

Chapter 12: Unemployment and Inflation

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April 22, 2015

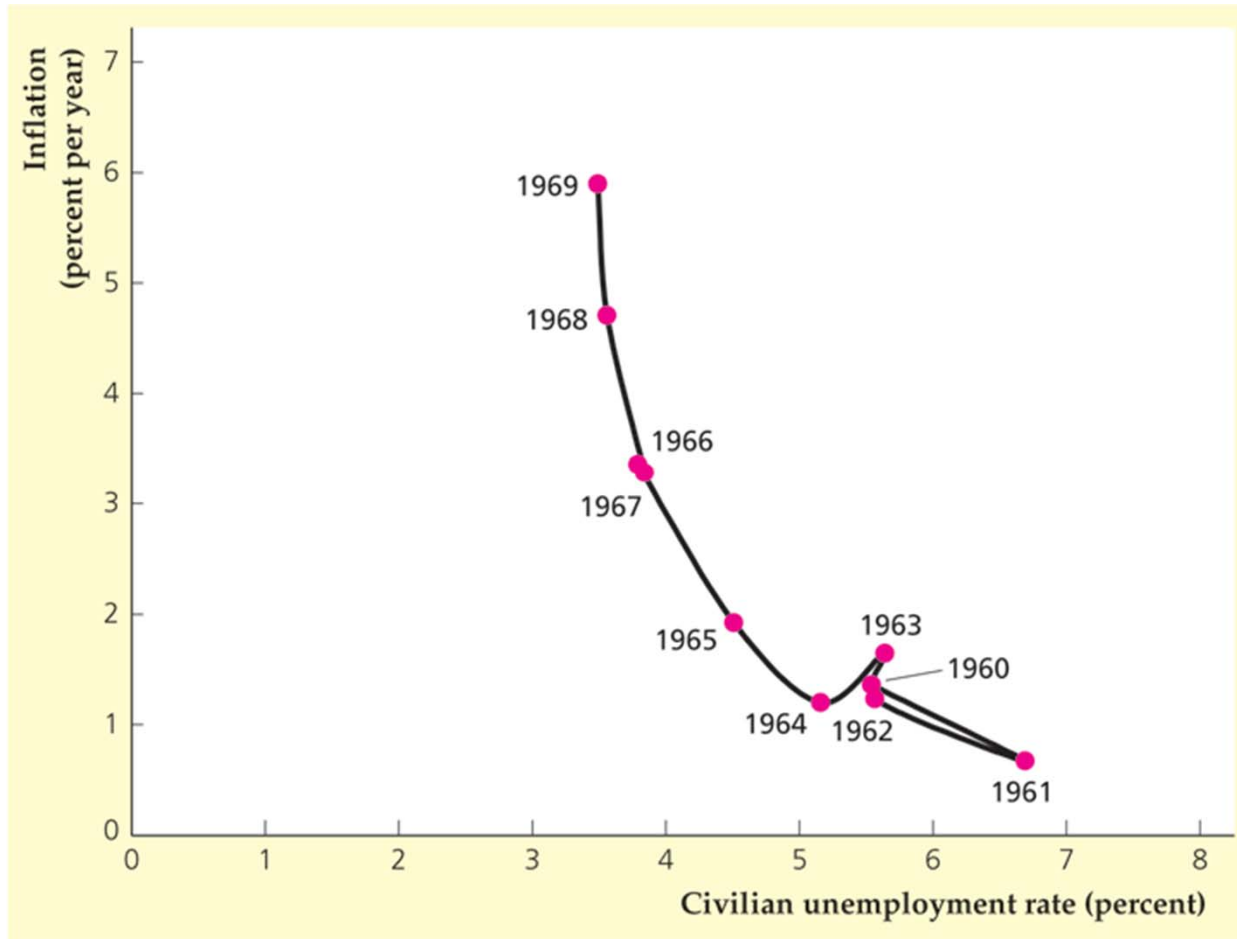
- Unemployment and Inflation: Is There a Trade-Off?
- Macroeconomic Policy and the Phillips Curve
- The Problem of Unemployment
- The Problem of Inflation
- Fighting Inflation: The Role of Inflationary Expectations

Unemployment and Inflation: Is There a Trade-off?

- Many people think there is a trade-off between inflation and unemployment.
- The idea originated in 1958 when A.W. Phillips showed a negative relationship between unemployment and nominal wage growth in Britain.
- Since then economists have looked at the relationship between unemployment and inflation.
- In the 1950s and 1960s many nations seemed to have a negative relationship between the two variables.
- The U.S. appears to be on one Phillips curve in the 1960s (Fig. 12.1)



Figure 12.1 The Phillips curve and the U.S. economy during the 1960s



Source: Federal Reserve Bank of St. Louis FRED database at research.stlouisfed.org/fred2, series *CPIAUCSL* and *UNRATE*.

- (Conti.) This suggested that policymakers could choose the combination of unemployment and inflation they most desired
- But the relationship fell apart in the following three decades (Fig. 12.2)
- The 1970s were a particularly bad period, with both high inflation and high unemployment, inconsistent with the Phillips curve.



