

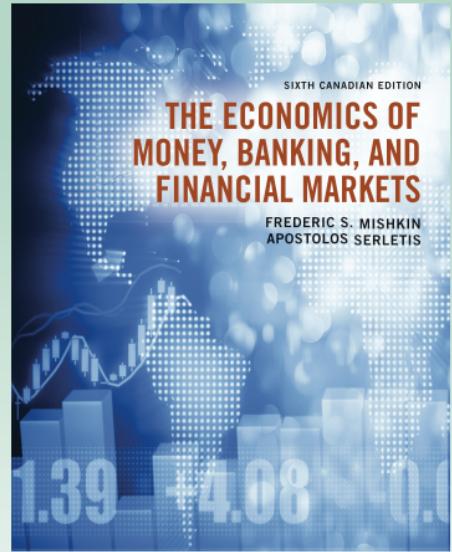
Mishkin/Serletis

The Economics of Money, Banking, and Financial Markets

Sixth Canadian Edition

Chapter 23

Aggregate Demand and Supply Analysis



Learning Objectives

- 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, shifts in the AS curve, and the role of self-correcting mechanisms
- Illustrate and interpret the short-run and long-run effects of a shock to aggregate demand, and shocks to aggregate supply (both temporary and permanent)
- Explain business cycle fluctuations in major economies during the 2007-2009 financial crisis

Aggregate Demand

- **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*

Deriving the Aggregate Demand Curve

The aggregate demand equation:

$$Y_{ad} = C + I + G + NX$$

- When inflation rises, monetary authorities react by raising the real interest rate
- When the real interest rate is higher, the cost of financing purchases of new physical capital becomes higher, so planned investment spending declines



The AD curve is drawn in a space with π_U on the vertical axis and Y on the horizontal axis.

To justify this downward slope, we need to establish an inverse relationship between π_U and Y .

Consider: if $\pi_U \uparrow$, the Bank will $\uparrow r$ (real interest rate). Since r represents the cost of the borrowing, firms will delay purchase plans, investments will decline and AD will fall.

Therefore, a higher π_U lead to a lower level of aggregate output demanded.

Factors that Shift the Aggregate Demand Curve

- Seven basic factors (referred to as **demand shocks**) shift the aggregate demand curve:
 - Autonomous monetary policy*
 - Government purchases*
 - Taxes*
 - Autonomous net exports*
 - Autonomous consumption expenditure*
 - Autonomous investment*
 - Financial frictions*

1. Autonomous Monetary Policy.

If the bank affects the real interest rate. for reasons other than the current inflation rate. a higher \bar{r} will lead to a higher cost of borrowing, lower investment spending, and lower AD at any inflation rate.

2. Gov Purchase: $\uparrow \bar{G} \rightarrow \uparrow A.D.$

3. Taxes (\bar{T}) affect disposable income which. affects consumption and AD.

4. Autonomous Net Exports (\bar{N}_X) foreign demand. for Canadian goods and Canadian demand. for foreign goods. In other words, the level of N_X that is not determined by r and the exchange rate (e).

5. Autonomous Consumption (\bar{C}) is affected by consumer optimism and expectations for future income

6. Autonomous Investment (\bar{I}) is firm's spending plans which are influenced by factors other than r and Y such as optimism and expectations for future profits.
7. Financial Friction (\bar{f}) are the factors that affect the real cost of borrowing caused by asymmetric information in financial market.

Leftward Shift in the Aggregate Demand Curve

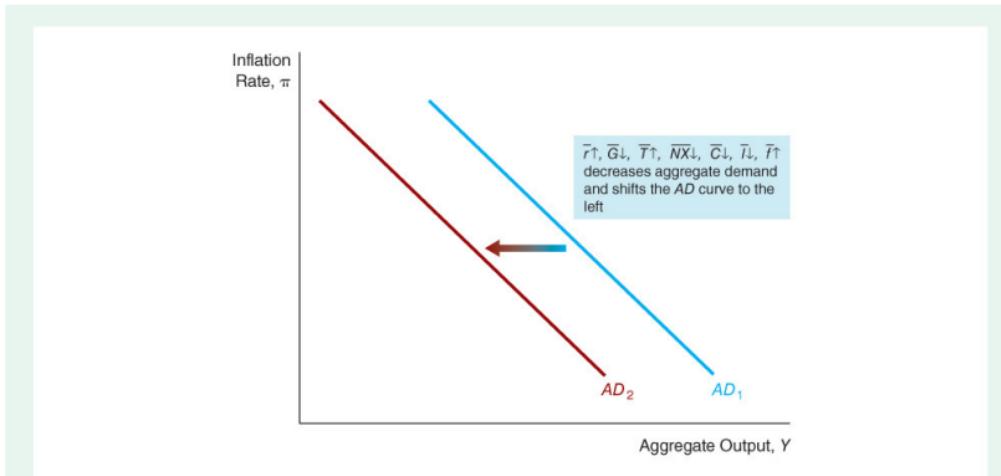
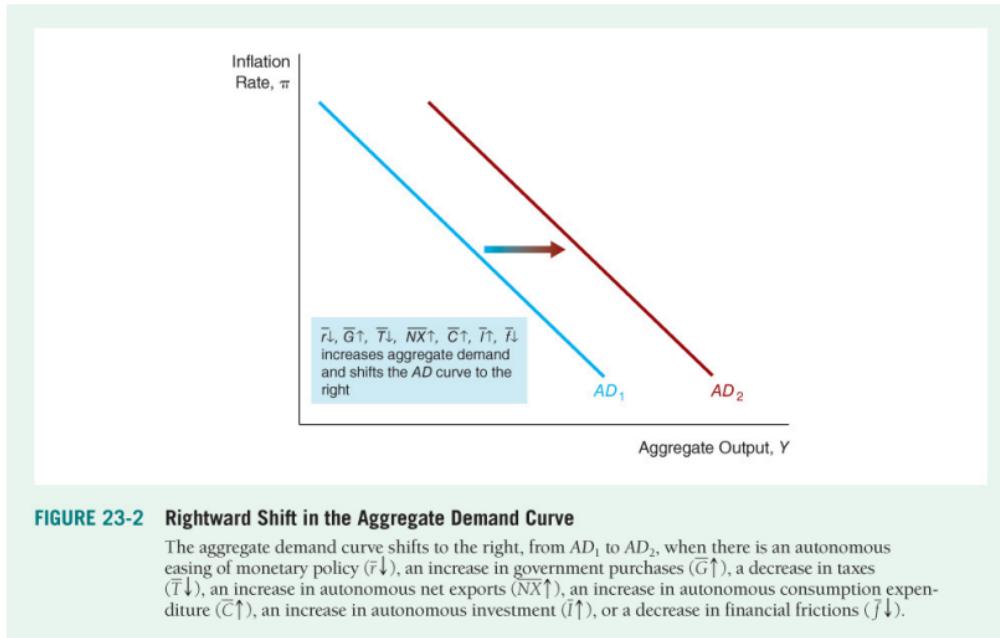


