Chapter 7

AGGREGATE SUPPLY AND AGGREGATE DEMAND*

Key Concepts

Aggregate Supply

The **aggregate production function** shows that the quantity of real GDP (Y) supplied depends on the quantity of labor (L), the quantity of capital (K), and the state of technology.

- When the wage rate makes the quantity of labor supplied equal the quantity of labor demanded, there is full employment. At full employment, the unemployment rate is the **natural rate of unemployment,** and the amount of GDP produced is potential GDP.

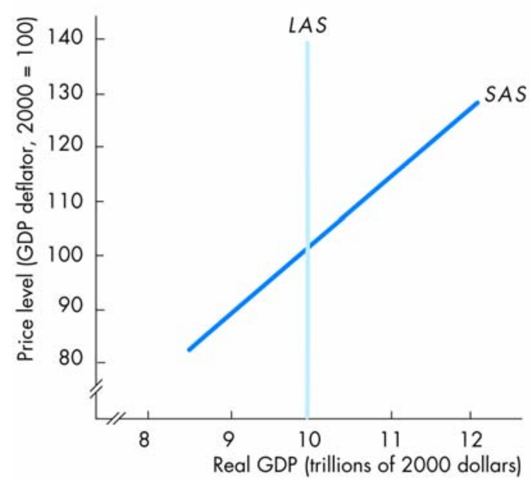
Aggregate supply is the relationship between the quantity of real GDP supplied and the price level. Aggregate supply depends on the time frame.

The **macroeconomic long run** is the period of time necessary for all changes to have occurred so that real GDP equals potential GDP.

- The **long-run aggregate supply curve**, *LAS*, is the relationship between the price level and real GDP when real GDP equals potential GDP. The *LAS* curve is vertical, as illustrated in Figure 7.1.
- Along the *LAS* curve, both the prices of goods and services *and* the prices of productive resources change.

In contrast, the **macroeconomic short run** is a period during which some money prices are sticky and real GDP might be below, above, or at potential GDP and the unemployment rate might be above, below, or at the natural rate of unemployment.

FIGURE 7.1
Long-Run and Short-Run Aggregate Supply



- The **short-run aggregate supply curve**, *SAS*, is the relationship between the quantity of real GDP supplied and the price level in the short run when the money wage rate, the prices of other resources, and potential GDP remain constant. The *SAS* curve slopes upward, as illustrated in Figure 7.1.
- Along the *SAS* curve, only the price level changes; the money wage rate and other resource prices are constant.
- The *SAS* curve shifts leftward when the money wage rate (or other costs) rise.

When the *LAS* curve shifts, so does the *SAS* curve. Three factors shift the *LAS* curve:

- Changes in the full-employment quantity of labor.
- Changes in the quantity of capital, including human capital.
- Advances in technology.

* This is Chapter 23 in *Economics*.

Short-run aggregate supply changes when the money wage rate or money price of other resources changes.

- ♦ A rise in the money wage rate decreases short-run aggregate supply and shifts the *SAS* curve leftward. It does not shift the *LAS* curve.
- ♦ The money wage rate changers when unemployment differs from the natural rate and when expected inflation changes.

■ Aggregate Demand

The quantity of real GDP demanded equals the sum of consumption expenditure (C), investment (I), government purchases (G), and exports (X) minus imports (M).

Aggregate demand shows the relationship between the quantity of real GDP demanded and the price level. As illustrated in Figure 7.2 the aggregate demand curve, *AD*, slopes downward. It does so for two reasons:

- ♦ Wealth effect — A higher price level decreases the amount of *real* wealth (that is, the purchasing power of wealth), which decreases the quantity of real GDP demanded.
- ♦ Substitution effects — An increase in the price level raises the interest rate, which reduces the quantity of real GDP demanded. In addition, an increase in the U.S. price level raises the price of U.S. goods relative to foreign goods.