Figure 12.2 Inflation and unemployment in the United States



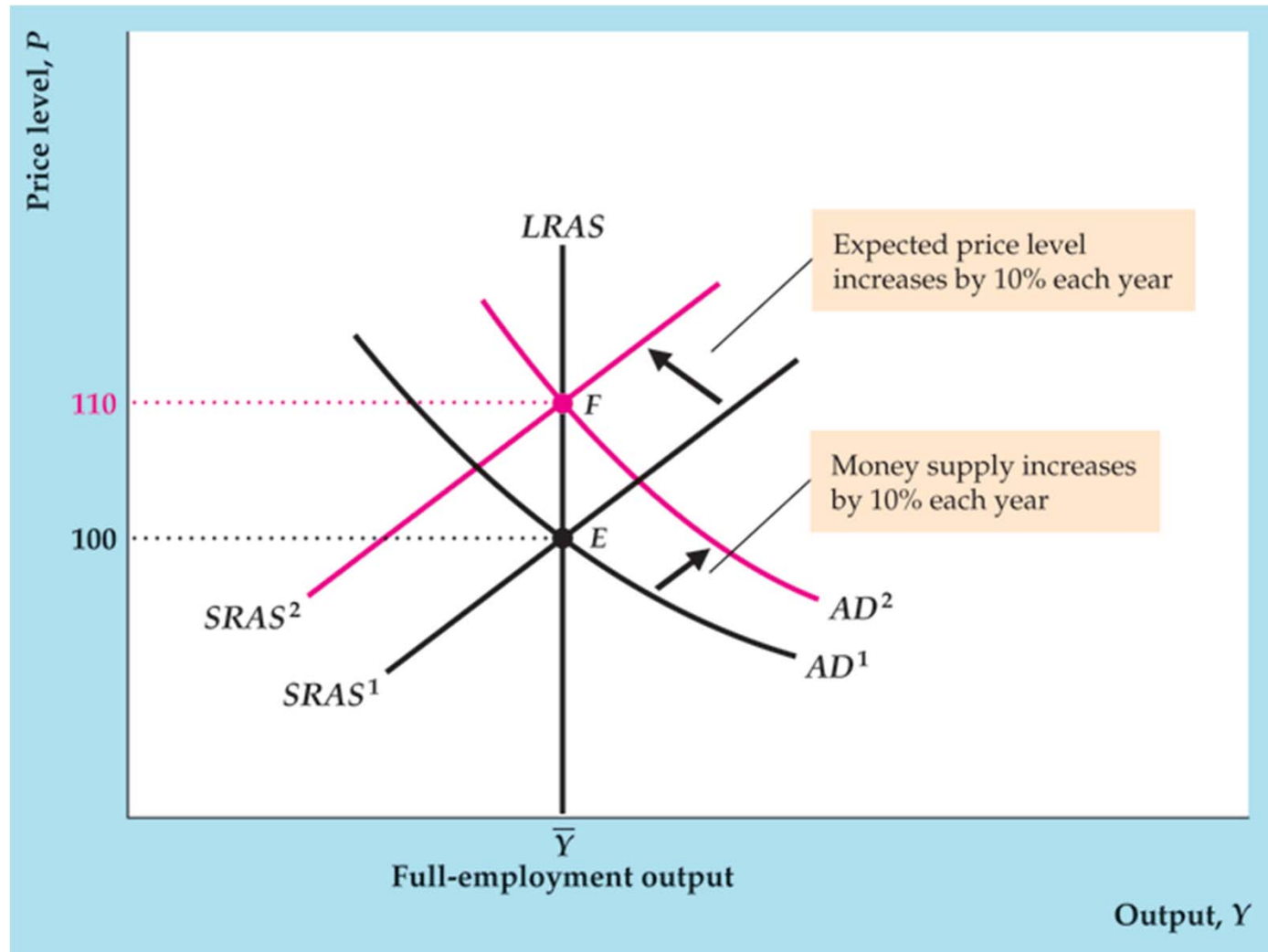
Source: Federal Reserve Bank of St. Louis FRED database at research.stlouisfed.org/fred2, series *CPIAUCSL* and *UNRATE*.

The expectations-augmented Phillips curve

- Friedman and Phelps: The cyclical unemployment rate (the difference between actual and natural unemployment rates) depends only on unanticipated inflation (the difference between actual and expected inflation):
 - This theory was made before the Phillips curve began breaking down in the 1970s.
 - It suggests that the relationship between inflation and the unemployment rate isn't stable.
- How does this work in the extended classical model? First case: anticipated increase in money supply (Fig. 12.3):
 - AD shifts up and SRAS shifts up, with no misperceptions.
 - Result: P rises, Y unchanged.
 - Inflation rises with no change in unemployment.



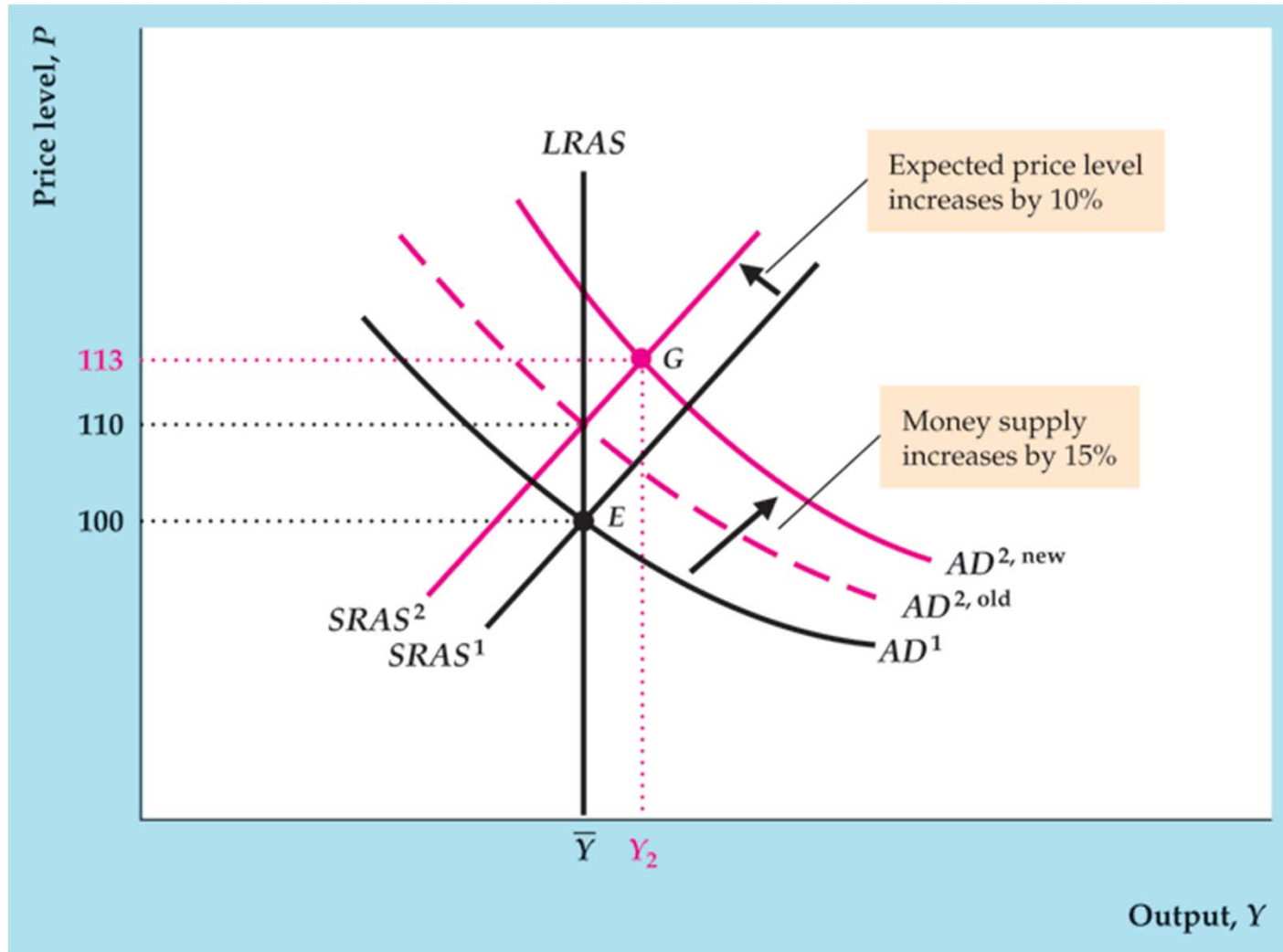
Figure 12.3 Ongoing inflation in the extended classical model