FIGURE 23-1 Leftward Shift in the Aggregate Demand Curve

The aggregate demand curve shifts to the left from AD_1 to AD_2 when there is an autonomous tightening of monetary policy ($\bar{r} \uparrow$), a decrease in government purchases ($\bar{G} \downarrow$), an increase in taxes ($\bar{T} \uparrow$), a decrease in autonomous net exports ($\bar{N}X\downarrow$), a decrease in autonomous consumption expenditure ($\bar{C} \downarrow$), a decrease in autonomous investment ($\bar{I} \downarrow$), or an increase in financial frictions ($\bar{f} \uparrow$).

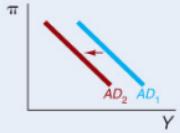
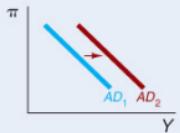
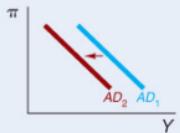
Rightward Shift in the Aggregate Demand Curve



Factors That Shift the Aggregate Demand Curve

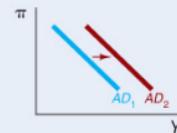
SUMMARY TABLE 23-1

Factors That Shift the Aggregate Demand Curve

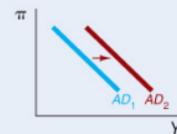
Factor	Change	Shift in Aggregate Demand Curve
Autonomous monetary policy, \bar{r}	↑	
Government purchases, \bar{G}	↑	
Taxes, \bar{T}	↑	

Factors That Shift the Aggregate Demand Curve (cont'd)

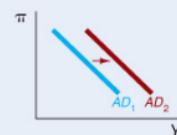
Autonomous net exports, \bar{NX}



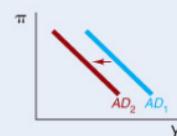
Autonomous consumption expenditure, \bar{C}



Autonomous investment, \bar{I}



Financial frictions, \bar{f}



Note: Only increases (\uparrow) 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 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*

Long- and Short-Run Aggregate Supply Curves

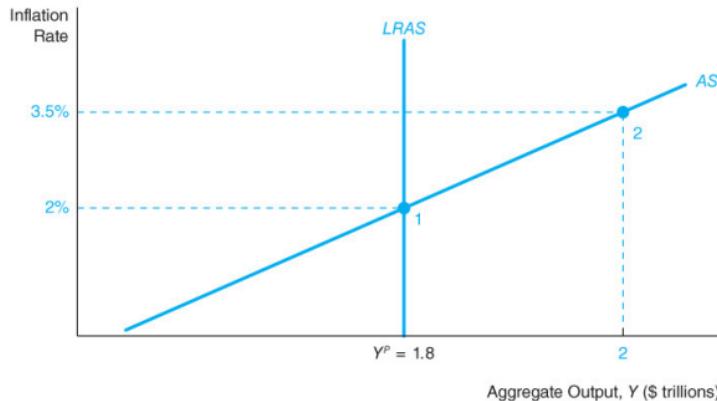


FIGURE 23-3 Long- and Short-Run Aggregate Supply Curves

The amount of aggregate output supplied at any given inflation rate is at potential output in the long run, \$1.8 trillion, so that the long-run aggregate supply curve $LRAS$ is a vertical line at $Y^P = \$1.8$ trillion. The short-run aggregate supply curve, AS (Note that the short-run aggregate supply curve in Figure 23-3 is marked as AS ($\pi^e = 2\%$) to indicate it is drawn assuming $\pi^e = 2\%$), where $\pi^e = 2\%$, is upward-sloping because as Y rises relative to Y^P , labour markets get tighter and inflation rises. AS intersects $LRAS$ at point 1, where current inflation equals expected inflation of 2%.

Y^P = Potential Output.

= the amount of GDP the economy is capable of producing at "full-employment"

The short-run aggregate supply curve is drawn for a. specific level of π^e .

where AS = LRAS, $\pi^e = \pi$ (actual inflation)

As output increases above Y^P , a tight labor market will put upward pressure on prices and inflation rises.

Short-Run Aggregate Supply Curve

- Based on the idea that three factors drive inflation:
 - Expected Inflation
 - Output Gap
 - Price (Supply) Shocks
- It is upward sloping
 - *When output rises relative to potential output (so the output gap is positive) the labour market is tighter and firms raise their prices at a more rapid rate*
 - *Thus, the AS curve is upward-sloping*

1. Expected Inflation.

If workers expect higher inflation, they will adjust their nominal wage (w) demands so that their real wage (w_p) remains unchanged. Higher wages lead to higher costs of production. Firms will increase prices leading to higher actual inflation.

