

22

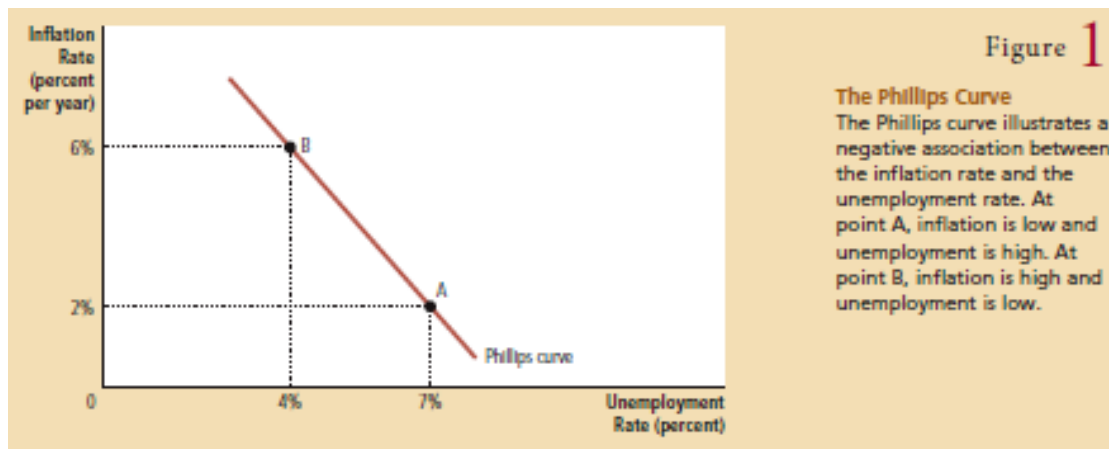
THE SHORT-RUN TRADE-OFF BETWEEN INFLATION AND UNEMPLOYMENT

CHAPTER OUTLINE:

I. The Phillips Curve

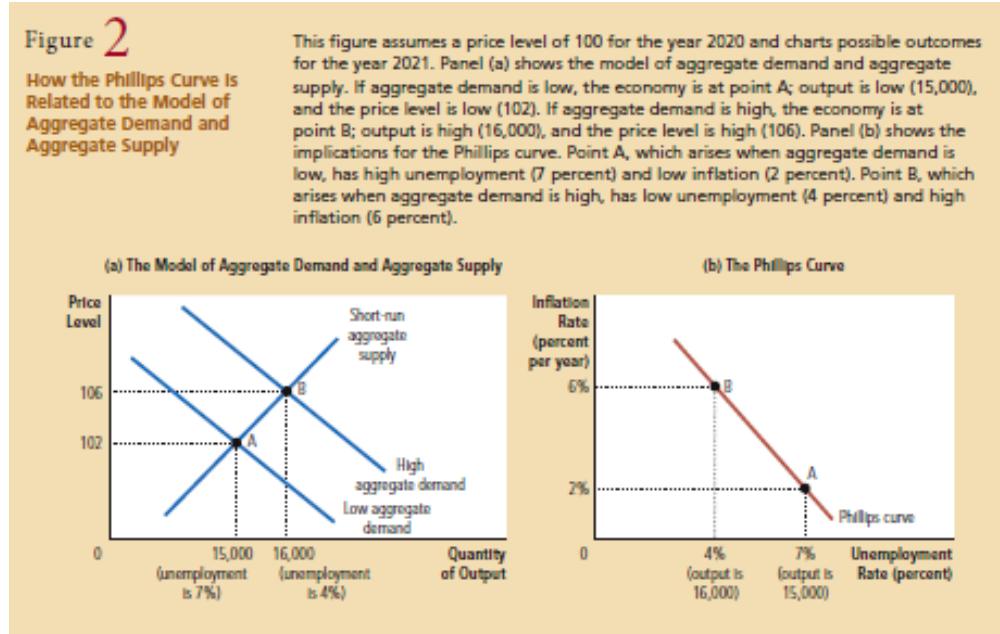
A. Origins of the Phillips Curve

1. In 1958, economist A. W. Phillips published an article discussing the negative correlation between inflation rates and unemployment rates in the United Kingdom.
2. American economists Paul Samuelson and Robert Solow showed a similar relationship between inflation and unemployment for the United States two years later.
3. The belief was that low unemployment is related to high aggregate demand, and high aggregate demand puts upward pressure on prices. Likewise, high unemployment is related to low aggregate demand, and low aggregate demand pulls price levels down.
4. Definition of **Phillips curve**: a curve that shows the short-run trade-off between inflation and unemployment.