- (Conti.) Second case: unanticipated increase in money supply (Fig. 12.4):
 - AD expected to shift up to $AD^{2,old}$ (money supply expected to rise 10%), but unexpectedly money supply rises 15%, so AD shifts further up to $AD^{2,new}$ SRAS shifts up based on expected 10% rise in money supply
 - Result: P rises and Y rises as misperceptions occur
 - So higher inflation occurs with lower unemployment
 - Long run: P rises further, Y declines to full-employment level.



Figure 12.4 Unanticipated inflation in the extended classical model





Unemployment and Inflation: Is There a Trade-off?

- The expectations-augmented Phillips curve

$$\pi = \pi^e - h(u - \bar{u}) \quad (12.1)$$

- When $\pi = \pi^e$, $u = \bar{u}$
- When $\pi < \pi^e$, $u > \bar{u}$
- When $\pi > \pi^e$, $u < \bar{u}$

The shifting Phillips curve

- The Phillips curve shows the relationship between unemployment and inflation for a given expected rate of inflation and natural rate of unemployment.
- Changes in the expected rate of inflation (Fig. 12.5):
 - For a given expected rate of inflation, the Phillips curve shows the trade-off between cyclical unemployment and actual inflation.
 - The Phillips curve is drawn such that $\pi = \pi^e$ when $u = \bar{u}$.
 - Higher expected inflation implies a higher Phillips curve.
- Changes in the natural rate of unemployment (Fig. 12.6):
 - For a given natural rate of unemployment, the Phillips curve shows the trade-off between unemployment and unanticipated inflation.
 - A higher natural rate of unemployment shifts the Phillips curve to the right.