2. Output Gap.

When output exceeds its potential level ($Y - Y^P > 0$) the economy is hot, and there are few unemployed resources. Workers will demand higher wages, leading to higher actual inflation.

3. Price (Supply) Shocks

Increases in inflation can occur when there are exogenous shocks, in other words, shocks to the productive process regardless of expectations of inflation, or the output gap. Typical example, an increase in oil prices, but there are other causes. Also called cost-push inflation

Shifts in the 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:*
 - an increase in the total amount of capital in the economy,*
 - an increase in the total amount of labor supplied in the economy,*
 - an increase in the available technology, or*
 - a decline in the natural rate of unemployment*
 - *An opposite movement in these variables shifts the LRAS curve to the left*

LRAS shifts right if:

- More factors of production.
- Technological improvement
- Decrease in the natural rate of unemployment.
 - more labour is being used, Y^P increases

The opposite is true

Shift in the Long-Run Aggregate Supply Curve

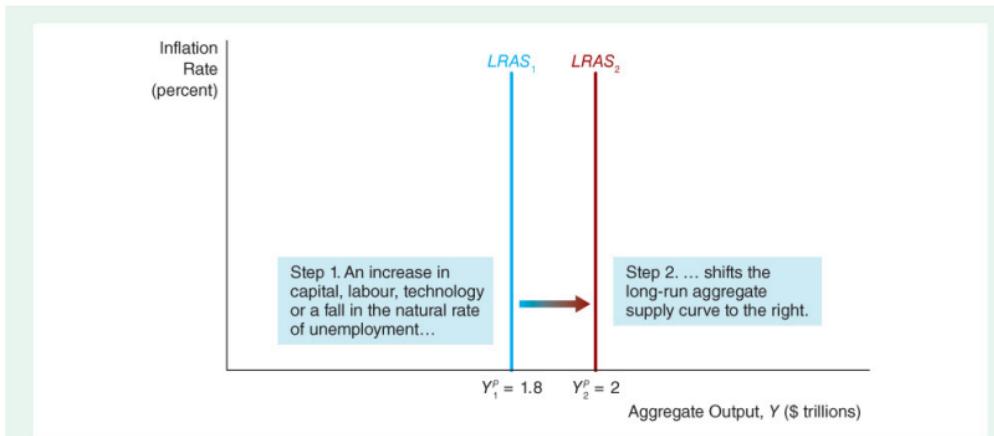


FIGURE 23-4 Shift in the Long-Run Aggregate Supply Curve

The long-run aggregate supply curve shifts to the right from $LRAS_1$ to $LRAS_2$ when there is (1) an increase in the total amount of capital in the economy, (2) an increase in the total amount of labour 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.

Shifts in the Short-Run Aggregate Supply Curve

There are three factors that can shift the short-run aggregate supply curve:

- Expected inflation*
- Inflation shocks*
- A persistent output gap*

1. Expected Inflation:

If an exogenous shock causes people to change their expectations of inflation, an increase in π^e will shift the SRAS up and left.

- A decrease in π^e will shift the SRAS down and right

2. Inflation shocks.

An adverse supply shock, e.g. oil supply shortage. raises prices and shifts SRAS up and left.

A favourable supply shock lower prices and shifts the SRAS down and right

3. persistent output gap .

- We know that a positive output gap ($Y - Y^P > 0$) is inflationary .
- It is represented. as movement along the SRAS .
(Point 1 → Point 2)
- If the output gap is persistently positive, the SRAS curve will shift up and left because the output gap will influence expectations of inflation
- From Point 2 , the SRAS curve will shift up and left in the next period as workers push for higher wages (Point 3)
- The upward shift of SRAS curve will stop. only when output return to Y^P level .

Shift in the Short-Run Aggregate Supply Curve from Changes in Expected Inflation and Inflation Shocks

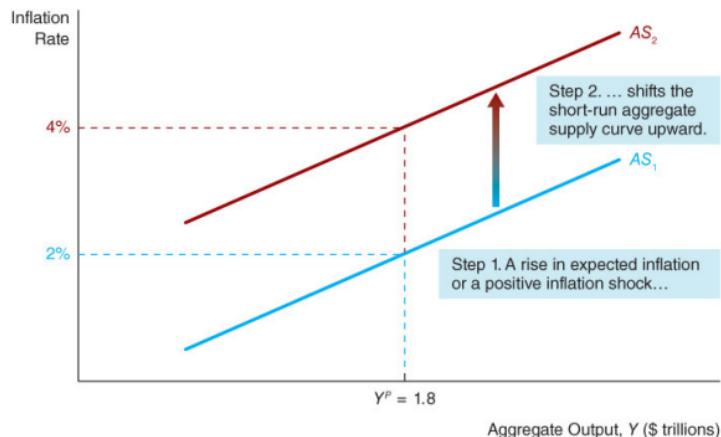


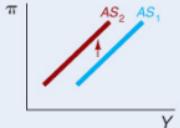
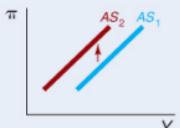
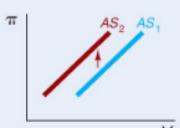
FIGURE 23-5 Shift in the Short-Run Aggregate Supply Curve from Changes in Expected Inflation and Inflation Shocks

A rise in expected inflation or a positive inflation shock shifts the short-run aggregate supply curve upward from AS_1 to AS_2 . (A decrease in expected inflation or a negative inflation shock would lead to a downward shift of the AS curve.)

