007–2009 Crisis

(a) Aggregate Demand and Aggregate Supply Analysis



(b) Unemployment and Inflation During the Perfect Storm of 2007–2009

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
2006	4.6	2.5
2007	4.6	4.1
2008, June	5.5	5.0
2008, Dec.	7.2	0.1
2009, June	9.5	-1.2
2009, Dec.	10.0	2.8

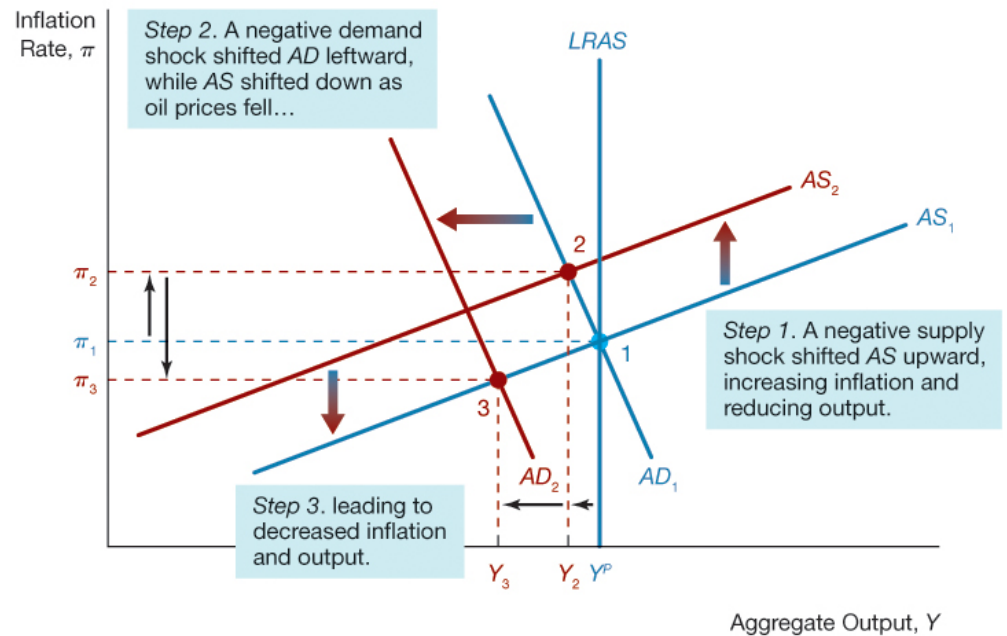
Source: Economic Report of the President.

# *AD/AS* Analysis of Foreign Business Cycle Episodes

- Our aggregate demand and supply analysis also can help us understand business cycle episodes in foreign countries.
  - Figure 17 shows the UK Financial Crisis, 2007–2009
  - Figure 18 shows China and the Financial Crisis, 2007–2009