When aggregate demand increases, the *AD* curve shifts rightward. Three key factors shift the *AD* curve:

- ♦ Expectations — higher expected future incomes, higher expected inflation, or higher expected profits increase current aggregate demand.
- ♦ Fiscal policy and monetary policy — **Fiscal policy** is government attempts to influence the economy by changing taxes, transfer payments, and government purchases. An increase in government purchases increases aggregate demand. Reduced taxes and increased transfer payments raise **disposable income** (aggregate income minus taxes plus transfer payments) and thereby increase consumption expenditures and hence aggregate demand. **Monetary policy** is changes in interest rates and the quantity of money. Increasing the quantity of money or lowering interest rates increases aggregate demand.
- ♦ International factors — a decline in the foreign exchange rate or an increase in foreign incomes increase net exports and hence aggregate demand.

FIGURE **7.2**
Aggregate Demand

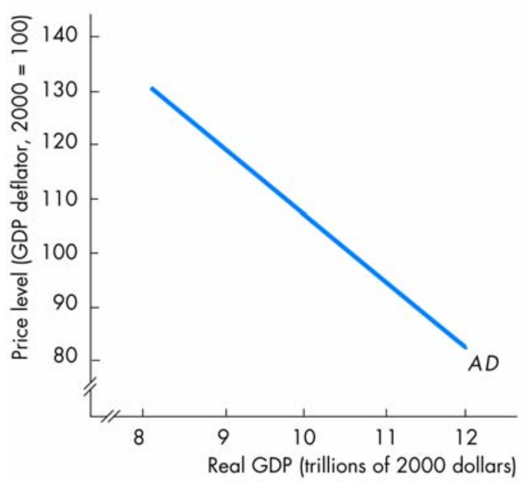
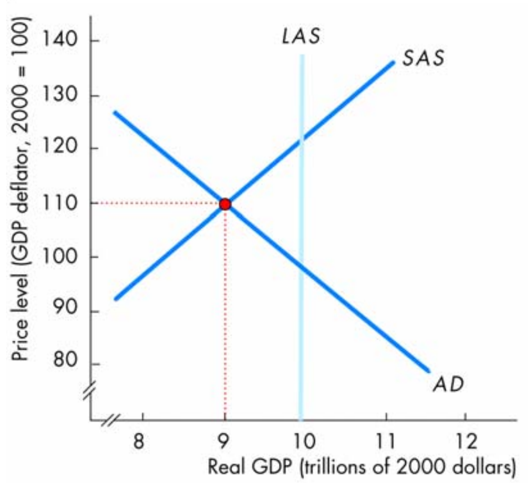


FIGURE **7.3**
Macroeconomic Equilibrium



■ Macroeconomic Equilibrium

Short-run macroeconomic equilibrium occurs when the quantity of GDP demanded equals the quantity supplied, which is where the *AD* and *SAS* curves intersect. In Figure 7.3 the equilibrium real GDP is \$10 trillion and the price level is 110. The price level adjusts to achieve equilibrium. Short-run equilibrium does not necessarily take place at full employment.

Long-run macroeconomic equilibrium occurs when real GDP equals potential GDP so that the economy is on the *LAS* curve.

Economic growth takes place when potential GDP increases. Inflation occurs when aggregate demand increases more than long-run aggregate supply. Business cycles result when aggregate demand and short-run aggregate supply do not grow at the same rate.

- Figure 7.3 shows a **below full-employment equilibrium** in which potential GDP exceeds real GDP. The Okun gap, which is also called a **recessionary gap**, is the amount by which potential GDP exceeds real GDP ($1 trillion in the figure).
- An **above full-employment equilibrium** occurs when real GDP exceeds potential GDP. The **inflationary gap** is the amount by which real GDP exceeds potential GDP.