Factors That Shift the Short-Run Aggregate Supply Curve

SUMMARY TABLE 23-2

Factors That Shift the Short-Run Aggregate Supply Curve

Factor	Change	Shift in Supply Curve
Expected inflation, π^e	↑	 A graph with the vertical axis labeled π and the horizontal axis labeled Y . Two upward-sloping curves are shown: a red one labeled AS_1 and a blue one labeled AS_2 . An arrow points from AS_1 to AS_2 , indicating a rightward shift.
Inflation shock, ρ	↑	 A graph with the vertical axis labeled π and the horizontal axis labeled Y . Two upward-sloping curves are shown: a red one labeled AS_1 and a blue one labeled AS_2 . An arrow points from AS_1 to AS_2 , indicating a rightward shift.
Persistent output gap, $(Y - Y^P)$	↑	 A graph with the vertical axis labeled π and the horizontal axis labeled Y . Two upward-sloping curves are shown: a red one labeled AS_1 and a blue one labeled AS_2 . An arrow points from AS_1 to AS_2 , indicating a rightward shift.

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.

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

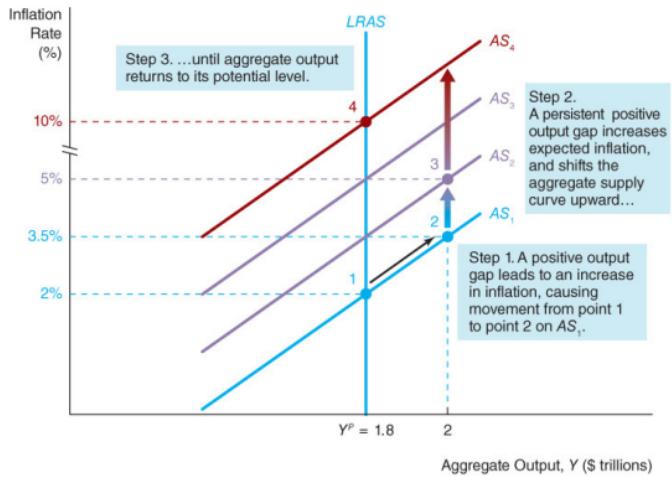


FIGURE 23-6 Shift in the Short-Run Aggregate Supply Curve from a Persistent Positive Output Gap

When output is above potential, the economy moves along the AS_1 curve from point 1 to point 2, and inflation rises to 3.5%. If output continues to remain above potential output, where the output gap is positive, the short-run aggregate supply curve will shift upward, to AS_2 and then to AS_3 . The short-run aggregate supply curve stops shifting upward when the economy reaches point 4 on the short-run aggregate supply curve AS_4 , where the output gap is once again zero.

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
- All markets are simultaneously in equilibrium at the point where the quantity of aggregate output demanded equals the quantity of aggregate output supplied

General Equilibrium Theory .

General Equilibrium Theory attempts to explain the functioning of economic markets as a whole, rather than as individual phenomena, It stands in contrast with partial equilibrium theory- which only analyzes specific markets .

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 π^*

Short-Run Equilibrium

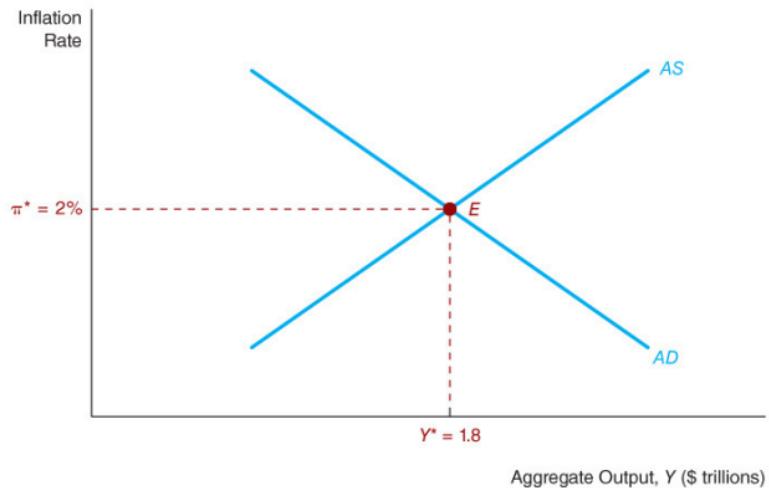


FIGURE 23-7 Short-Run Equilibrium

Short-run equilibrium occurs at point E, at the intersection of the aggregate demand curve AD and the short-run aggregate supply curve AS.

Short-run Equilibrium.

Note: Without knowing the level of Y^P , we cannot tell whether Y^* is an above full-employment equilibrium or a below full-employment equilibrium.