# Figure 17 U.K. Financial Crisis, 2007–2009

(a) Aggregate Demand and Aggregate Supply Analysis

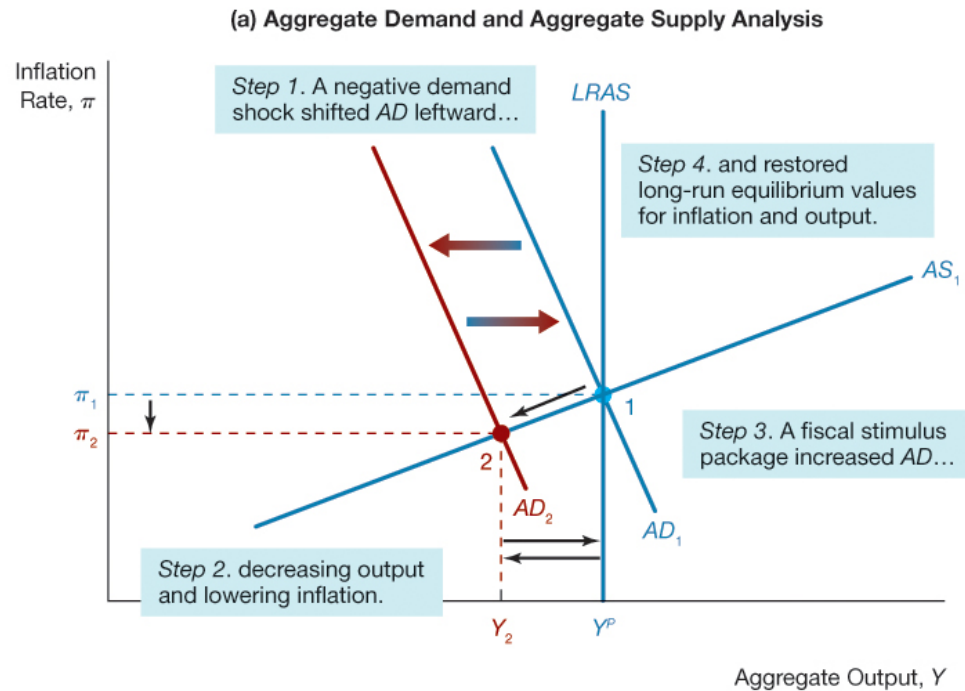


(b) Unemployment and Inflation, 2006–2009

Year	Unemployment Rate (%)	Inflation (Year to Year) (%)
2006	5.4	2.3
2007	5.3	2.3
2008, June	5.3	3.4
2008, Dec.	6.4	3.9
2009, June	7.8	2.1
2009, Dec.	7.8	2.1

Source: Office of National Statistics, UK.  
<http://www.statistics.gov.uk/statbase/tsdt/imezone.asp>.

# Figure 18 China and the Financial Crisis, 2007–2009



(b) Chinese Output Growth and Inflation, 2006–2009

Year	Output Growth (%)	Inflation (Year to Year) (%)
2006	11.8	1.5
2007	12.4	4.8
2008, June	11.2	7.9
2008, Dec.	4.4	3.9
2009, June	11.1	-1.1
2009, Dec.	10.4	-0.3