The *AS/AD* framework illustrates how the economy responds to an increase in aggregate demand:

- In the short run, the *AD* curve shifts rightward and the equilibrium moves along the initial *SAS* curve. Real GDP increases and the price level rises.
- The money wage rate rises to reflect the higher prices, and the *SAS* curve shifts leftward, decreasing real GDP and further raising the price level.
- In the long run, the *SAS* curve shifts leftward enough so that real GDP returns to potential GDP. Further adjustments cease. Real GDP is at potential GDP, and the price level is permanently higher than before the increase in aggregate demand.

The *AD/AS* model also explains how the economy responds to a decrease in aggregate supply:

- The *SAS* curve shifts leftward, real GDP decreases and the price level rises. A period of time with combined recession and inflation is known as *stagflation*.

U.S. Economic Growth, Inflation, and Cycles

GDP and the price level have changed dramatically over time in the U.S. economy. Both real GDP and the price level have grown over time.

- Growth in GDP results from growth in potential GDP, owing to increases in the labor force, capital stock, and advances in technology.
- Persistent inflation occurs when aggregate demand grows faster than long-run aggregate supply.
- Growth in real GDP is not steady but goes in cycles because aggregate demand and short-run aggregate supply do not increase at the same rate.

Macroeconomic Schools of Thought

Macroeconomists can be divided into three broad schools of thought.

- **Keynesian** — a macroeconomist who believes that left alone, the economy would rarely operate at full employment and that to achieve full employment, active help from fiscal policy and monetary policy is needed. Aggregate demand fluctuations and sticky money wages lead to business cycle. A **new Keynesian** view holds that not only is the money wage rate sticky, but that prices of goods and services are also sticky.
- **Classical** — a macroeconomist who believes that the economy is self-regulating and that it is always at full employment. Business cycle fluctuations are the efficient responses to technological change.
- **Monetarist** — a macroeconomist who believes that the economy is self-regulating and that it will normally operate at full employment provided that monetary policy is not erratic and that the pace of money growth is kept steady. Changes in the quantity of money is the most significant source of aggregate demand fluctuations.

Helpful Hints

1. **SHORT-RUN AND LONG-RUN AGGREGATE SUPPLY:** In the short run, the prices of resources do not change in response to change in the price level; in the long run, resource prices do change. This difference leads to the distinction between the short-run and the long-run aggregate supply curves.

   When the price level rises, in the short run resource prices do not change. Firms' profits increase because the prices of their outputs rise while the costs of their inputs do not change. They react by hiring more resources and supplying more real GDP, so the short-run aggregate supply curve slopes upward: As the price level rises, the quantity of real GDP supplied increases.

   In the long run, resource prices adjust by the same amount as the price level, which means that firms find their costs have risen by the same percentage as their revenue. These two effects offset each other, so firms do not change their supply as the price level rises. Hence the long-run aggregate supply curve is vertical.

Questions

True/False and Explain

Aggregate Supply

1. At full employment, there is no unemployment.
2. Along the *LAS* curve, a rise in the price level and all resource prices increase the aggregate quantity of goods and services supplied.
3. Along the *SAS* curve, a rise in the price level increases the aggregate quantity of goods and services supplied.
4. Both the long-run and short-run aggregate supply curves shift rightward when the quantity of capital increases.
5. Any factor that shifts the short-run aggregate supply curve also shifts the long-run aggregate supply curve.

Aggregate Demand

6. Aggregate demand equals consumption expenditure plus investment plus government purchases plus exports minus imports.
7. According to the wealth effect, the lower the quantity of real wealth, the larger will be the quantity of real GDP demanded.
8. The term "monetary policy" refers to the government's spending more money to purchase more goods and services.

Macroeconomic Equilibrium

9. Long-run macroeconomic equilibrium occurs when real GDP equals potential GDP.
10. In the short run, an increase in expected future profits raises the price level and increases real GDP.
11. If the economy is in equilibrium at below full employment, there is a recessionary gap.
12. A rise in the money wage rate increases short-run aggregate supply, that is, shifts the short-run aggregate supply curve rightward.
13. If aggregate demand increases so the economy is producing more output than potential real GDP, then, with the passage of time, the money wage rate will rise in response to the higher price level.

