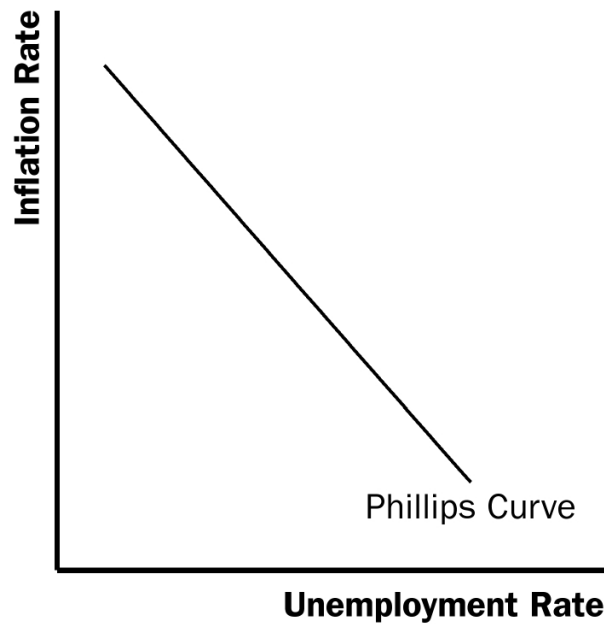


## **SOLUTIONS TO TEXT PROBLEMS:**

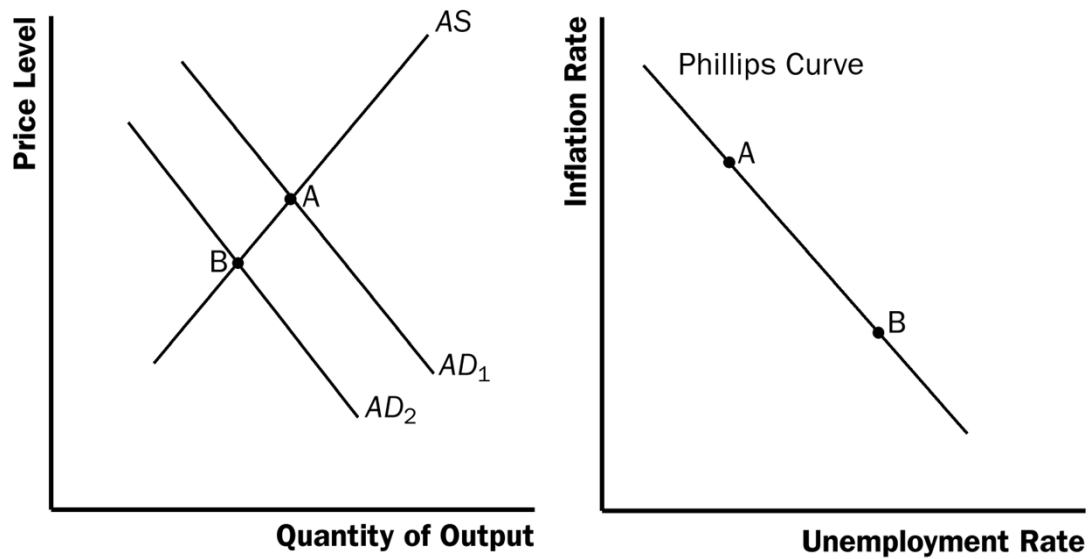
### **Quick Quizzes**

1. The Phillips curve is shown in Figure 1.



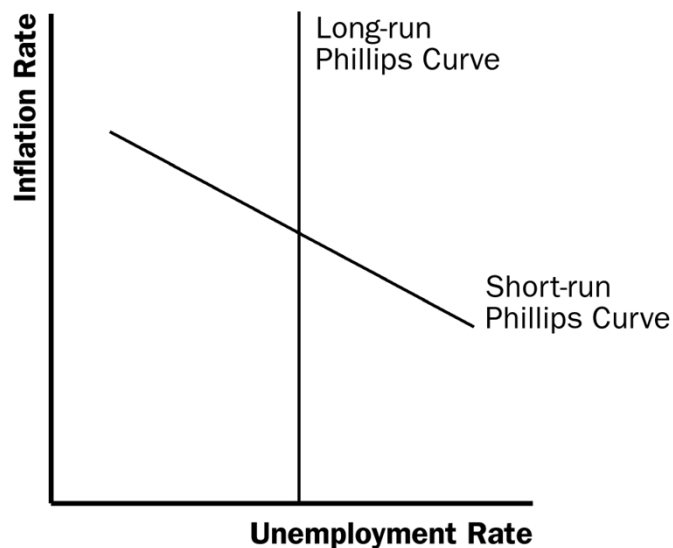
**Figure 1**

To see how policy can move the economy from a point with high inflation to a point with low inflation, suppose the economy begins at point A in Figure 2. If policy is used to reduce aggregate demand (such as a decrease in the money supply or a decrease in government purchases), the aggregate-demand curve shifts from  $AD_1$  to  $AD_2$  and the economy moves from point A to point B with lower inflation.