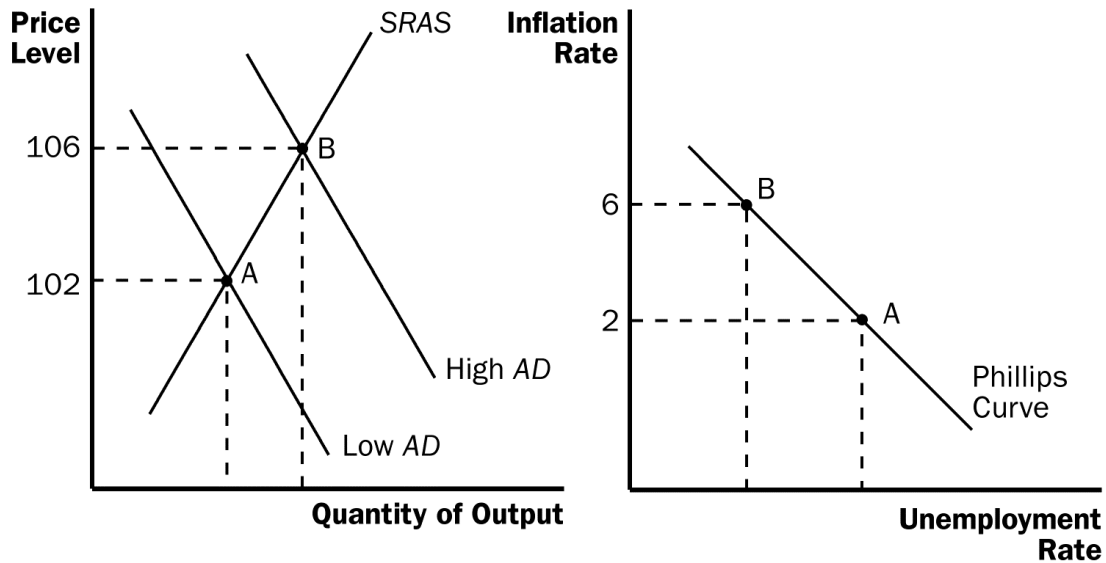


5. Samuelson and Solow believed that the Phillips curve offered policymakers a menu of possible economic outcomes. Policymakers could use monetary and fiscal policy to choose any point on the curve.

B. Aggregate Demand, Aggregate Supply, and the Phillips Curve



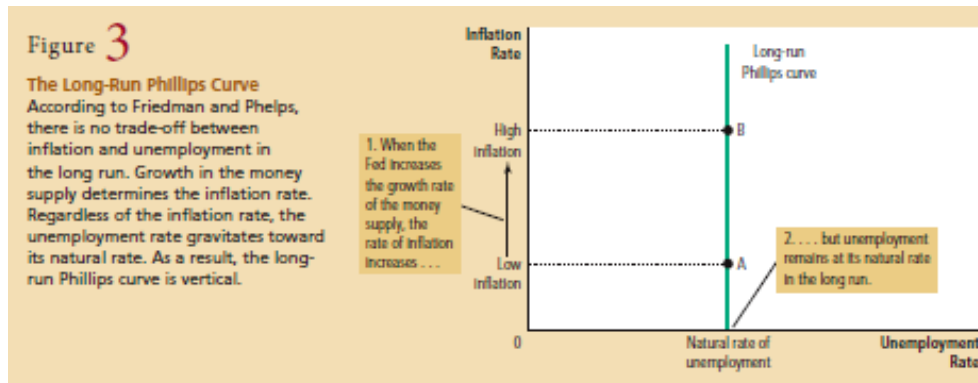
1. The Phillips curve shows the combinations of inflation and unemployment that arise in the short run due to shifts in the aggregate-demand curve.
2. The greater the aggregate demand for goods and services, the greater the economy's output and the higher the price level. Greater output means lower unemployment. Whatever the previous year's price level happens to be, the higher the price level in the current year, the higher the rate of inflation.
3. Example: The price level is 100 (measured by the Consumer Price Index) in the year 2020. There are two possible changes in the economy for the year 2021: a low level of aggregate demand or a high level of aggregate demand.
 - a. If the economy experiences a low level of aggregate demand, we would be at a short-run equilibrium like point A. This point also corresponds with point A on the Phillips curve. Note that when aggregate demand is low, the inflation rate is relatively low and the unemployment rate is relatively high.



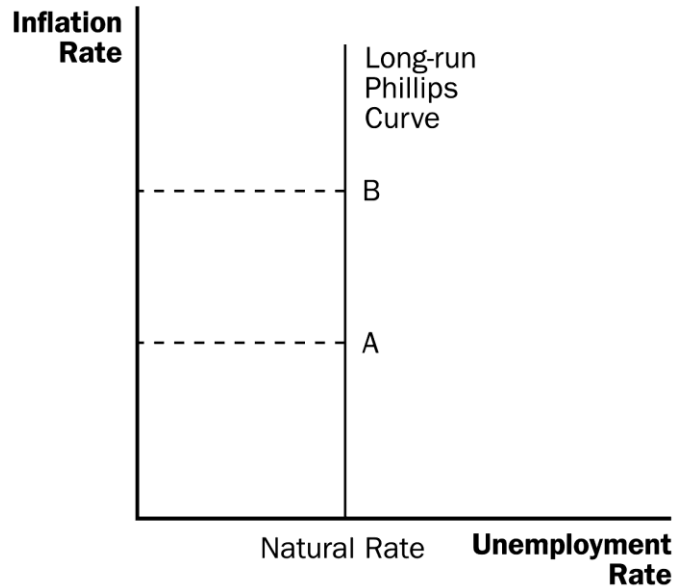
- b. If the economy experiences a high level of aggregate demand, we would be at a short-run equilibrium like point B. This point also corresponds with point B on the Phillips curve. Note that when aggregate demand is high, the inflation rate is relatively high and the unemployment rate is relatively low.
- 4. Because monetary and fiscal policies both shift the aggregate-demand curve, these policies can move the economy along the Phillips curve.
 - a. Increases in the money supply, increases in government spending, or decreases in taxes all increase aggregate demand and move the economy to a point on the Phillips curve with lower unemployment and higher inflation.
 - b. Decreases in the money supply, decreases in government spending, or increases in taxes all lower aggregate demand and move the economy to a point on the Phillips curve with higher unemployment and lower inflation.