U.S. Economic Growth, Inflation, and Cycles

14. If the aggregate demand curve shifts rightward by more than the short-run aggregate supply curve shifts rightward, the price level rises.
15. If the aggregate demand curve and the short-run aggregate supply curve both shift rightward at the same time, real GDP increases.
16. The main forces generating persistent growth in real GDP are those that cause increases in long-run aggregate supply.

Macroeconomic Schools of Thought

17. All macroeconomic schools of thought agree that the economy is self-regulating and would operate at full employment if left alone.

Multiple Choice

Aggregate Supply

1. Long-run aggregate supply is the level of real GDP at which
   a. aggregate demand always equals short-run aggregate supply.
   b. full employment occurs.
   c. more than full employment occurs.
   d. prices are sure to rise

2. Along which curve do money wages and the price level change in the same proportion?
   a. Both the *SAS* and the *LAS* curves.
   b. Only the *SAS* curve.
   c. Only the *LAS* curve.
   d. Neither the *SAS* curve nor the *LAS* curve.

3. Long-run aggregate supply will increase for all the following reasons <u>EXCEPT</u>
   a. reduced money wages.
   b. increased human capital.
   c. introduction of new technology.
   d. increased capital.

4. A technological improvement shifts
   a. both the *SAS* and *LAS* curves rightward.
   b. both the *SAS* and *LAS* curves leftward.
   c. the *SAS* curve rightward, but it leaves the *LAS* unchanged.
   d. the *LAS* curve rightward, but it leaves the *SAS* curve unchanged.

5. An increase in the money wage rate shifts
   a. both the *SAS* and *LAS* curves rightward.
   b. both the *SAS* and *LAS* curves leftward.
   c. the *SAS* curve leftward, but leaves the *LAS* curve unchanged.
   d. the *LAS* curve rightward, but leaves the *SAS* curve unchanged.

Aggregate Demand

6. The aggregate demand curve (*AD*) illustrates that, as the price level falls,
   a. the quantity of real GDP demanded increases.
   b. the quantity of real GDP demanded decreases.
   c. the *AD* curve shifts rightward.
   d. the *AD* curve shifts leftward.

7. As the price level rises, the quantity of real wealth ____ and the aggregate quantity demanded ____.
   a. increases; increases
   b. increases; decreases
   c. decreases; increases
   d. decreases; decreases

8. Which of the following is classified as monetary policy?
   a. The government changing the amount of its purchases.
   b. The government changing its level of taxation.
   c. The government changing interest rates.
   d. The government financing a change in money wages.

9. Which of the following shifts the aggregate demand curve rightward?
   a. An increase in expected inflation.
   b. An increase in taxes.
   c. A fall in the price level.
   d. A rise in the price level.

Macroeconomic Equilibrium

10. Short-run macroeconomic equilibrium occurs at the level of GDP where the
    a. economy is at full employment.
    b. *AD* curve intersects the *SAS* curve.
    c. *SAS* curve intersects the *LAS* curve.
    d. *AD* curve intersects the *LAS* curve.

Use Table 7.1 for the next four questions.

TABLE **7.1**

Multiple Choice Questions 11, 12, 13, 14

Price level	Aggregate demand (billions of 2000 dollars)	Short-run aggregate supply (billions of 2000 dollars)	Long-run aggregate supply (billions of 2000 dollars)
100	$800	$600	$600
110	700	700	600
120	600	800	600
130	500	900	600

11. In the short-run macroeconomic equilibrium, the price level is ____ and the level of real GDP is ____ billion.
    a. 100; $600
    b. 110; $700
    c. 120; $600
    d. 130; $600

12. In the short run, the economy is in
    a. a full-employment equilibrium and resource prices will not change.
    b. an above full-employment equilibrium and resource prices will rise.
    c. an above full-employment equilibrium and resource prices will fall.
    d. a below full-employment equilibrium and resource prices will fall.