**Figure 2**

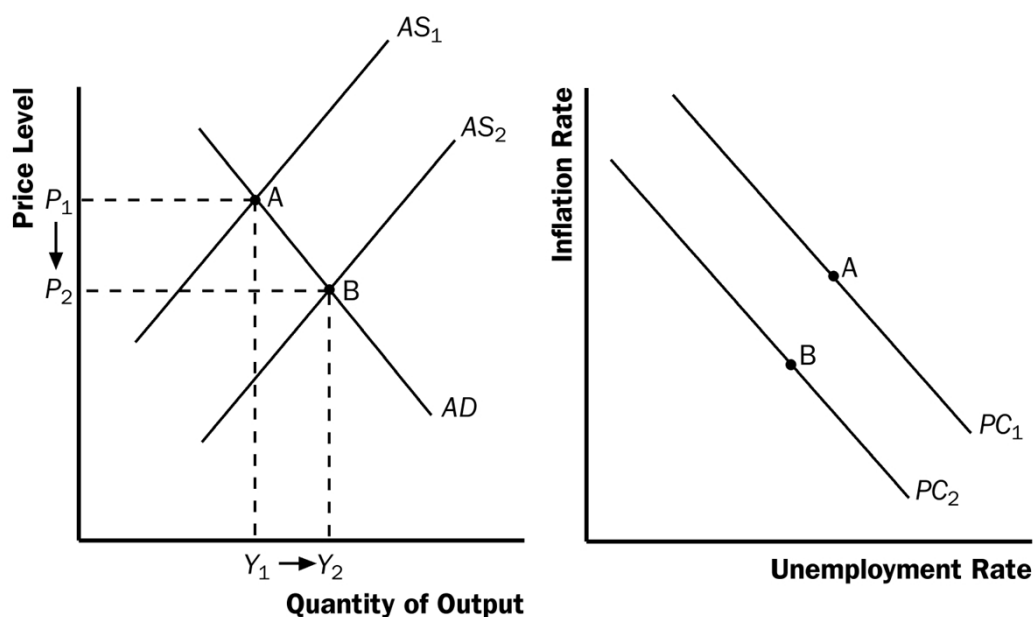
2. Figure 3 shows the short-run Phillips curve and the long-run Phillips curve. The curves are different because in the long run, monetary policy has no effect on unemployment, which must be at its natural rate, but in the short run, monetary policy can shift aggregate demand, raising or lowering the inflation rate with the opposite effect on the unemployment rate.



**Figure 3**

3. Examples of a favorable shock to aggregate supply include improved productivity and a decline in oil prices. The shock shifts the aggregate-supply curve to the right, increasing output and reducing the price level, moving the economy from point A to point B in Figure 4. As a result, the Phillips curve shifts to the left, as the figure

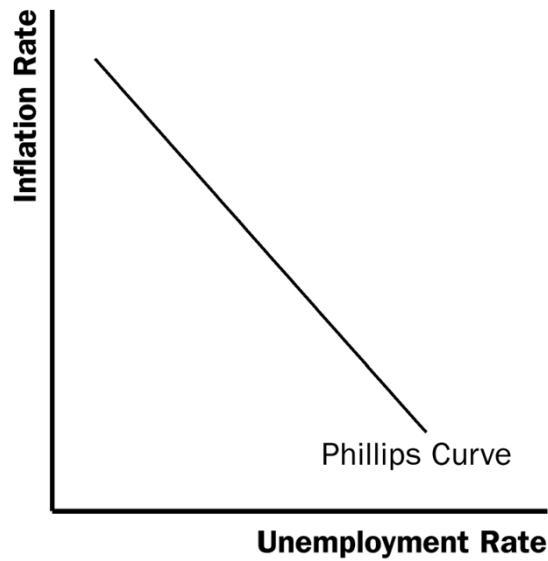
shows.