II. Shifts in the Phillips Curve: The Role of Expectations

A. The Long-Run Phillips Curve



1. In 1968, economist Milton Friedman argued that monetary policy is only able to choose a combination of unemployment and inflation for a short period of time. At the same time, economist Edmund Phelps wrote a paper suggesting the same thing.
2. In the long run, monetary growth has no real effects. This implies that it cannot affect the factors that determine the economy's long-run unemployment rate.

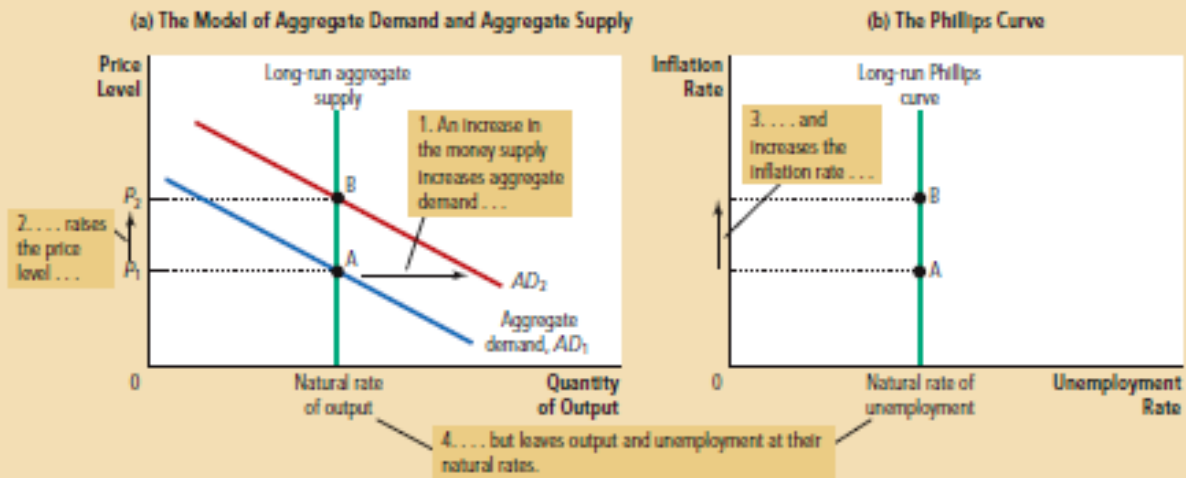


3. Thus, in the long run, we would not expect there to be a relationship between unemployment and inflation. This must mean that, in the long run, the Phillips curve is vertical.

Panel (a) shows the model of aggregate demand and aggregate supply with a vertical aggregate-supply curve. When expansionary monetary policy shifts the aggregate-demand curve to the right from AD_1 to AD_2 , the equilibrium moves from point A to point B. The price level rises from P_1 to P_2 , while output remains the same. Panel (b) shows the long-run Phillips curve, which is vertical at the natural rate of unemployment. In the long run, expansionary monetary policy moves the economy from lower inflation (point A) to higher inflation (point B) without changing the rate of unemployment.

Figure 4

How the Long-Run Phillips Curve Is Related to the Model of Aggregate Demand and Aggregate Supply



- The vertical Phillips curve occurs because, in the long run, the aggregate supply curve is vertical as well. Thus, increases in aggregate demand lead only to changes in the price level and have no effect on the economy's level of output. Thus, in the long run, unemployment will not change when aggregate demand changes, but inflation will.
- The long-run aggregate-supply curve occurs at the economy's natural rate of output. This means that the long-run Phillips curve occurs at the natural rate of unemployment.

B. The Meaning of "Natural"

- Friedman and Phelps considered the natural rate of unemployment to be the rate toward which the economy gravitates in the long run.
- The natural rate of unemployment may not be the socially desirable rate of unemployment.
- The natural rate of unemployment may change over time.

C. Reconciling Theory and Evidence

- The conclusion of Friedman and Phelps that there is no long-run trade-off between inflation and unemployment was based on *theory*, while the correlation between inflation and unemployment found by Phillips, Samuelson, and Solow was based on actual *evidence*.
- Friedman and Phelps believed that an inverse relationship between inflation and unemployment exists in the short run.