13. In the short-run equilibrium, there is
    a. an inflationary gap of $100 billion.
    b. an inflationary gap of $50 billion.
    c. a recessionary gap of $50 billion.
    d. a recessionary gap of $100 billion.

14. Assuming no changes in aggregate demand or long-run aggregate supply, in the long-run macroeconomic equilibrium, the price level is ____ and the level of real GDP is ____ billion.
    a. 100; $600
    b. 110; $700
    c. 120; $600
    d. 130; $600

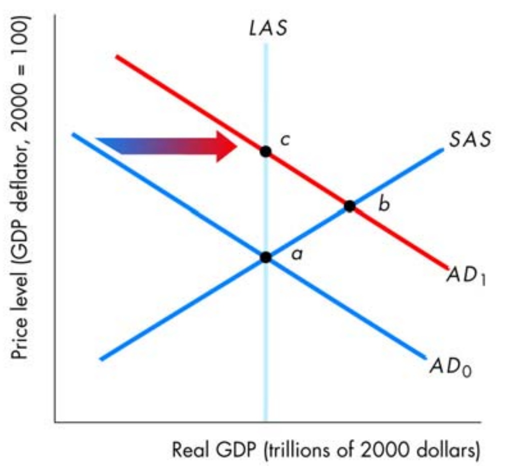
15. If real GDP is greater than potential real GDP, then the economy is
    a. not in macroeconomic equilibrium.
    b. in a full-employment equilibrium.
    c. in an above full-employment equilibrium.
    d. in a below full-employment equilibrium.

16. A below full-employment equilibrium can be the result of the
    a. *AD* curve shifting rightward.
    b. *SAS* curve shifting rightward.
    c. *LAS* curve shifting leftward.
    d. *AD* curve shifting leftward.

Use Figure 7.4 for the next four questions.

FIGURE **7.4**

Multiple Choice Questions 17, 18, 19, 20



17. Which of the following factors might have shifted the aggregate demand curve rightward?
    a. Reduced taxes
    b. Less investment
    c. A decrease in government purchases
    d. Higher money wages

18. After the aggregate demand curve has shifted permanently to AD_1, the new short-run macroeconomic equilibrium is at point
    a. point *a*.
    b. point *b*.
    c. point *c*.
    d. No point identified with a letter in the figure.

19. When the economy in Figure 7.4 is moving to its long-run equilibrium, which curve shifts?
    a. The *LAS* curve shifts rightward.
    b. The *LAS* curve shifts leftward.
    c. The *SAS* curve shifts rightward.
    d. The *SAS* curve shifts leftward.

20. After the aggregate demand curve has shifted permanently to AD_1, the new long-run macroeconomic equilibrium will be at
    a. point *a*.
    b. point *b*.
    c. point *c*.
    d. No point identified with a letter in the figure.

U.S. Economic Growth, Inflation, and Cycles

22. The fact that the short-run aggregate supply and aggregate demand curves do not shift at a fixed, steady pace explains
    a. persistent inflation.
    b. business cycles.
    c. trend growth in real GDP.
    d. large government budget deficits.

23. Persistent inflation is caused by
    a. persistent rightward shifts in the *AD* curve.
    b. persistent rightward shifts in the *SAS* curve.
    c. the tendency for long-run aggregate supply to increase faster than aggregate demand.
    d. persistent leftward shifts in the *SAS* and *AD* curves.

Macroeconomic Schools of Thought

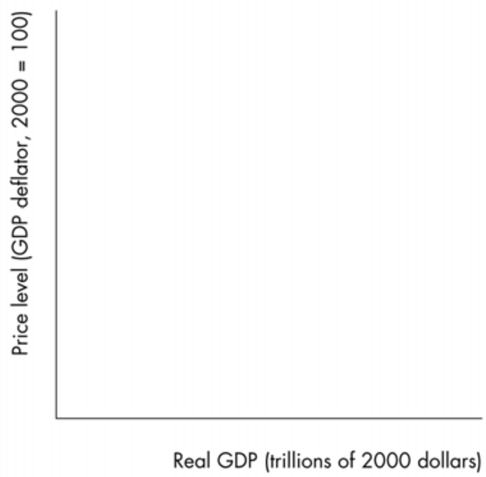
23. Which school of thought says that expectations are the most important influence on aggregate demand?
    a. Keynesian school
    b. classical school
    c. monetarist school
    d. Both Keynesian and monetarist schools