**Figure 4**

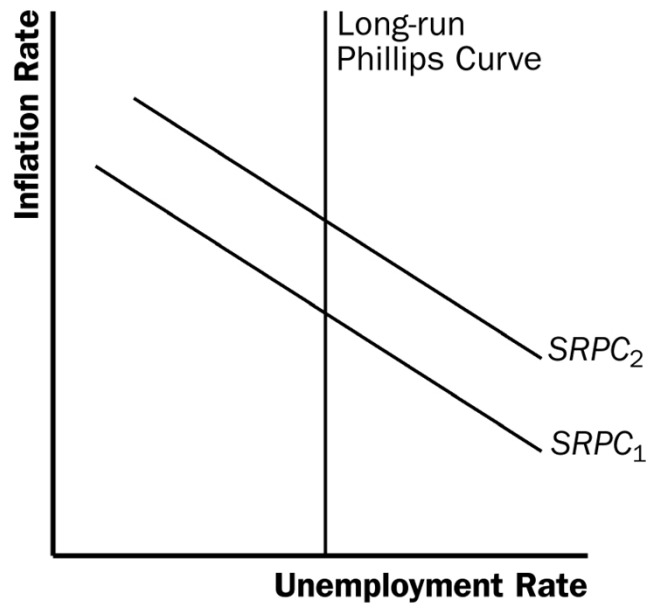
4. The sacrifice ratio is the number of percentage points of annual output lost in the process of reducing inflation by 1 percentage point. The credibility of the Fed's commitment to reduce inflation might affect the sacrifice ratio because it affects the speed at which expectations of inflation adjust. If the Fed's commitment to reduce inflation is credible, people will adjust their expectations of inflation quickly, the Phillips curve will shift left, and the cost of reducing inflation will be low. But if the Fed isn't credible, people will not adjust their expectations of inflation, and the cost of reducing inflation will be high.

### Questions for Review



**Figure 5**

1. Figure 5 shows the short-run tradeoff between inflation and unemployment. The Fed can move from one point on this curve to another by changing the money supply. An increase in the money supply reduces the unemployment rate and increases the inflation rate, while a decrease in the money supply increases the unemployment rate and decreases the inflation rate.
2. Figure 6 shows the long-run tradeoff between inflation and unemployment. In the long run, there is no tradeoff, as the economy must return to the natural rate of unemployment on the long-run Phillips curve. In the short run, the economy can move along a short-run Phillips curve, like  $SRPC_1$  shown in the figure. But over time (as inflation expectations adjust) the short-run Phillips curve will shift to return the economy to the long-run Phillips curve, for example shifting from  $SRPC_1$  to  $SRPC_2$ .



**Figure 6**

3. The natural rate of unemployment is natural because it is beyond the influence of monetary policy. The rate of unemployment will move to its natural rate in the long run, regardless of the inflation rate.

The natural rate of unemployment might differ across countries because countries have varying degrees of union power, minimum-wage laws, collective-bargaining laws, unemployment insurance, job-training programs, and other factors that influence labor-market conditions.

4. If a drought destroys farm crops and drives up the price of food, the short-run aggregate-supply curve shifts up, as does the short-run Phillips curve, because the costs of production have increased. The higher short-run Phillips curve means the inflation rate will be higher for any given unemployment rate.
5. When the Fed decides to reduce inflation, the economy moves down along the short-run Phillips curve, as shown in Figure 7. Beginning at point A on short-run Phillips curve  $SRPC_1$ , the economy moves down to point B as inflation declines. Once people's expectations adjust to the lower rate of inflation, the short-run Phillips curve shifts to  $SRPC_2$ , and the economy moves to point C. The short-run costs of disinflation, which arise because the unemployment rate is temporarily above its natural rate, could be reduced if the Fed's action was credible, so that expectations would adjust more rapidly.