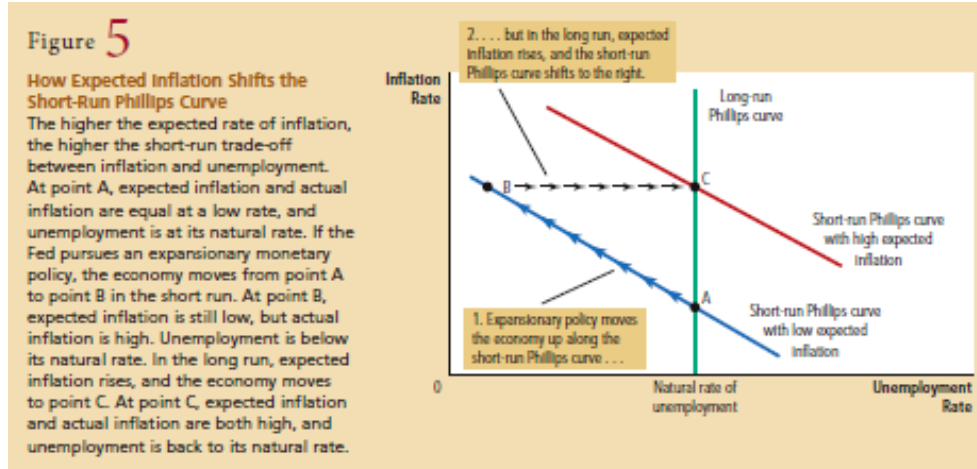
3. The long-run aggregate-supply curve is vertical, indicating that the price level does not influence output in the long run.
4. But, the short-run aggregate-supply curve is upward sloping because of misperceptions about relative prices, sticky wages, and sticky prices. These perceptions, wages, and prices adjust over time, so that the positive relationship between the price level and the quantity of goods and services supplied occurs only in the short run.
5. This same logic applies to the Phillips curve. The trade-off between inflation and unemployment holds only in the short run.
6. The expected level of inflation is an important factor in understanding the difference between the long-run and the short-run Phillips curves. Expected inflation measures how much people expect the overall price level to change.
7. The expected rate of inflation is one variable that determines the position of the short-run aggregate-supply curve. This is true because the expected price level affects the perceptions of relative prices that people form and the wages and prices that they set.
8. In the short run, expectations are somewhat fixed. Thus, when the Fed increases the money supply, aggregate demand increases along the upward sloping short-run aggregate-supply curve. Output grows (unemployment falls) and the price level rises (inflation increases).
9. Eventually, however, people will respond by changing their expectations of the price level. Specifically, they will begin expecting a higher rate of inflation.

D. The Short-Run Phillips Curve

1. We can relate the actual unemployment rate to the natural rate of unemployment, the actual inflation rate, and the expected inflation rate using the following equation:

$$\text{unemp. rate} = \text{natural rate} - a(\text{actual inflation} - \text{expected inflation})$$

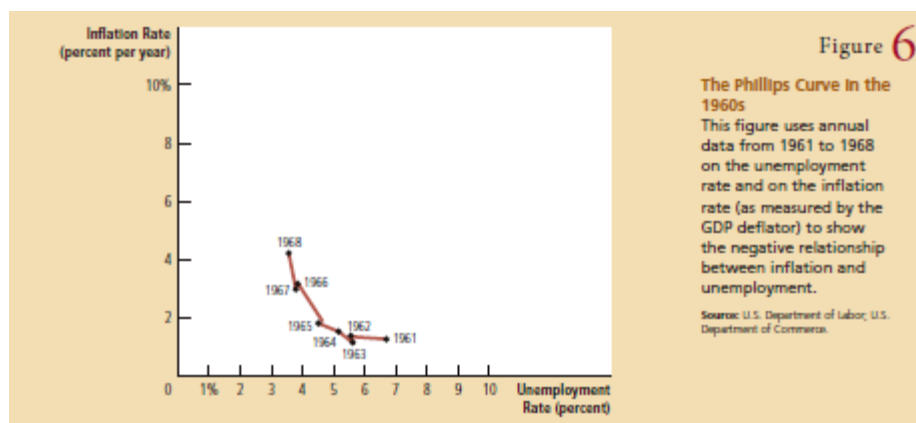
- a. Because expected inflation is already given in the short run, higher actual inflation leads to lower unemployment.
- b. How much unemployment changes in response to a change in inflation is determined by the variable a , which is related to the slope of the short-run aggregate-supply curve.



2. If policymakers want to take advantage of the short-run trade-off between unemployment and inflation, it may lead to negative consequences.
 - a. Suppose the economy is at point A and policymakers wish to lower the unemployment rate. Expansionary monetary policy or fiscal policy is used to shift aggregate demand to the right. The economy moves to point B, with a lower unemployment rate and a higher rate of inflation.
 - b. Over time, people get used to this new level of inflation and raise their expectations of inflation. This leads to an upward shift of the short-run Phillips curve. The economy ends up at point C, with a higher inflation rate than at point A, but the same level of unemployment.