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

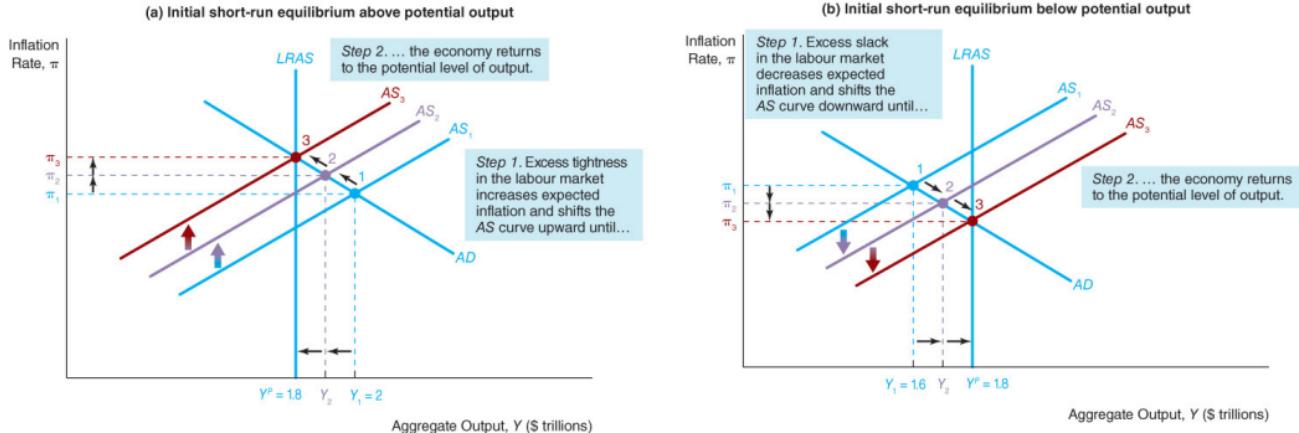


FIGURE 23-8 Adjustment to Long-Run Equilibrium in Aggregate Supply and Demand Analysis

In both panels, the initial short-run equilibrium is at point 1, at the intersection of AD and AS_1 . In panel (a), initial short-run equilibrium is above potential output, the long-run equilibrium, and so the short-run aggregate supply curve shifts upward until it reaches AS_3 , where output returns to Y^P . In panel (b), initial short-run equilibrium is below potential output, and so the short-run aggregate supply curve shifts downward until output returns to Y^P . In both panels, the economy's self-correcting mechanism returns the economy to the level of potential output.

(a) Above full-employment equilibrium .

- The positive output gap and tight labor market push up wages and prices.
- Higher π^e shifts the SRAS curve up and left .
- This activity will continue until the output gap has been eliminated .

(b) Below full-employment equilibrium .

- The negative output gap and slack labor markets decreases inflation .
- Lower π^e shifts the SRAS curve down and right until $Y = Y^P$

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

Positive Demand Shock

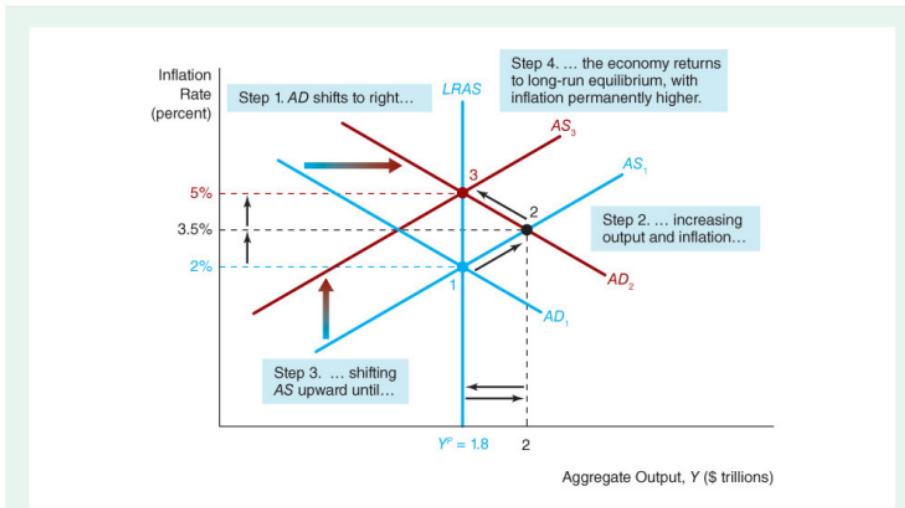
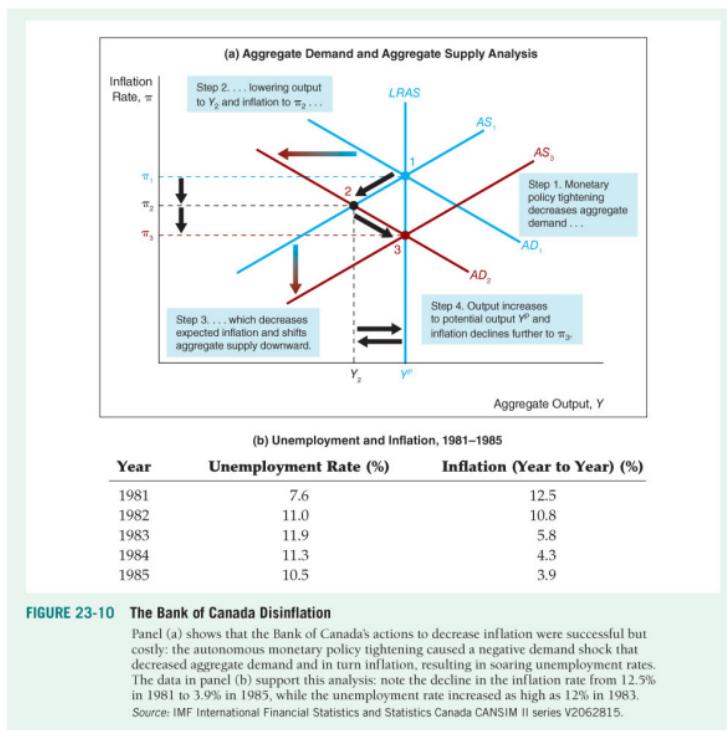


FIGURE 23-9 Positive Demand Shock

A positive demand shock shifts the aggregate demand curve upward from AD_1 to AD_2 and moves the economy from point 1 to point 2, resulting in higher inflation at 3.5% and higher output of \$2 trillion. Because output is greater than potential output and therefore expected inflation increases, the short-run aggregate supply curve begins to shift up, eventually reaching AS_3 . At point 3, the economy returns to long-run equilibrium, with output at $Y^P = \$1.8$ trillion and the inflation level rising to 5%.