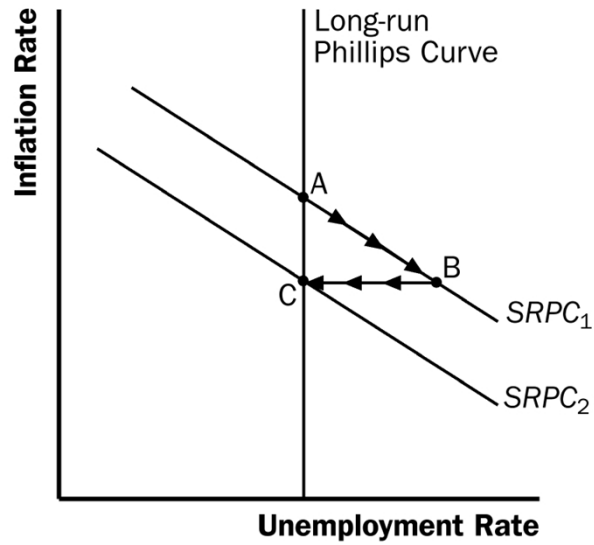


Figure 7

### Problems and Applications

1. Figure 8 shows two different short-run Phillips curves depicting these four points. Points a and d are on  $SRPC_1$  because both have expected inflation of 3 percent. Points b and c are on  $SRPC_2$  because both have expected inflation of 5 percent.

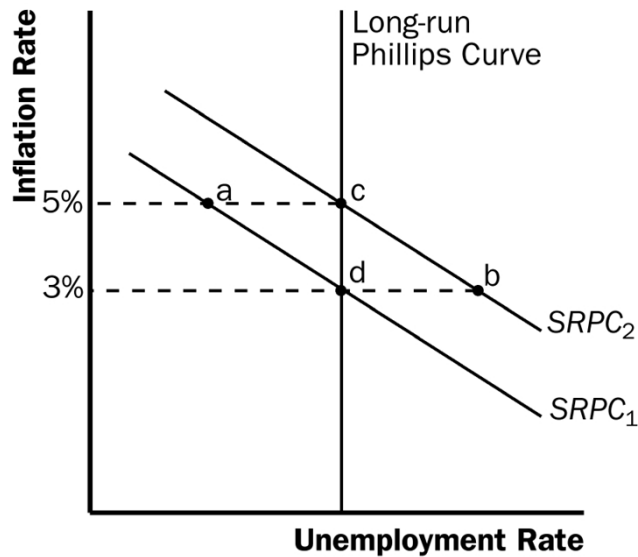
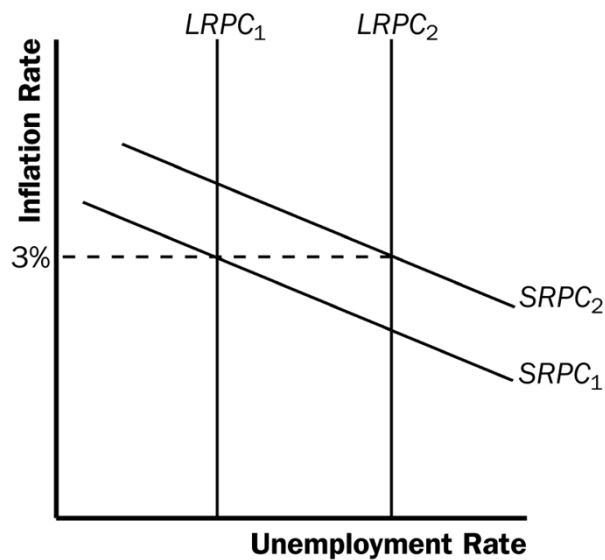


Figure 8

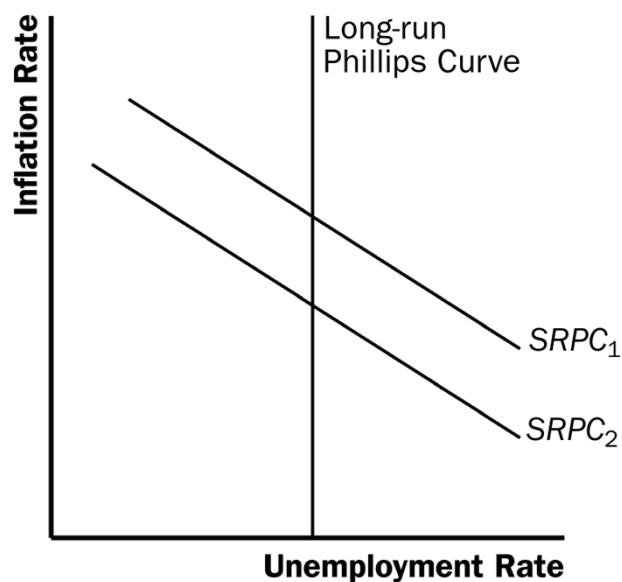
2. a. A rise in the natural rate of unemployment shifts the long-run Phillips curve to the right, as shown in Figure 9. The economy is initially on  $LRPC_1$  and  $SRPC_1$  at an inflation rate of 3 percent, which is also the expected rate of

inflation. The increase in the natural rate of unemployment shifts the long-run Phillips curve to  $LRPC_2$  and the short-run Phillips curve to  $SRPC_2$ , with the expected rate of inflation remaining equal to 3 percent.