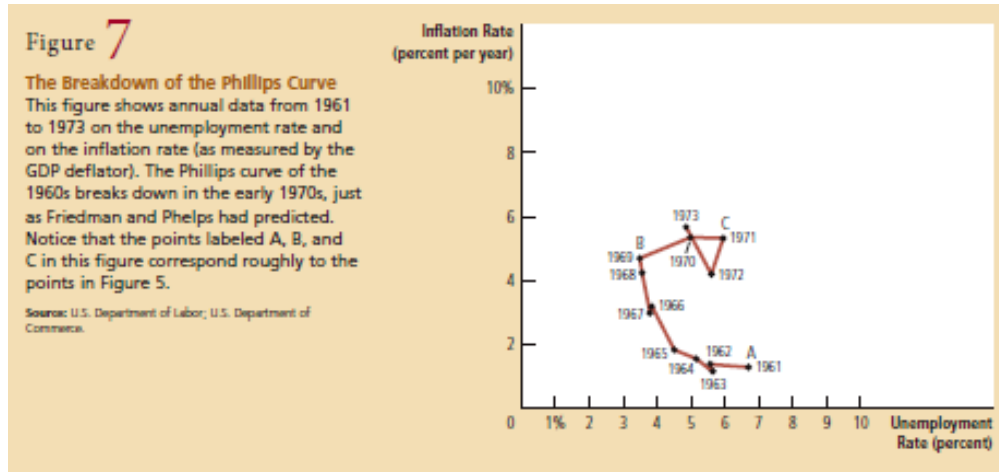
E. The Natural Experiment for the Natural-Rate Hypothesis

1. Definition of the **natural-rate hypothesis: the claim that unemployment eventually returns to its normal, or natural rate, regardless of the rate of inflation.**



2. Figure 6 shows the unemployment and inflation rates from 1961 to 1968. It is easy to see the inverse relationship between these two variables.

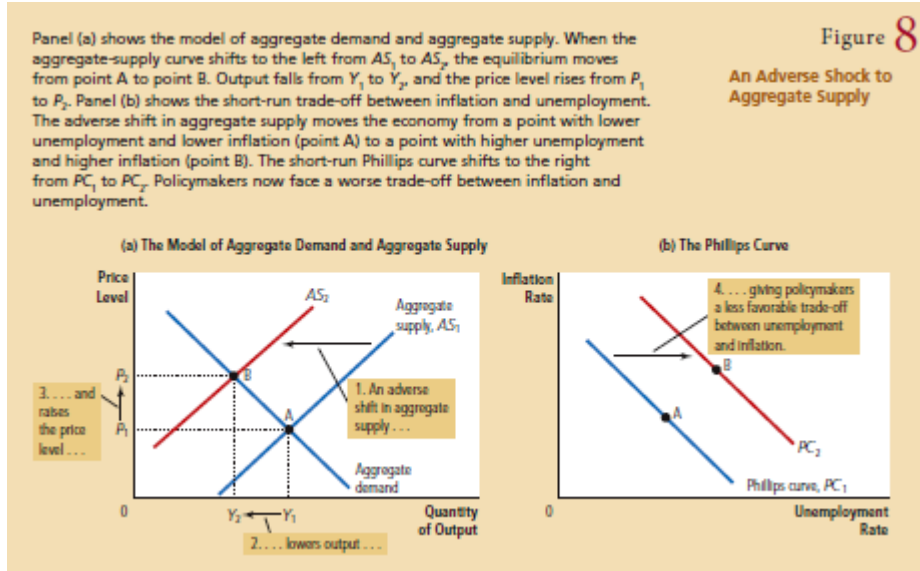
3. Beginning in the late 1960s, the government followed policies that increased aggregate demand.
 - a. Government spending rose because of the Vietnam War.
 - b. The Fed increased the money supply to try to keep interest rates down.
4. As a result of these policies, the inflation rate remained fairly high. However, even though inflation remained high, unemployment did not remain low.