Figure 12.5 The shifting Phillips curve: an increase in expected inflation

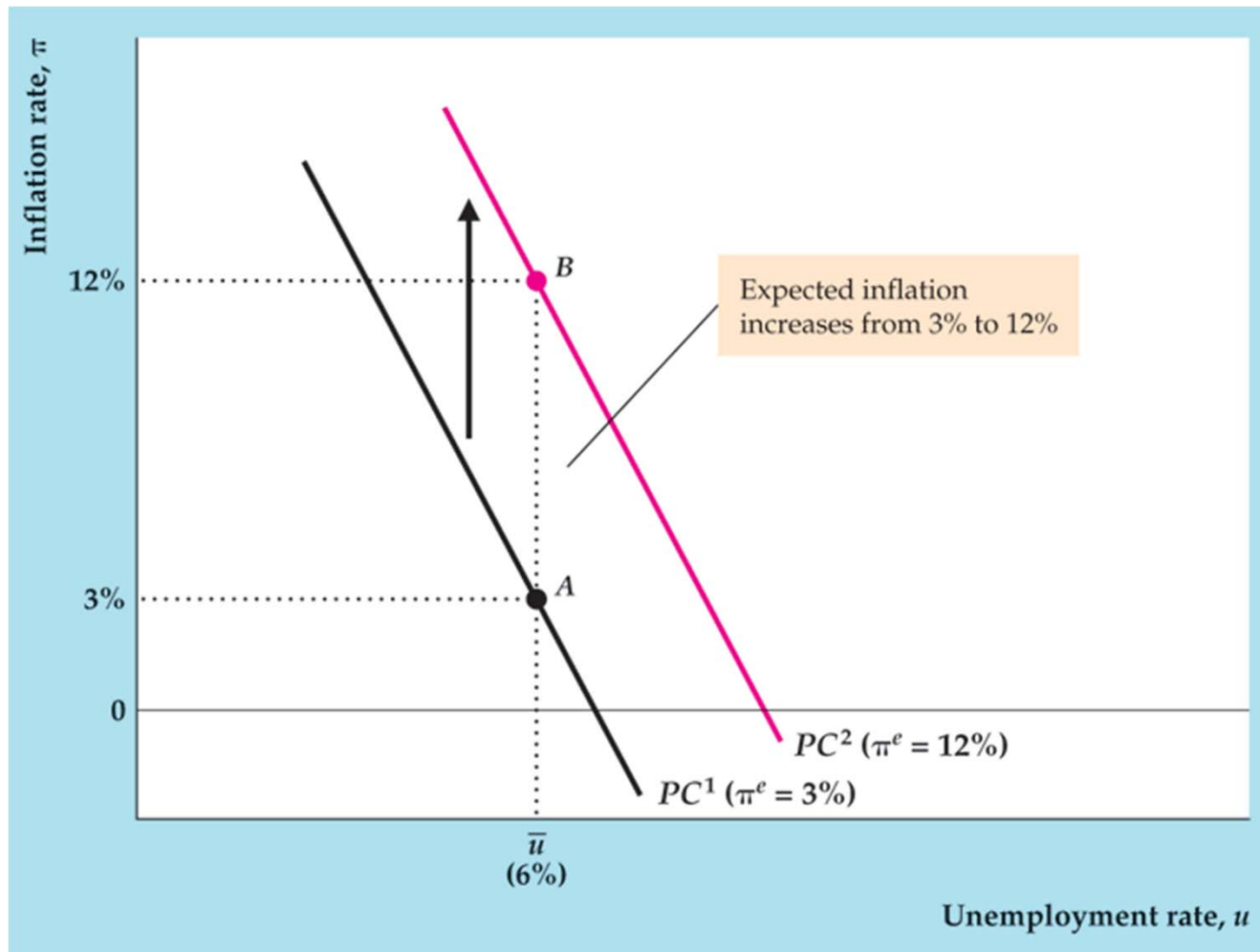
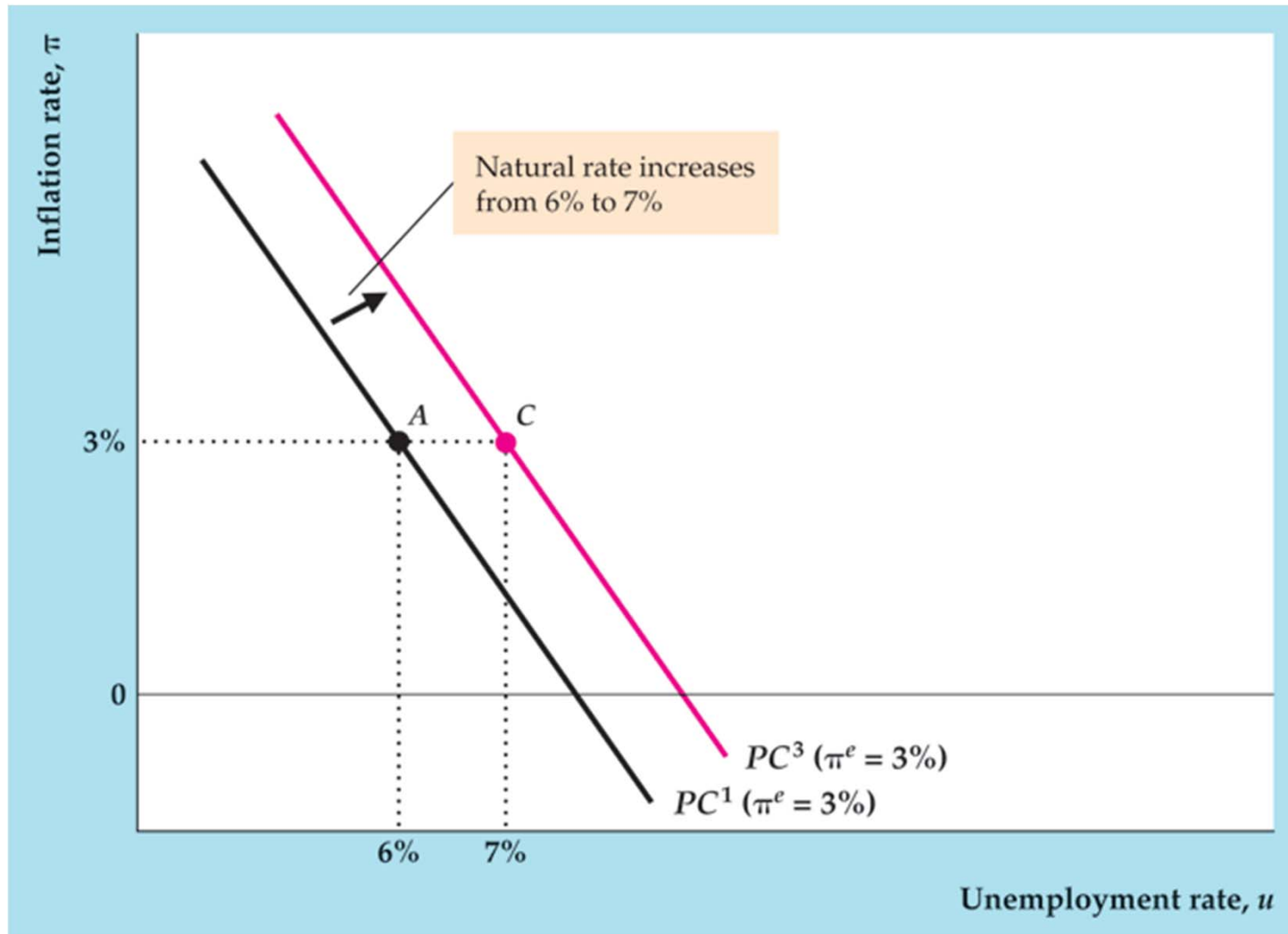




Figure 12.6 The shifting Phillips curve: an increase in the natural unemployment rate