24. Which school of thought believes the economy is self-regulating?
    a. Keynesian school
    b. classical school
    c. monetarist school
    d. Both classical and monetarist schools

Short Answer Problems

1. Why is the *LAS* curve vertical?
2. Why does the *SAS* curve have a positive slope?
3. The international substitution effect implies that an increase in the price level will lead to a decrease in the aggregate quantity of goods and services demanded. Explain why.

FIGURE 7.5
Short Answer Problem 4



4. In Figure 7.5 illustrate an economy in long-run equilibrium, producing at the full-employment level of production. Indicate the equilibrium price level and level of real GDP. Also indicate the potential level of real GDP.
5. In Figure 7.6 illustrate an economy in short-run equilibrium producing at a below full-employment level of production. Indicate the equilibrium price level and level of real GDP and show the amount of the recessionary gap.
6. In Figure 7.7 illustrate an economy in short-run equilibrium producing at an above full-employment level of production. Indicate the equilibrium price level and level of real GDP and show the amount of the inflationary gap.

FIGURE 7.6
Short Answer Problem 5

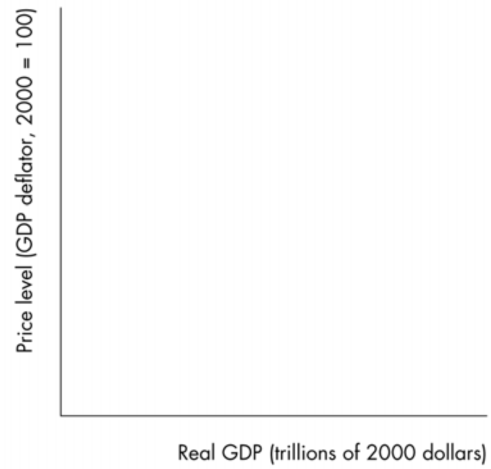


FIGURE 7.7
Short Answer Problem 6

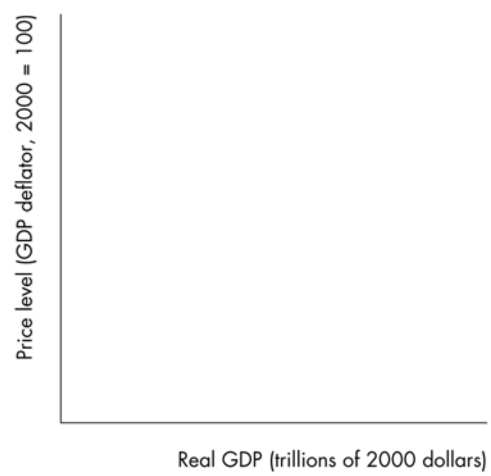


FIGURE **7.8**
Problem 7

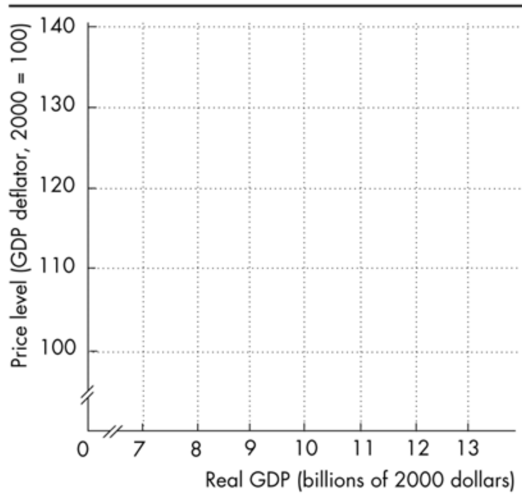
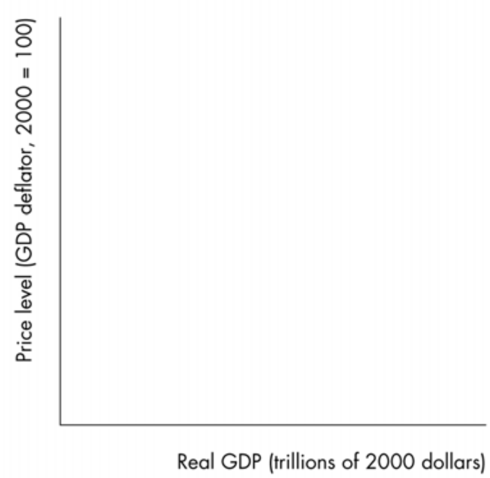


TABLE **7.2**
Short Answer Problem 7

Price level	Aggregate demand (billions of 2000 dollars)	Short-run aggregate supply (billions of 2000 dollars)	Long-run aggregate supply (billions of 2000 dollars)
100	$11	$9	$10
110	10	10	10
120	9	11	10
130	8	12	10
140	7	13	10

7. Table 7.2 shows the initial aggregate demand, short-run, and long-run aggregate supply schedules for the nation of Macro.
   a. Draw the *AD*, *SAS*, and *LAS* curves for Macro in Figure 7.8. Label the equilibrium point *a*. What is the equilibrium level of real GDP and price level?
   b. Suppose that government purchases increase so that aggregate demand increases by $2 billion at every price level. In Figure 7.8 draw the new aggregate demand curve. Label the new short run equilibrium point *b*. What is the equilibrium level of real GDP and price level in the short run?
   c. Why is point *b* not a long-run equilibrium? In your answer, mention the level of potential real GDP, and describe whether point *b* represents an above full-employment, a full-employment, or a below full-employment equilibrium. If either an inflationary or recessionary gap exists, calculate what it equals.