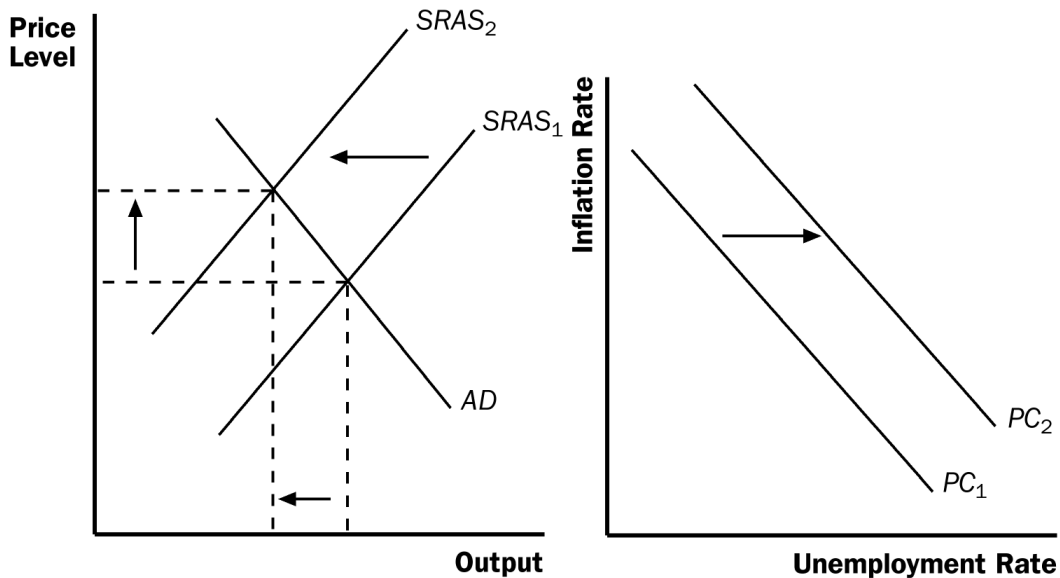
- a. Figure 7 shows the unemployment and inflation rates from 1961 to 1973. The simple inverse relationship between these two variables began to disappear around 1970.
- b. Inflation expectations adjusted to the higher rate of inflation and the unemployment rate returned to its natural rate of around 5% to 6%.

III. Shifts in the Phillips Curve: The Role of Supply Shocks

- A. In 1974, OPEC increased the price of oil sharply. This increased the cost of producing many goods and services and therefore resulted in higher prices.

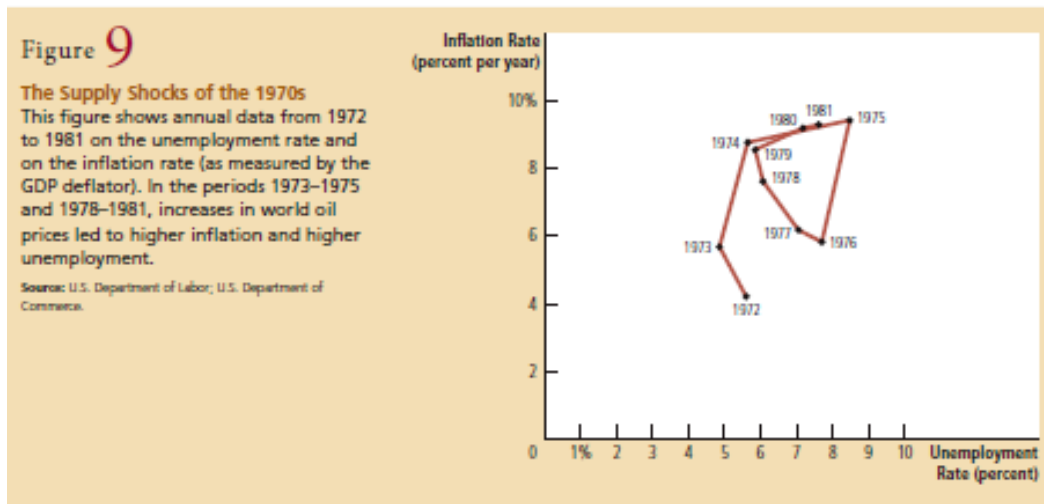


1. Definition of **supply shock**: an event that directly alters firms' costs and prices, shifting the economy's aggregate-supply curve and thus the Phillips curve.
2. Graphically, we could represent this supply shock as a shift in the short-run aggregate-supply curve to the left.
3. The decrease in equilibrium output and the increase in the price level left the economy with stagflation.



- B. Given this turn of events, policymakers are left with a less favorable short-run trade-off between unemployment and inflation.
 1. If they increase aggregate demand to fight unemployment, they will raise inflation further.
 2. If they lower aggregate demand to fight inflation, they will raise unemployment further.

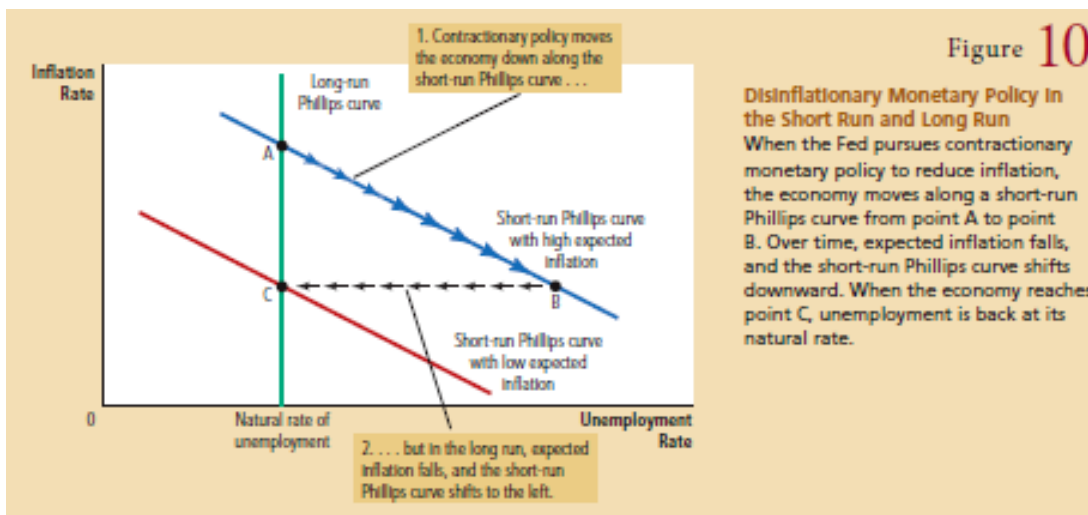
- C. This less favorable trade-off between unemployment and inflation can be shown by a shift of the short-run Phillips curve. The shift may be permanent or temporary, depending on how people adjust their expectations of inflation.