The Bank of Canada Disinflation



Negative Demand Shocks

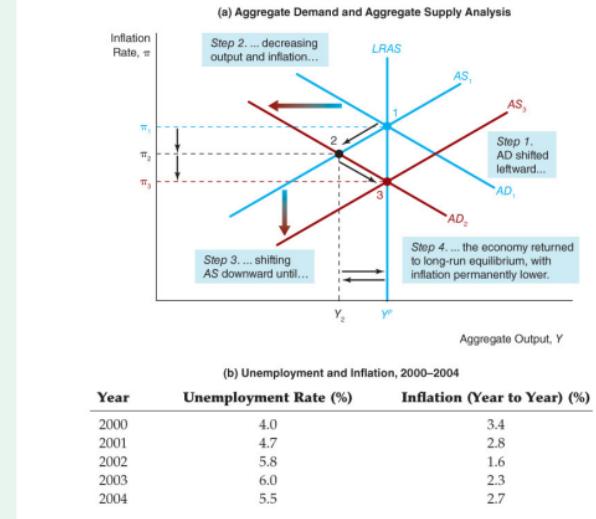


FIGURE 23-11 Negative Demand Shocks, 2001–2004

Panel (a) shows that the negative demand shocks from 2001–2004 decreased consumption expenditure and investment, shifting the aggregate demand curve to the left from AD_1 to AD_2 . The economy moved to point 2, where output fell, unemployment rose, and inflation declined. The large negative output gap that occurred when output was less than potential caused the short-run aggregate supply curve to begin falling to AS_2 . The economy moved toward point 3, where output would return to potential. Inflation declined further to π_3 , and unemployment fell back to its natural rate level of around 5%. The data in panel (b) support this analysis, with inflation declining to around 2% and the unemployment rate dropping back to 5.5% by 2004.

Source: Economic Report of the President.

Changes in Equilibrium: Aggregate Supply (Inflation) Shocks

- 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 (cont'd)

- 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)*

Temporary Negative Supply Shock

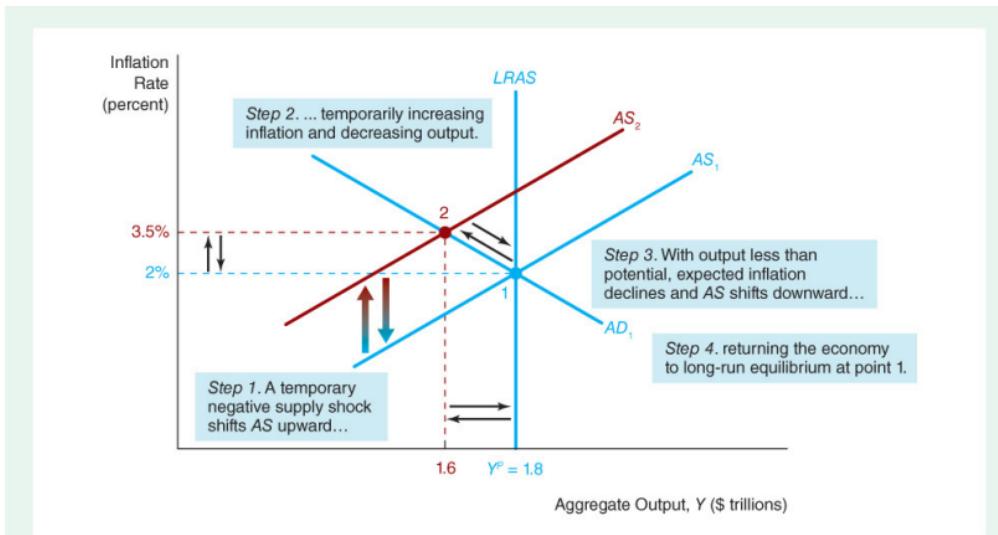
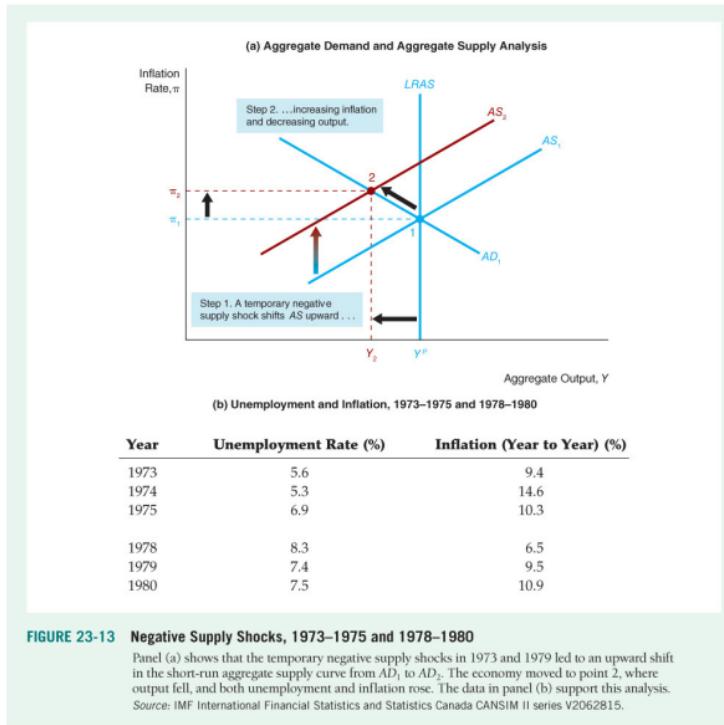


FIGURE 23-12 Temporary Negative Supply Shock

A temporary negative supply shock shifts the short-run aggregate supply curve from AS_1 to AS_2 , and the economy moves from point 1 to point 2, where inflation increases to 3.5% and output declines to \$1.6 trillion. Because output is less than potential, the negative output gap lowers inflation and hence expected inflation. The decline in expected inflation shifts the short-run aggregate supply curve back down, and eventually it returns to AS_1 , where the economy is again at the initial long-run equilibrium at point 1.