   d. As time passes, what happens to move the economy back to its long-run equilibrium? Illustrate this process in Figure 7.8 by drawing any other curves you need. Label the long-run equilibrium point *c*. What is the equilibrium level of GDP and price level in the long run?
8. Suppose that the *AD* curve shifts rightward. In the long run, how does this shift affect the *SAS* curve? Why does the *SAS* change only in the long run?

FIGURE **7.9**
Short Answer Problem 9



9. Suppose that new, productivity enhancing technologies are discovered. In Figure 7.9 show how these technological advances affect the equilibrium level of real GDP and the price level.
10. Why are increases in the quantity of money the factor that created the persistent inflation that the United States has experienced for the last several decades?
11. Keynesian economists generally believe that government fiscal and monetary policy is desirable. Classical economists generally disagree. What accounts for this difference in views?

You're the Teacher

1. "I've really tried, but I just don't see why a change in the price level doesn't shift the short-run aggregate supply curve. After all, it seems like when the price level falls, firms should decrease the amount they produce and that this should shift the *SAS* curve. Plus, I'm a little shaky on how to use the *AS/AD* model. I sure hope the *AS/AD* model isn't too important so that I don't get hurt badly by not knowing this." In truth, your friend may be mortally wounded by not understanding the difference between a shift of a curve and a movement along a curve. Use an example in which the *AD* curve shifts leftward to help explain to your friend how to use the *AS/AD* model for the short run and also why a drop in the price level does not shift the *SAS* curve.

2. After you have helped overcome the previous problems, your friend offers an observation: "I think I'm catching on to this stuff now. And the diagram you just drew was really helpful. But, is that diagram the end of the story? Or does something else happen as more time passes?" Basically, your friend is asking you to complete the explanation you started by showing what happens in the long run. Doing so would help reinforce your friend's grasp of the *AS/AD* model. So, using another diagram, show what happens in the long run after an initial decrease in aggregate demand has occurred.