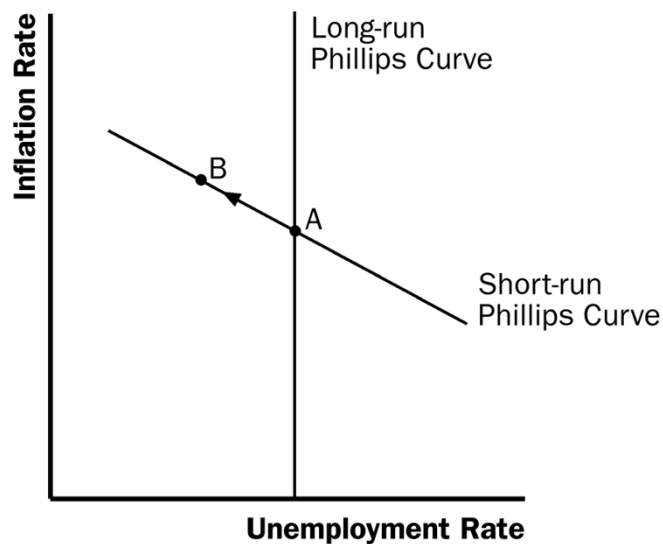
**Figure 9**

- b. A decline in the price of imported oil shifts the short-run Phillips curve down, as shown in Figure 10, from  $SRPC_1$  to  $SRPC_2$ . For any given unemployment rate, the inflation rate is lower, since oil is such a significant aspect of production costs in the economy.



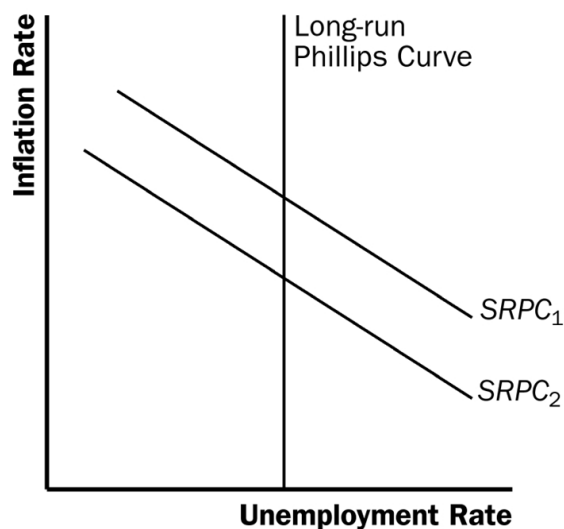
**Figure 10**

- c. A rise in government spending represents an increase in aggregate demand, so it moves the economy along the short-run Phillips curve, as shown in Figure 11. The economy moves from point A to point B, with a decline in the unemployment rate and an increase in the inflation rate.



**Figure 11**

- d. A decline in expected inflation causes the short-run Phillips curve to shift down, as shown in Figure 12. The lower rate of expected inflation shifts the short-run Phillips curve from  $SRPC_1$  to  $SRPC_2$ .