Supply shocks and the Phillips curve

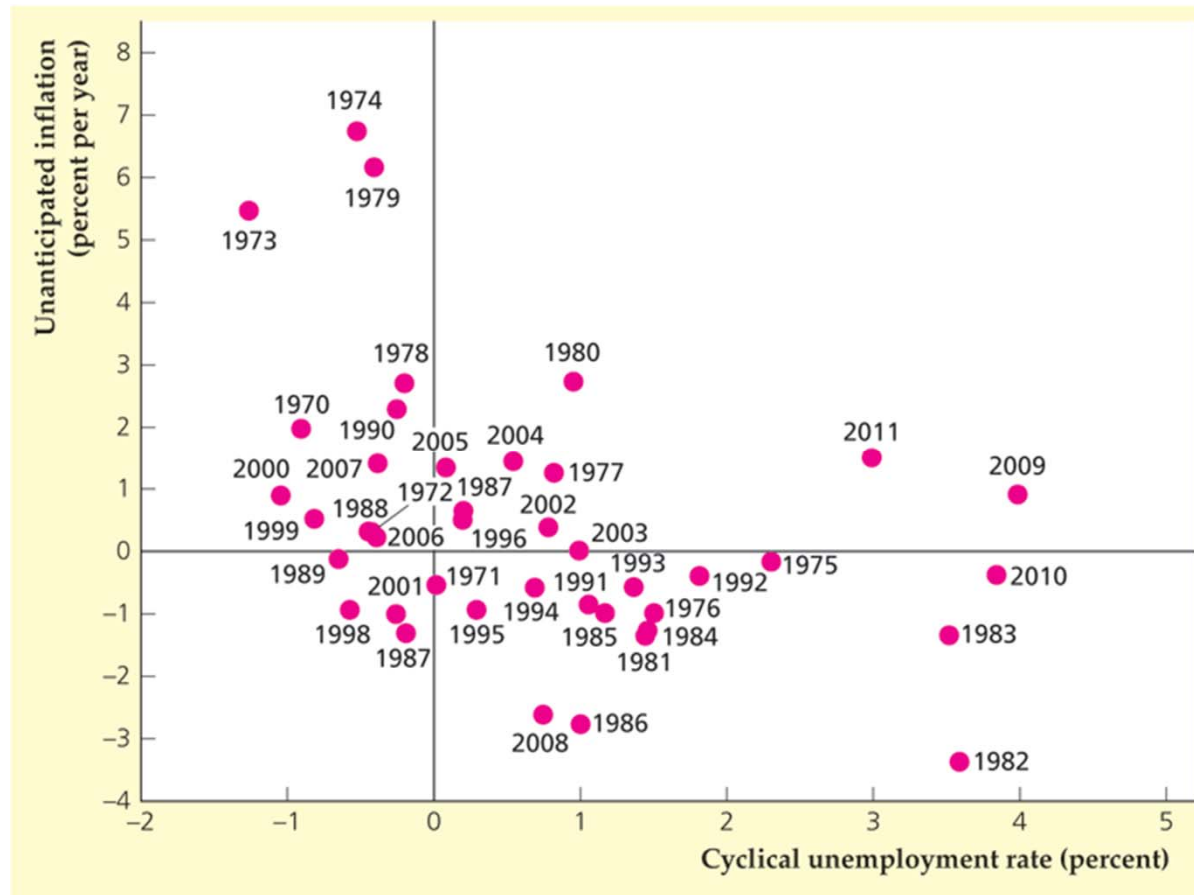
- A supply shock increases both expected inflation and the natural rate of unemployment:
 - A supply shock in the classical model increases the natural rate of unemployment (NRU), because it increases the mismatch between firms and workers.
 - A supply shock in the Keynesian model reduces the marginal product of labor and thus reduces labor demand at the fixed real wage, so the natural unemployment rate rises.
- So an adverse supply shock shifts the Phillips curve up and to the right.
- The Phillips curve will be unstable in periods with many supply shocks.

The shifting Phillips curve in practice

- Why did the original Phillips curve relationship apply to many historical cases?
 - The original relationship between inflation and unemployment holds up as long as expected inflation and NRU are approximately constant.
 - This was true in the U.S. in the 1960s, so the Phillips curve appeared to be stable.
- Why did the U.S. Phillips curve disappear after 1970?
 - Both the expected inflation rate and the natural rate of unemployment varied considerably more in the 1970s than they did in the 1960s.
 - Especially important were the oil price shocks of 1973 – 1974 and 1979 – 1980.
 - Also, the composition of the labor force changed in the 1970s and there were other structural changes in the economy as well, raising NRU.
 - Monetary policy was expansionary in the 1970s, leading to high and volatile inflation.
 - Plotting unanticipated inflation against cyclical unemployment shows a fairly stable relationship since 1970 (Fig. 12.7).



Figure 12.7 The expectations-augmented Phillips curve in the United States, 1970-2011



Source: Federal Reserve Bank of St. Louis FRED database at research.stlouisfed.org/fred2, series CPIAUCSL (inflation) and UNRATE (unemployment rate); expected inflation: Federal Reserve Bank of Philadelphia Livingston Survey at www.philadelphiafed.org; natural rate of unemployment: Congressional Budget Office, www.cbo.gov/ftpdocs/100xx/doc10014/Mar09Web_Tbl_potential.xls.

Macroeconomic Policy and the Phillips Curve

- Can the Phillips curve be exploited by policymakers? Can they choose the optimal combination of unemployment and inflation?
- Classical model: NO.
- The unemployment rate returns to its natural level quickly, as people's expectations adjust.
- So unemployment can change from its natural level only for a very brief time.
- Also, people catch on to policy games; they have rational expectations and try to anticipate policy changes, so there is no way to fool people systematically.

- (Conti.) Keynesian model: YES, temporarily
- The expected rate of inflation in the Phillips curve is the forecast of inflation at the time the oldest sticky prices were set
- It takes time for prices and expected prices to adjust, so unemployment may differ from the natural rate for some time