- D. During the 1970s, the Fed decided to accommodate the supply shock by increasing the supply of money. This increased the level of expected inflation. Figure 9 shows inflation and unemployment in the United States during the late 1970s and early 1980s.

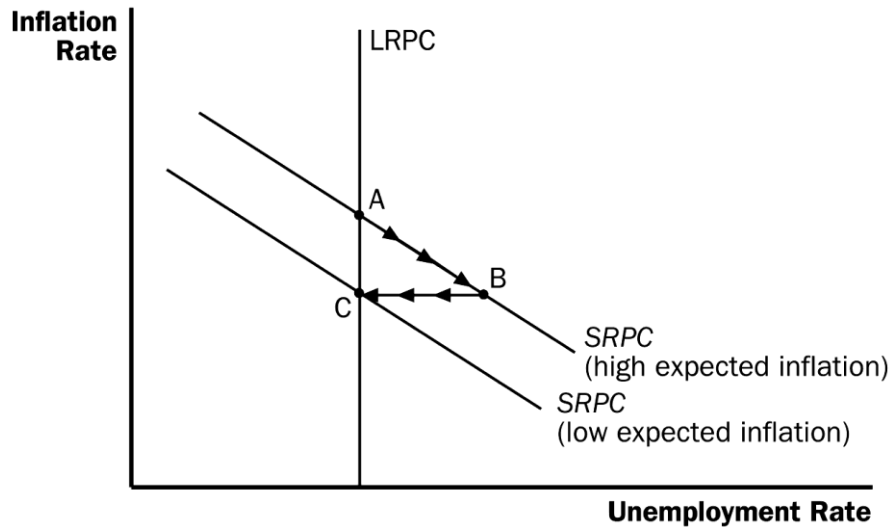
IV. The Cost of Reducing Inflation

A. The Sacrifice Ratio



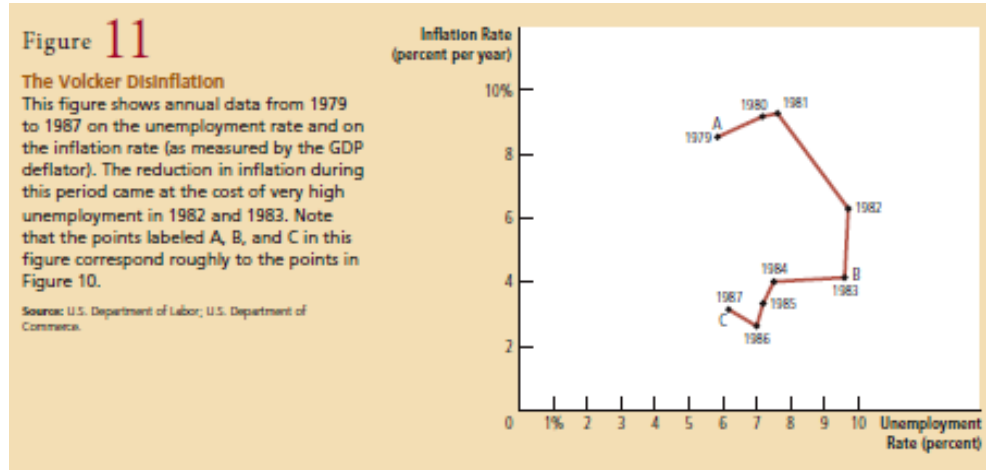
1. To reduce the inflation rate, the Fed must follow contractionary monetary policy.
 - a. When the Fed slows the rate of growth of the money supply, aggregate demand falls.
 - b. This reduces the level of output in the economy, increasing unemployment.

- c. The economy moves from point A along the short-run Phillips curve to point B, which has a lower inflation rate but a higher unemployment rate.
- d. Over time, people begin to adjust their inflation expectations downward and the short-run Phillips curve shifts. The economy moves from point B to point C, where inflation is lower and the unemployment rate is back to its natural rate.