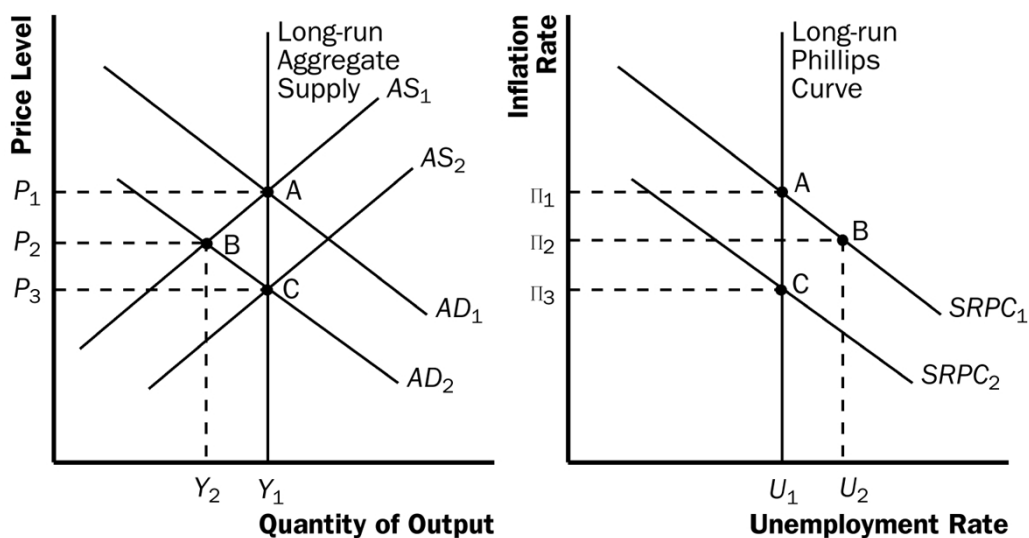


**Figure 12**

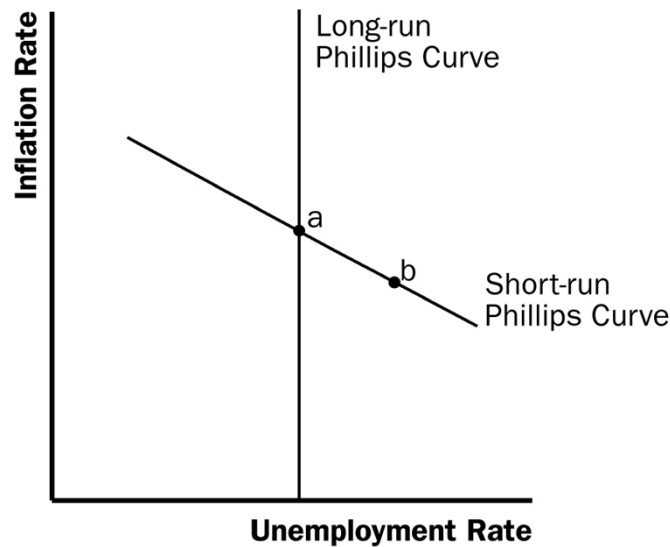
3. a. Figure 13 shows how a reduction in consumer spending causes a recession in both an aggregate-supply/aggregate-demand diagram and a Phillips-curve diagram. In both diagrams, the economy begins at full employment at point



- A. The decline in consumer spending reduces aggregate demand, shifting the aggregate-demand curve to the left from  $AD_1$  to  $AD_2$ . The economy initially remains on the short-run aggregate-supply curve  $SRAS_1$ , so the new equilibrium occurs at point B. The movement of the aggregate-demand curve along the short-run aggregate-supply curve leads to a movement along short-run Phillips curve  $SRPC_1$ , from point A to point B. The lower price level in the aggregate-supply/aggregate-demand diagram corresponds to the lower inflation rate in the Phillips-curve diagram. The lower level of output in the aggregate-supply/aggregate-demand diagram corresponds to the higher unemployment rate in the Phillips-curve diagram.
- b. As expected inflation falls over time, the short-run aggregate-supply curve shifts down from  $AS_1$  to  $AS_2$ , and the short-run Phillips curve shifts down from  $SRPC_1$  to  $SRPC_2$ . In both diagrams, the economy eventually gets to point C, which is back on the long-run aggregate-supply curve and long-run Phillips curve. After the recession is over, the economy faces a better set of inflation-unemployment combinations.