Negative Supply Shocks



Permanent Supply Shocks and Real Business Cycle Theory

- A permanent negative supply shock
 - *i.e., regulations that causes the economy to be less efficient*
 - *Decrease potential output, shift LRAS left*
- Higher prices and immediate rise in inflation
 - *Short-run AS curve shifts up and to the left*
- Theory that business cycle fluctuations result from permanent supply shocks alone and their theory of aggregate economic fluctuations is called **real business cycle theory**

Permanent Negative Supply Shock

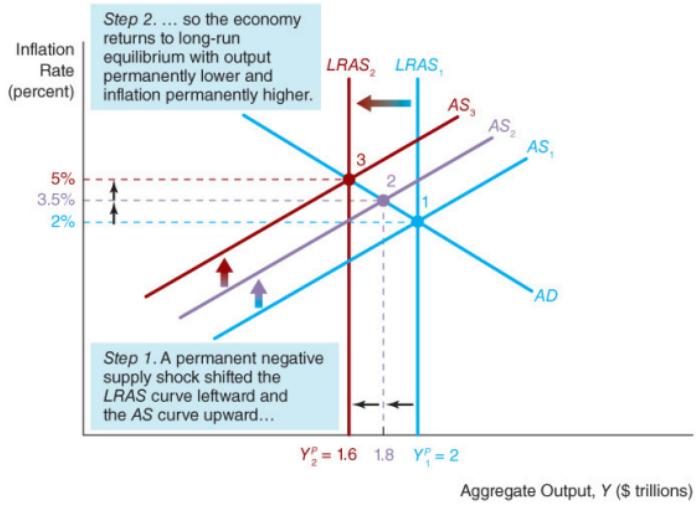
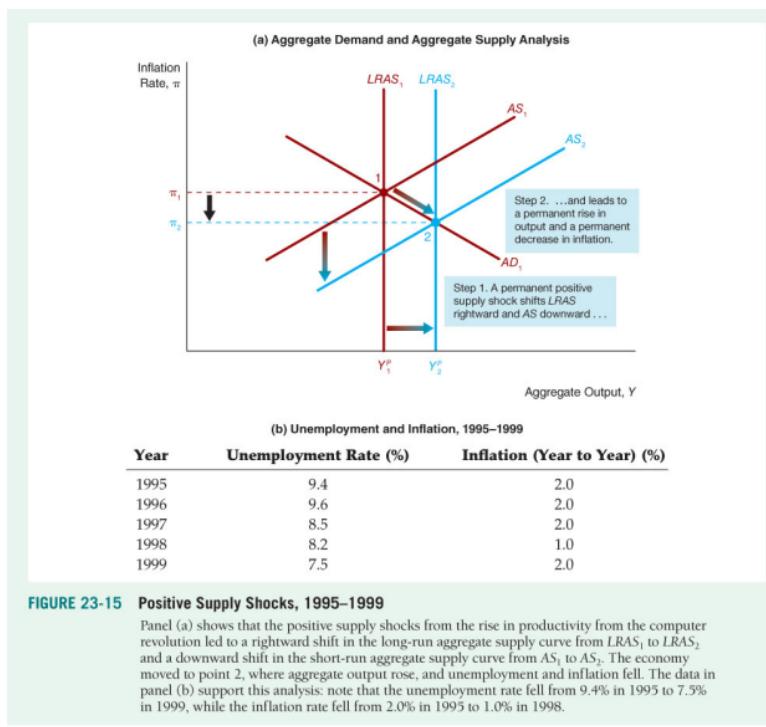


FIGURE 23-14 Permanent Negative Supply Shock

A permanent negative supply shock initially leads to a decline in output and a rise in inflation. In the long run, it leads to a permanent decline in output and a permanent rise in inflation, as indicated by point 3, where inflation has risen to 5% and output has fallen to \$1.6 trillion.

Positive Supply Shocks



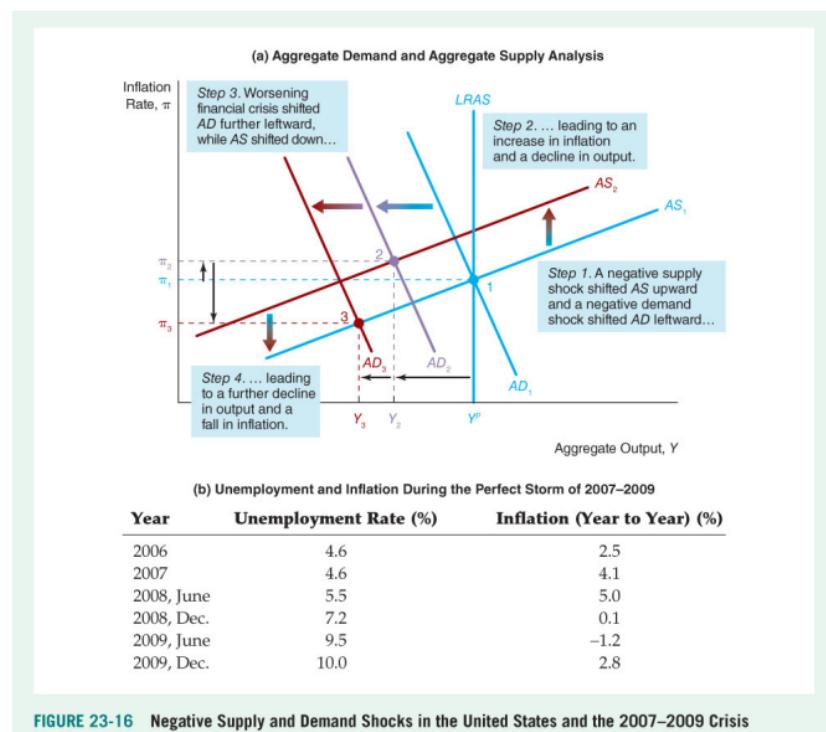
Can we explain these outcomes?