In touch with data and research: The Lucas critique

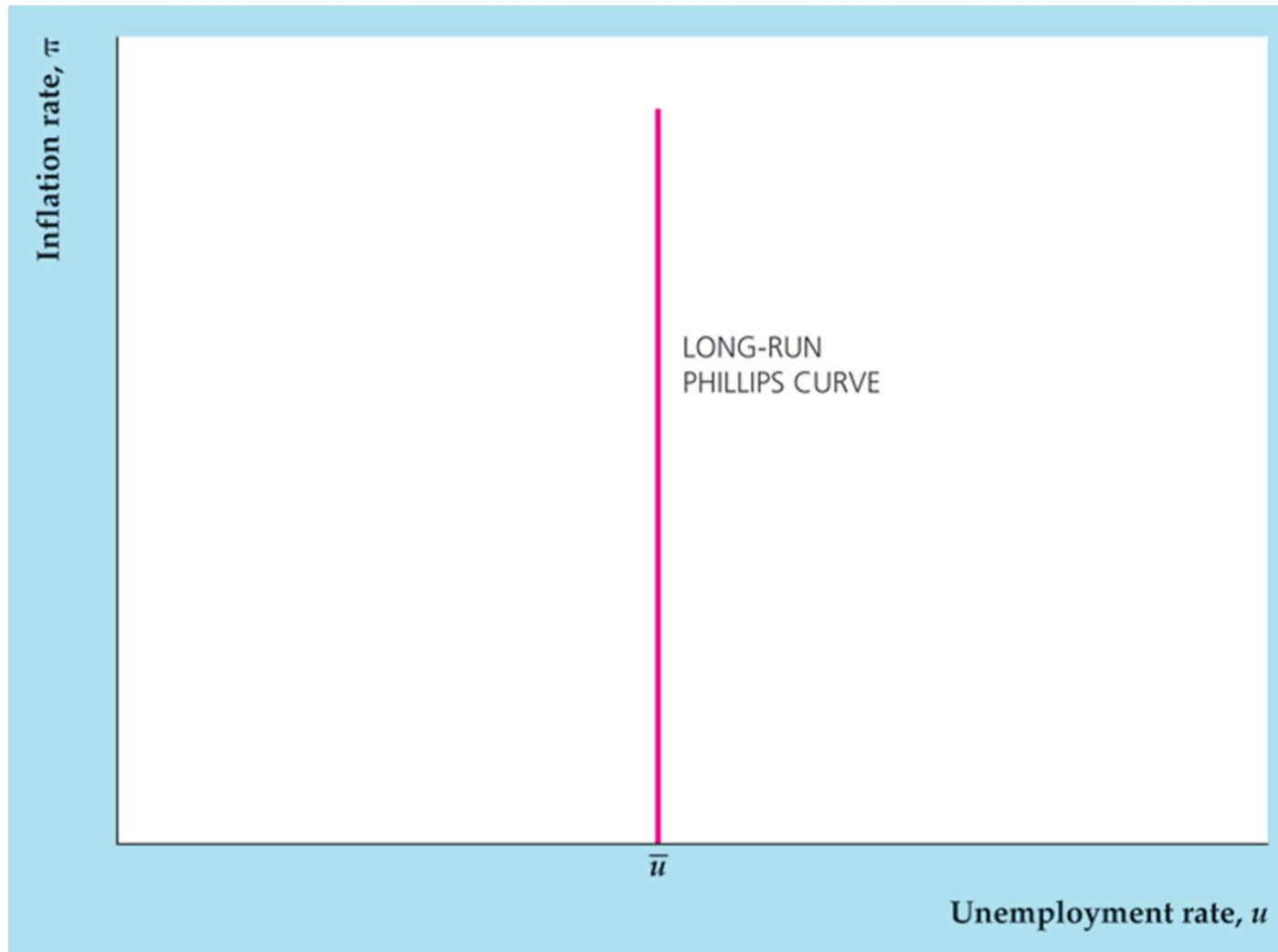
- When the rules of the game change, behavior changes.
- For example, if batters in baseball were called out after two strikes instead of three, they'd swing more often when they have one strike than they do now.
- Lucas applied this idea to macroeconomics, arguing that historical relationships between variables won't hold up if there's been a major policy change.
- The Phillips curve is a good example—it fell apart as soon as policymakers tried to exploit it.
- Evaluating policy requires an understanding of how behavior will change under the new policy, so both economic theory and empirical analysis are necessary.

The long-run Phillips curve

- Long run: the $u = \bar{u}$ for both Keynesians and classicals.
- The long-run Phillips curve is vertical, since when $\pi = \pi^e$, then $u = \bar{u}$. (Figure 12.8).
- Changes in the level of money supply have no long-run real effects; changes in the growth rate of money supply have no long-run real effects, either.
- Even though expansionary policy may reduce unemployment only temporarily, policymakers may want to do so if, for example, timing economic booms right before elections helps them (or their political allies) get reelected.



Figure 12.8 The long-run Phillips curve



The costs of unemployment

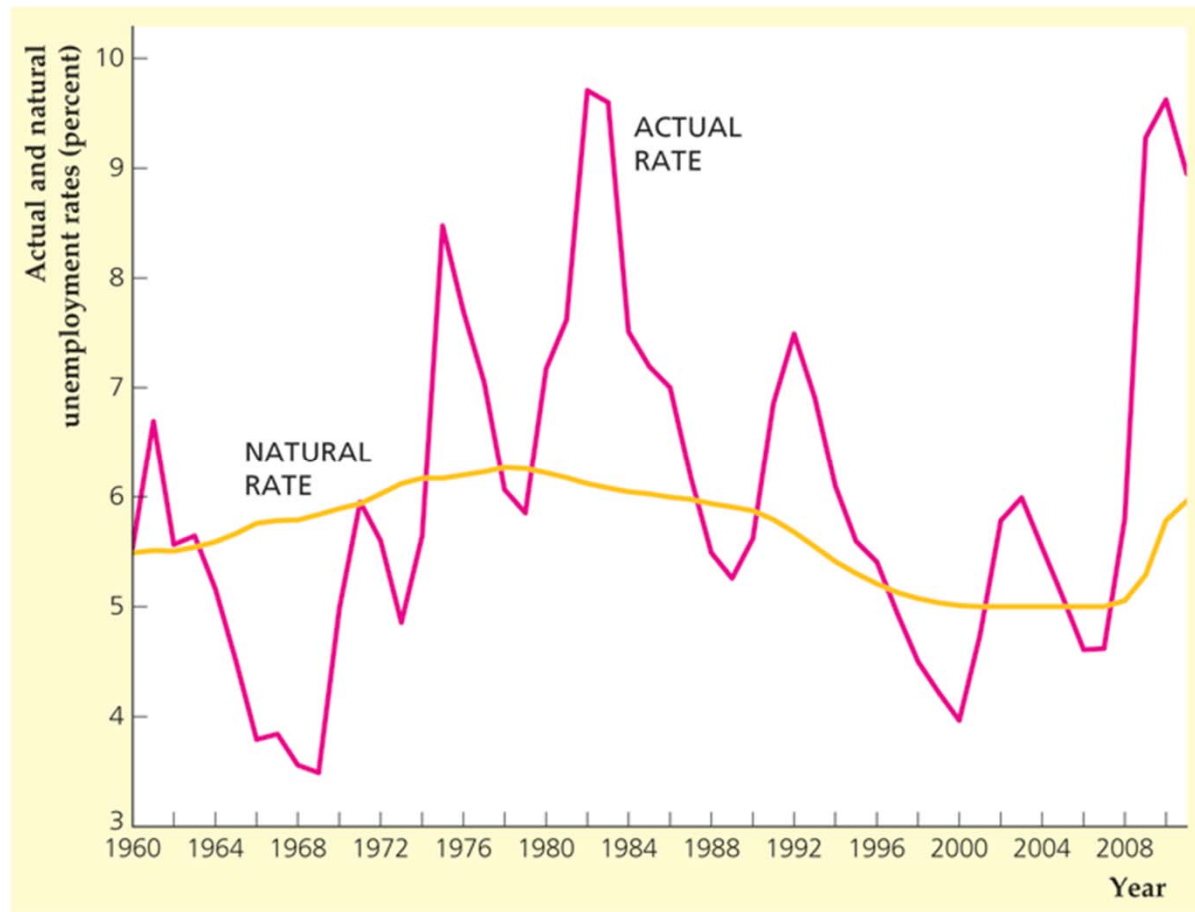
- Loss in output from idle resources:
 - Workers lose income.
 - Society pays for unemployment benefits and makes up lost tax revenue.
 - Using Okun's Law (each percentage point of cyclical unemployment is associated with a loss equal to 2% of full-employment output), if full-employment output is \$17 trillion, each percentage point of unemployment sustained for one year costs \$340 billion.
- Personal or psychological cost to workers and their families.
 - Especially important for those with long spells of unemployment.
- There are some offsetting factors:
 - Unemployment leads to increased job search and acquiring new skills, which may lead to increased future output.
 - Unemployed workers have increased leisure time, though most wouldn't feel that the increased leisure compensated them for being unemployed.