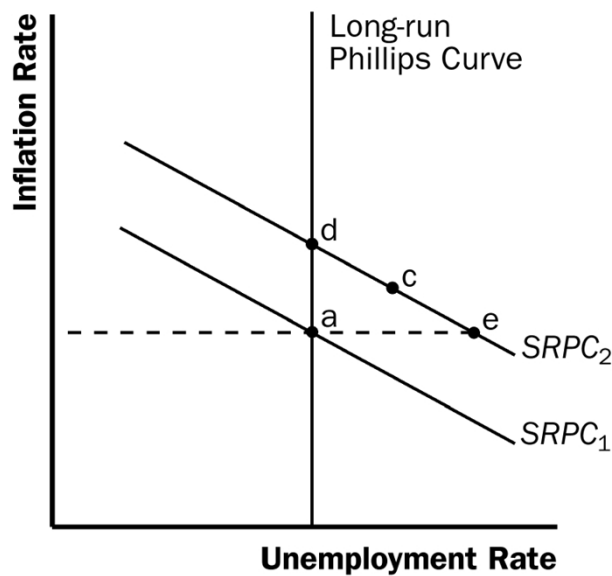


**Figure 13**



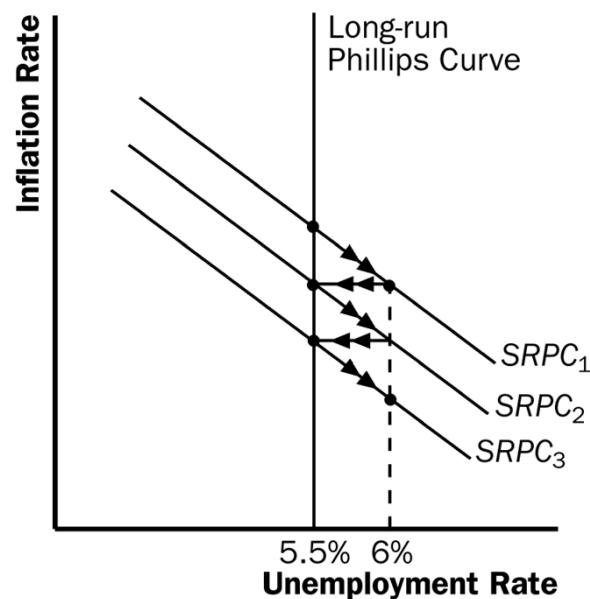
**Figure 14**

4.
  - a. Figure 14 shows the economy in long-run equilibrium at point a, which is on both the long-run and short-run Phillips curves.
  - b. A wave of business pessimism reduces aggregate demand, moving the economy to point b in the figure. The unemployment rate rises and the inflation rate declines. If the Fed undertakes expansionary monetary policy, it can increase aggregate demand, offsetting the pessimism and returning the economy to point a, with the initial inflation rate and unemployment rate.
  - c. Figure 15 shows the effects on the economy if the price of imported oil rises. The higher price of imported oil shifts the short-run Phillips curve up from  $SRPC_1$  to  $SRPC_2$ . The economy moves from point a to point c, with a higher inflation rate and higher unemployment rate. Now if the Fed engages in expansionary monetary policy, it can return the economy to its original unemployment rate at point d, but the inflation rate will be higher. If the Fed engages in contractionary monetary policy, it can return the economy to its original inflation rate at point e, but the unemployment rate will be higher. This situation differs from that in part (b) because in part (b) the economy stayed on the same short-run Phillips curve, but in part (c) the economy moved to a higher short-run Phillips curve, which gives policymakers a less favorable tradeoff between inflation and unemployment.