- Consider the positive impact of IT on production.
- Due to "Baby boomers" being less likely to be unemployed, the natural rate of unemployment decreased.
- Together, the phenomena represent a permanent positive supply shock
- The LRAS curve shifted to the right
- Inflation fell immediately
- As no output gap exists, π^e decreased and the SRAS curve shifted down and right to a new long-term equilibrium at Point B.
- Final Outcome : $Y \uparrow$ $U \downarrow$ $\pi \downarrow$

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*

Negative Supply and Demand Shocks and the 2007–2009 Crisis



UK Financial Crisis, 2007–2009

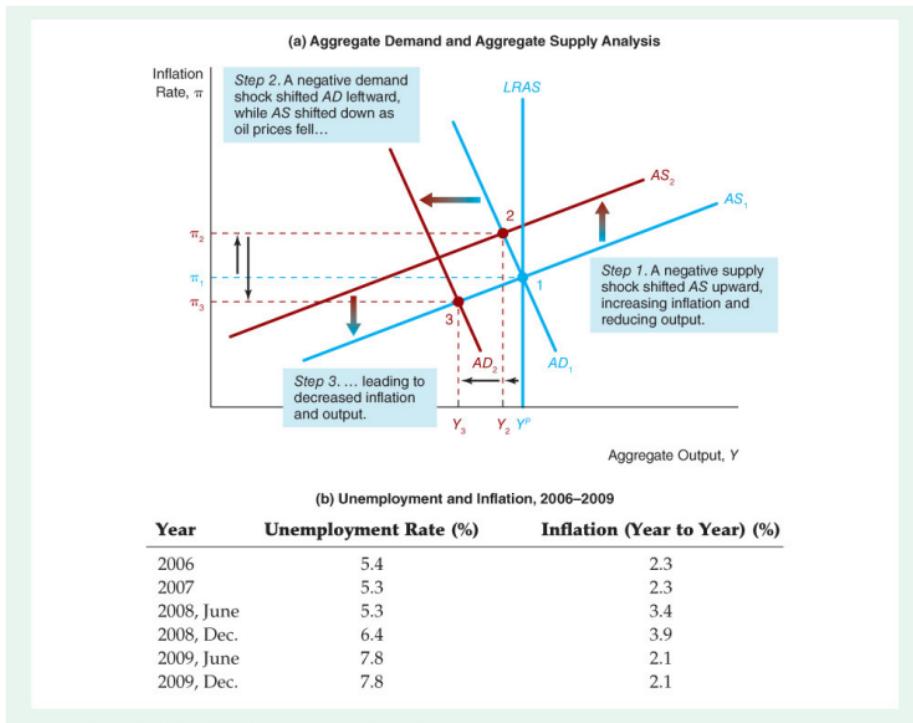


FIGURE 23-17 U.K. Financial Crisis, 2007–2009

China and the Financial Crisis, 2007–2009

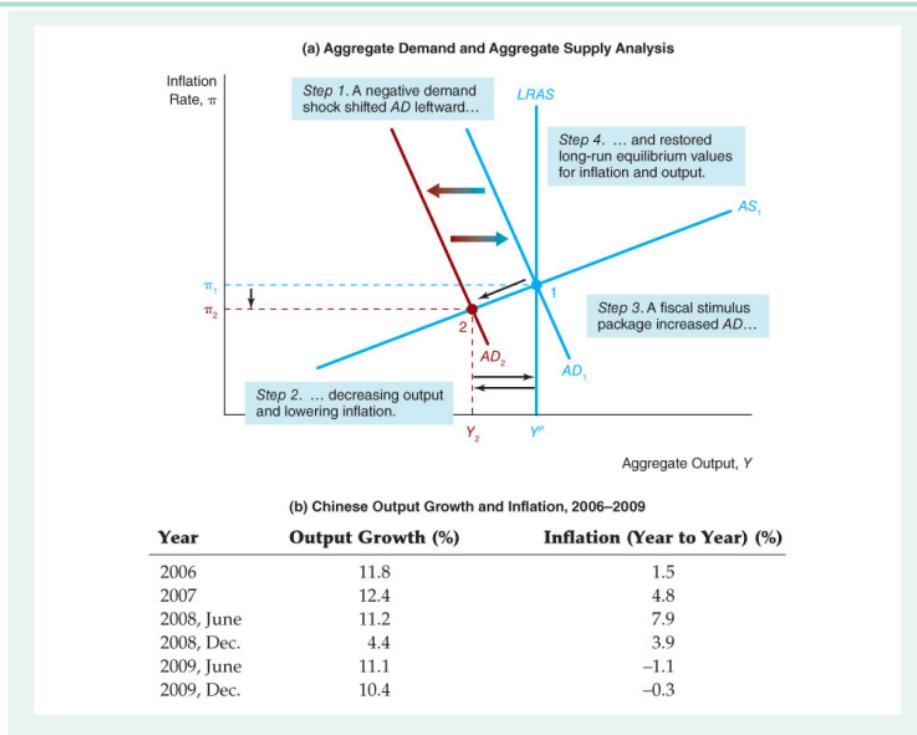


FIGURE 23-18 China and the Financial Crisis, 2007–2009