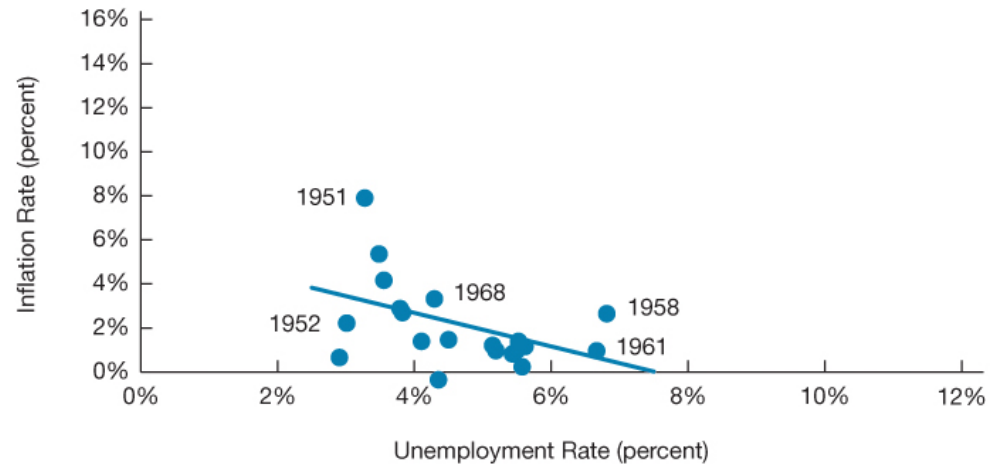


# Appendix to Chapter 22: The Phillips Curve and the Short-Run Aggregate Supply Curve

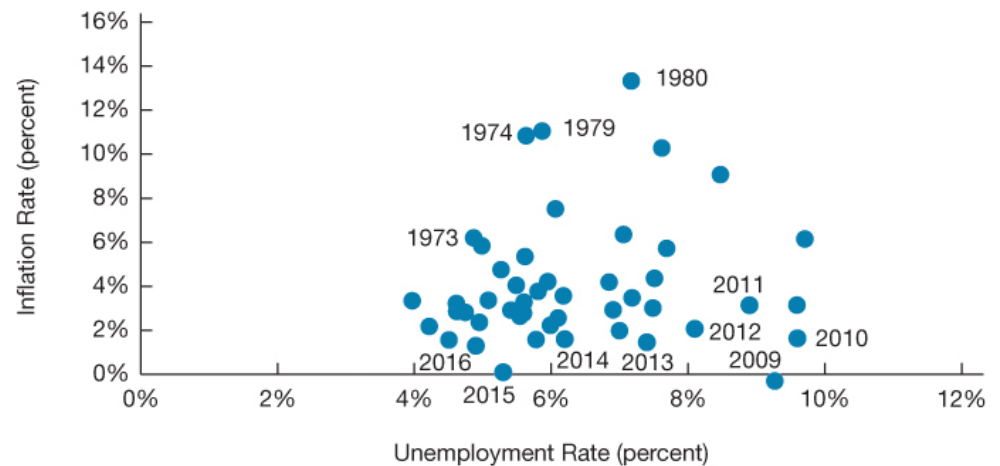
- **The Phillips Curve:** the negative relationship between unemployment and inflation.
- The idea behind the Phillips curve is intuitive: When labor markets are *tight*—that is, the unemployment rate is *low*—firms may have difficulty hiring qualified workers and may even have a hard time keeping their present employees. Because of the shortage of workers in the labor market, firms will raise wages to attract needed workers and raise their prices at a more rapid rate.