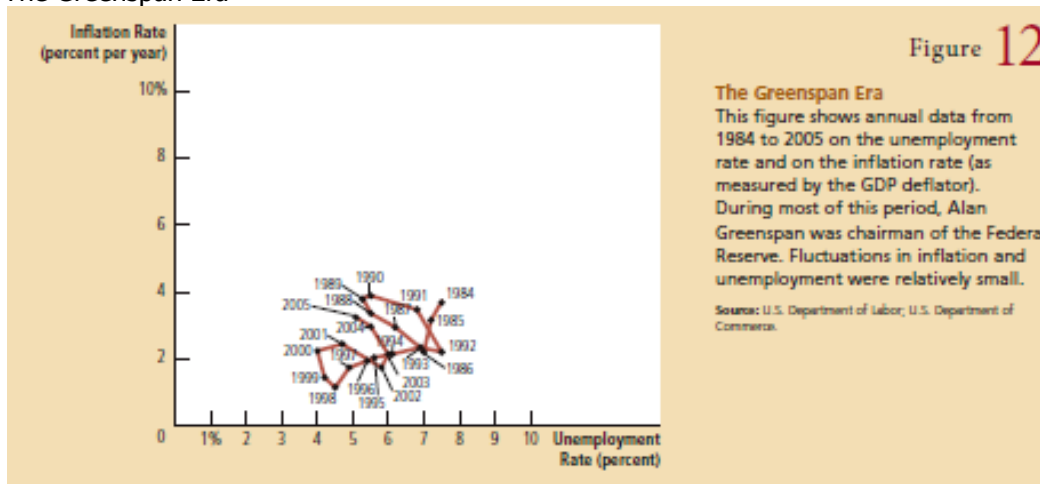
2. Therefore, to reduce inflation, the economy must suffer through a period of high unemployment and low output.
 3. Definition of **sacrifice ratio**: the number of percentage points of annual output lost in the process of reducing inflation by one percentage point.
 4. A typical estimate of the sacrifice ratio is five. This implies that for each percentage point inflation is decreased, output falls by 5%.
- B. Rational Expectations and the Possibility of Costless Disinflation
1. Definition of **rational expectations**: the theory according to which people optimally use all the information they have, including information about government policies, when forecasting the future.
 2. Proponents of rational expectations believe that when government policies change, people alter their expectations about inflation.
 3. Therefore, if the government makes a credible commitment to a policy of low inflation, people would be rational enough to lower their expectations of inflation immediately. This implies that the short-run Phillips curve would shift quickly without any extended period of high unemployment.

C. The Volcker Disinflation



1. Figure 11 shows the inflation and unemployment rates that occurred while Paul Volcker worked at reducing the level of inflation during the 1980s.
2. As inflation fell, unemployment rose. In fact, the United States experienced its deepest recession since the Great Depression.
3. Some economists have offered this as proof that the idea of a costless disinflation suggested by rational-expectations theorists is not possible. However, there are two reasons why we might not want to reject the rational-expectations theory so quickly.
 - a. The cost (in terms of lost output) of the Volcker disinflation was not as large as many economists had predicted.
 - b. While Volcker promised that he would fight inflation, many people did not believe him. Few people thought that inflation would fall as quickly as it did; this likely kept the short-run Phillips curve from shifting quickly.

D. The Greenspan Era



1. Figure 12 shows the inflation and unemployment rate from 1984 to 1999, called the Greenspan era because Alan Greenspan became the chairman of the Federal Reserve in 1987.
 2. In 1986, OPEC's agreement with its members broke down and oil prices fell. The result of this favorable supply shock was a drop in both inflation and unemployment.
 3. The rest of the 1990s witnessed a period of economic prosperity. Inflation gradually dropped, approaching zero by the end of the decade. Unemployment also reached a low level, leading many people to believe that the natural rate of unemployment has fallen.
 4. The economy ran into problems in 2001 due to the end of the dot-com stock market bubble, the 9-11 terrorist attacks, and corporate accounting scandals that reduced aggregate demand. Unemployment rose as the economy experienced its first recession in a decade.
 5. But a combination of expansionary monetary and fiscal policies helped end the downturn, and by early 2005, the unemployment rate was close to the estimated natural rate.
 6. In 2005, President Bush nominated Ben Bernanke as the Fed chairman.
- E. The Phillips Curve during a Financial Crisis
1. In his first couple of years as Fed chairman, Bernanke faced some significant economic challenges.
 - a. One challenge arose from problems in the housing and financial markets.
 - b. The resulting financial crisis led to a large drop in aggregate demand and high rates of unemployment.
 - c. As the unemployment rate rose, the inflation rate fell.
 - d. Policymakers used expansionary monetary and fiscal policy to move the economy along the short-term Phillips curve with lower unemployment and somewhat higher inflation.
- F. *In The News: Do We Need More Inflation?*
1. In 2010, as the U.S. was trying to climb out of a severe economic downturn, some individuals suggested that a bit more inflation would do the economy some good.
 2. This is an article from *The Wall Street Journal* arguing against such a suggestion.