The long-term behavior of the unemployment rate

- The changing natural rate:
 - How do we calculate the NRU?
 - CBO's estimates: 6% today, similar to 1970s and 1980s; much higher than it was in 1960s, 1990s, and 2000s.
 - In the 1980s and 1990s, demographic forces reduced NRU (Fig. 12.9)
 - The proportion of the labor force aged 16–24 years fell from 25% in 1980 to 16% in 1998.
 - Research by Shimer showed this is the main reason for the fall in NRU.



Figure 12.9 Actual and natural unemployment rates in the United States, 1960–2011



Sources: Actual unemployment rate, Federal Reserve Bank of St. Louis FRED database at research.stlouisfed.org/fred2, series UNRATE; natural rate of unemployment: Congressional Budget Office, www.cbo.gov/ftpdocs/100xx/doc10014/Mar09Web_TbL_potential.xls.

- (Conti.) Some economists think NRU was 4.5% or even lower in the 1990s and 2000s. The labor market became more efficient at matching workers and jobs, reducing frictional and structural unemployment. Temporary help agencies became prominent, helping the matching process and reducing the natural rate of unemployment
- Increased labor productivity may increase NRU. If increases in real wages lag changes in productivity, firms hire more workers and NRU will decline temporarily. Ball and Mankiw found evidence supporting this hypothesis in the 1990s

Measuring the natural rate of unemployment

- Policymakers need a measure of NRU to use the unemployment rate for setting policy.
- Economists disagree about how to measure NRU and the CBO has often revised its measure.
- Staiger, Stock, and Watson found that NRU cannot be measured precisely with econometric methods, as the confidence interval is very large.
- What should policymakers do in response to uncertainty about NRU?
 - They may wish to be less aggressive with policy than they would be if they knew the natural rate more precisely.
 - Research (Orphanides-Williams) suggests that the rise of inflation in the 1970s can be blamed on bad estimates of the natural rate.

The costs of inflation (Perfectly anticipated inflation)

- No effects if all prices and wages keep up with inflation.
- Even returns on assets may rise exactly with inflation.
- Shoe-leather costs: People spend resources to economize on currency holdings; the estimated cost of 10% inflation is 0.3% of GNP.
- Menu costs: the costs of changing prices (but technology may mitigate this somewhat).

Unanticipated inflation

- Unanticipated inflation is $\pi - \pi^e$. Realized real returns differ from expected real returns:

$$\text{Expected: } r = i - \pi^e$$

$$\text{Actual: } r = i - \pi$$

That is, actual r differs from expected r by $\pi^e - \pi$.

- Numerical example: $i = 6\%$, $\pi^e = 4\%$, so expected $r = 2\%$; if $\pi = 6\%$, actual $r = 0\%$; if $\pi = 2\%$, actual $r = 4\%$.

- (Conti.) Similar effect on wages and salaries. Result: transfer of wealth
 - From lenders to borrowers when $\pi > \pi^e$
 - From borrowers to lenders when $\pi < \pi^e$
- So people want to avoid risk of unanticipated inflation. They spend resources to forecast inflation.
- Loss of valuable signals provided by prices:
 - Confusion over changes in aggregate prices vs. changes in relative prices.
 - People expend resources to extract correct signals from prices.

- People could use indexed contracts to avoid the risk of transferring wealth because of unanticipated inflation.
- Most U.S. financial contracts are not indexed, with the exception of some long-term contracts like adjustable-rate mortgages and inflation-indexed bonds issued by the U.S. Treasury beginning in 1997.
- Many U.S. labor contracts are indexed by COLAs (cost-of-living adjustments).
- Indexed contracts are more prevalent in countries with high inflation.

The costs of hyperinflation

- Hyperinflation is a very high, sustained inflation (for example, 50% or more per month).
- Hungary in August 1945 had inflation of 19,800% per month.
- Zimbabwe had annual rates of inflation of 1017% in 2006, 10,453% in 2007, and 55.6 billion percent in 2008, before dropping to 6.5% in 2009.
- There are large shoe-leather costs, as people minimize cash balances.
- People spend many resources getting rid of money as fast as possible.
- Tax collections fall, as people pay taxes with money whose value has declined sharply.
- Prices become worthless as signals, so markets become inefficient.

If rapid money growth causes inflation, why do central banks allow the money supply to grow rapidly?

- Developing or war-torn countries may not be able to raise taxes or borrow, so they print money to finance spending.
- Industrialized countries may try to use expansionary monetary policy to fight recessions, then not tighten monetary policy enough later.
- Disinflation is a reduction in the rate of inflation:
 - But disinflations may lead to recessions.
 - An unexpected reduction in inflation leads to a rise in unemployment along the Phillips curve.
- The costs of disinflation could be reduced if expected inflation fell at the same time actual inflation fell.