# Figure 1 Inflation and Unemployment in the United States, 1950–1969 and 1970–2016

(a) Inflation and Unemployment, 1950–1969

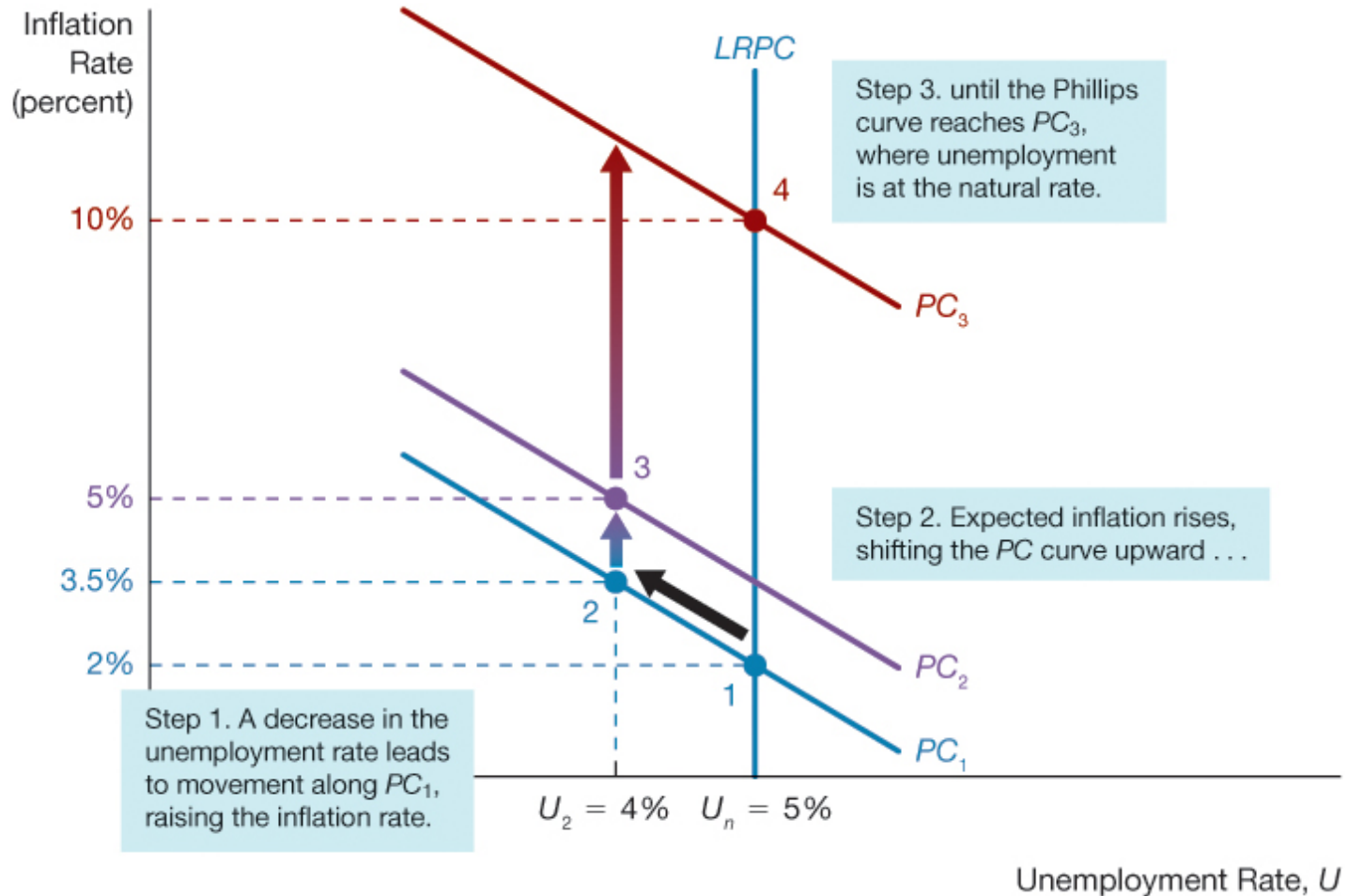


(b) Inflation and Unemployment, 1970–2016



Source: Federal Reserve Bank of St. Louis, FRED database:  
<https://fred.stlouisfed.org/series/UNRATE>;  
<https://fred.stlouisfed.org/series/CPIAUCSL>

# Figure 2 The Short- and Long-Run Phillips Curve



# Three Important Conclusions

1. There is no long-run trade off between unemployment and inflation.
2. There is a short-run trade off between unemployment and inflation.
3. There are two types of Phillips curves, long run and short run.

# The Phillips Curve After the 1960s

- The expectations-augmented Phillips curve shows that the negative correlation between unemployment and inflation breaks down when the unemployment rate remains below the natural rate of unemployment for any extended period of time.
- Inflation jumped up sharply with the sharp rise in oil prices in 1973 and 1979 and Phillips-curve theorists realized that they had to add one more feature to the expectations-augmented Phillips curve. Supply shocks are shocks to supply that change the amount of output an economy can produce from the same amount of capital and labor. These supply shocks translate into inflation shocks.

# The Modern Phillips Curve with Adaptive (Backward-Looking) Expectations

- To complete our analysis of the Phillips curve, we need to understand how firms and households form expectations about inflation. One simple model assumes that they do so by looking at past inflation.
- This form of expectations is known as adaptive expectations or backward-looking expectations because expectations are formed by looking at the past and therefore change only slowly over time.