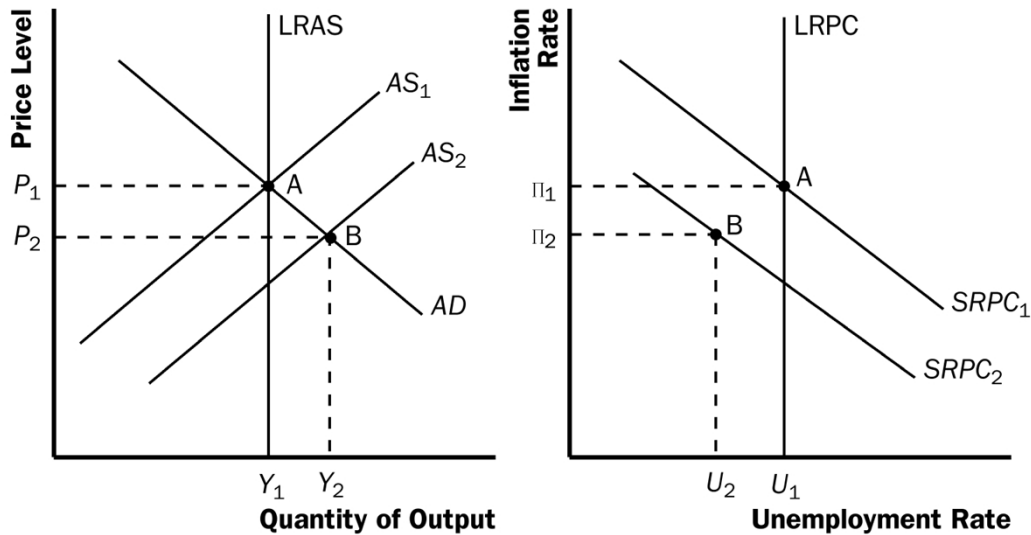


**Figure 15**

5. If the Fed acts on its belief that the natural rate of unemployment is 6 percent, when the natural rate is in fact 5.5 percent, the result will be a spiraling down of the inflation rate, as shown in Figure 16. Starting from a point on the long-run Phillips curve, with an unemployment rate of 5.5 percent, the Fed will think that the economy is overheating, since the unemployment rate is below what it thinks is the natural rate. So the Fed will contract the money supply, moving the economy along the short-run Phillips curve  $SRPC_1$ . The inflation rate will decline and the unemployment rate will rise to 6 percent. As the inflation rate declines, people's expectations of inflation will eventually decline, and the short-run Phillips curve will shift to the left to  $SRPC_2$ . This process will continue, and the inflation rate will spiral downwards.



**Figure 16**



**Figure 17**

6.
  - a. Figure 17 shows the effects of a fall in the price of oil. The short-run aggregate-supply curve shifts to the right, reducing the price level and increasing the quantity of output. The short-run Phillips curve shifts to the left. In both diagrams, the economy moves from point A to point B. In equilibrium, both the inflation rate and the unemployment rate decline.
  - b. The effects of this event do not mean there is no short-run tradeoff between inflation and unemployment, as shifts in aggregate demand still move the economy along the short-run Phillips curve.
7.
  - a. If wage contracts have short durations, a recession induced by contractionary monetary policy will be less severe, since wage contracts can be adjusted more rapidly to reflect the lower inflation rate. This will allow a more rapid movement of the short-run aggregate-supply curve and short-run Phillips curve to restore the economy to long-run equilibrium.
  - b. If there is little confidence in the Fed's determination to reduce inflation, a recession induced by contractionary monetary policy will be more severe. It will take longer for people's inflation expectations to adjust downwards.
  - c. If expectations of inflation adjust quickly to actual inflation, a recession induced by contractionary monetary policy will be less severe. In this case, people's expectations adjust quickly, so the short-run Phillips curve shifts

quickly to restore the economy to long-run equilibrium at the natural rate of unemployment.

8. Economists who believe the short-run Phillips curve is relatively steep and shifts quickly in response to changes in the economy would be more likely to favor using contractionary policy to reduce inflation than economists with the opposite views. If the short-run Phillips curve is relatively steep, then the unemployment rate does not rise much because of contractionary policy. And if the short-run Phillips curve shifts quickly in response to changes in the economy, then the economy will not be off of the long-run Phillips curve for long in response to contractionary monetary policy. Thus, the costs of disinflation will be very small.
9. If the Fed announces a disinflation, but nominal wages have been set in three-year contracts, then the lower rate of inflation will mean real wages are too high until the contracts can be renegotiated in three years. As a result, firms will not hire as much labor and the unemployment rate will exceed the natural rate, so the disinflation would be costly. To reduce the cost of disinflation, the Fed could announce that it would reduce inflation three years from now, so contracts could be adjusted. Alternatively, the Fed could reduce inflation very slowly, so real wages wouldn't be too high for long, and the costs of disinflation would be lower.
10. Even though inflation is unpopular, elected leaders do not always support efforts to reduce inflation because of the short-run costs associated with disinflation. In particular, as disinflation occurs, the unemployment rate rises, and when unemployment is high people tend not to vote for incumbent politicians, blaming them for the bad state of the economy. Thus politicians tend not to support disinflation.

Economists believe that countries with independent central banks can reduce the cost of disinflation because in those countries politicians cannot interfere with central banks' disinflation efforts. People will believe the central bank when it announces a disinflation because they know politicians cannot stop the disinflation. In countries with central banks that are not independent, people know that politicians who are worried they will not be reelected could stop a disinflation. As a result, the credibility of the central bank is lower and thus the costs of disinflation are higher.

11. If policymakers are uncertain about the value of the natural rate of unemployment (as was clearly the case in the 1990s, when economists were continually revising their estimates of the natural rate downward), they need to look at other variables. Since there's a correspondence through the Phillips curve between inflation and unemployment, when unemployment is close to its natural rate, inflation should not change. Thus, policymakers can look at data on the inflation rate to judge how close unemployment is to its natural rate. In addition, they can look at other macroeconomic variables, including the components of GDP and interest rates, to try

to disentangle shifts in aggregate supply from shifts in aggregate demand, which (when combined with information about inflation) can help them determine the appropriate stance for monetary policy.