# The Short-Run Aggregate Supply Curve

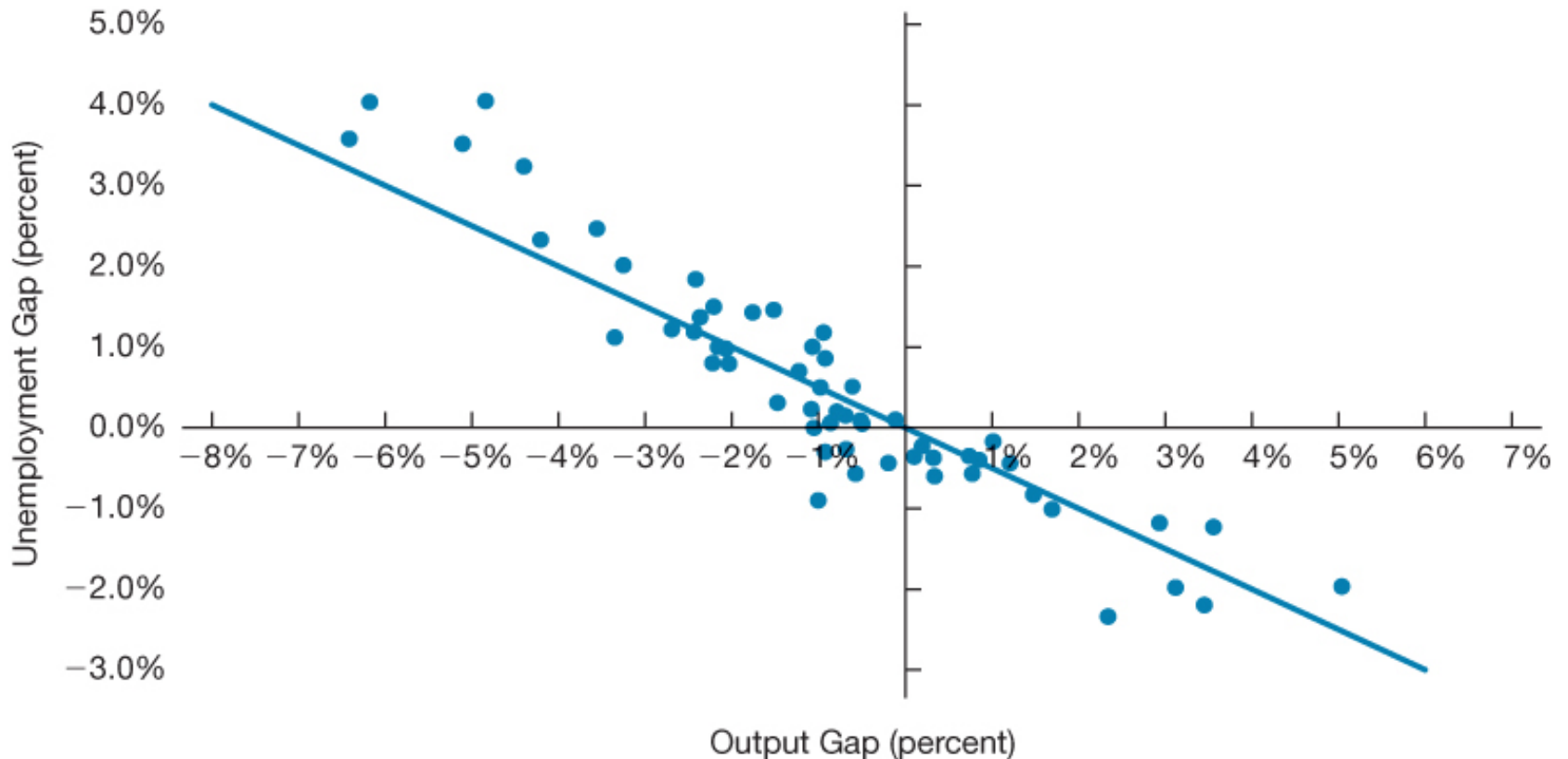
- To complete our aggregate demand and supply model, we need to use our analysis of the Phillips curve to derive a short-run aggregate supply curve, which represents the relationship between the total quantity of output that firms are willing to produce and the inflation rate.
- We can translate the modern Phillips curve into a short-run aggregate supply curve by replacing the unemployment gap ( $U - U_n$ ) with the *output gap*, the difference between output and potential output ( $Y - Y_P$ ).

# Okun's Law

- **Okun's law** describes the negative relationship between the unemployment gap and the output gap.
- Okun's law states that for each percentage point that output is above potential, the unemployment rate is one-half of a percentage point below the natural rate of unemployment. Alternatively, for every percentage point that unemployment is above its natural rate, output is two percentage points below potential output.



# Figure 3 Okun's Law, 1960–2016



Source: Federal Reserve Bank of St. Louis, FRED database: <https://fred.stlouisfed.org/series/UNRATE>; <https://fred.stlouisfed.org/series/GDPC1>; <https://fred.stlouisfed.org/series/GDPPOT>.

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