Rapid versus gradual disinflation

- The classical prescription for disinflation is cold turkey—a rapid and decisive reduction in money growth.
- Proponents argue that the economy will adjust fairly quickly, with low costs of adjustment, if the policy is announced well in advance.
- Keynesians disagree with rapid disinflation: Price stickiness due to menu costs and wage stickiness due to labor contracts make adjustment slow.
- Cold turkey disinflation would cause a major recession.
- The strategy might fail to alter inflation expectations, because if the costs of the policy are high (because the economy goes into recession), the government will reverse the policy
- The Keynesian prescription for disinflation is gradualism:
 - A gradual approach gives prices and wages time to adjust to the disinflation
 - Such a strategy will be politically sustainable because the costs are low

In touch with data and research: The sacrifice ratio

- When unanticipated tight monetary and fiscal policies are used to reduce inflation, they reduce output and employment for a time, a cost that must be weighed against the benefits of lower inflation.
- Economists use the sacrifice ratio as a measure of the costs.
- The sacrifice ratio is the number of percentage points of output lost in reducing inflation by one percentage point.
- Ball's study: U.S. inflation fell by 8.83 percentage points in the early 1980s, with a loss in output of 16.18 percent of the nation's potential output.
- Sacrifice ratio = $16.18/8.83 = 1.832$.

- (Conti.) Ball studied the sacrifice ratios for many different disinflations around the world in the 1960s, 1970s, and 1980s.
- The sacrifice ratios varied substantially across countries, from less than 1 to almost 3.
- One factor affecting the sacrifice ratio is the flexibility of the labor market.
- Countries with slow wage adjustment (for example, because of heavy government regulation of the labor market) have higher sacrifice ratios.
- Ball also found a lower sacrifice ratio from cold turkey disinflation than from gradualism.
- Ball's results should be interpreted with caution, since it isn't easy to calculate the loss of output and because supply shocks can distort the calculation of the sacrifice ratio.

Wage and price controls

- Pro: Controls would hold down inflation, thus lowering expected inflation and reducing the costs of disinflation.
- Con: Controls lead to shortages and inefficiency; once controls are lifted, prices will rise again.
- The outcome of wage and price controls may depend on what happens with fiscal and monetary policy:
 - If policies remain expansionary, people will expect renewed inflation when the controls are lifted.
 - If tight policies are pursued, expected inflation may decline.
- The Nixon wage-price controls from August 1971 to April 1974 led to shortages in many products; the controls reduced inflation when they were in effect, but prices returned to where they would have been soon after the controls were lifted.

Credibility and reputation

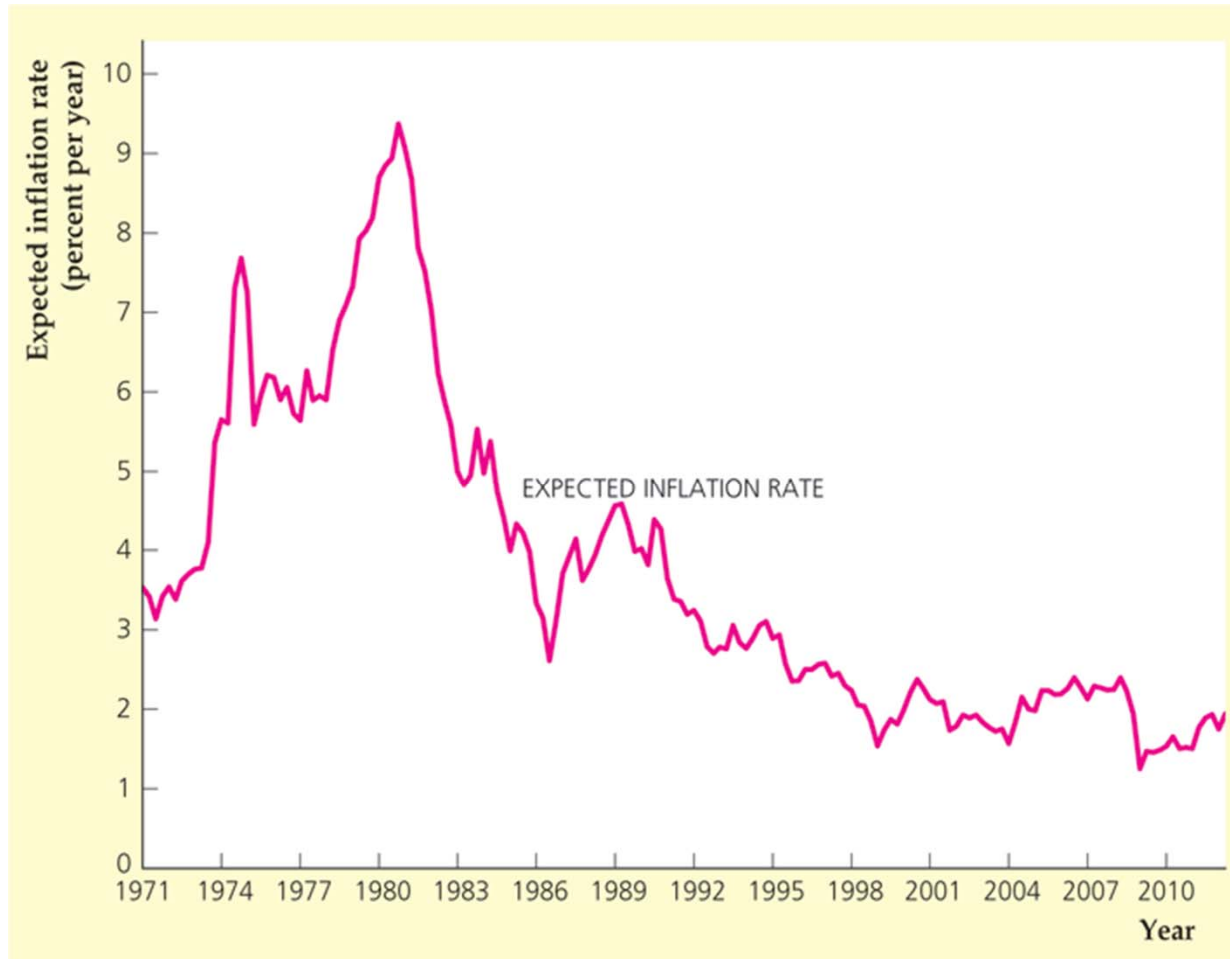
- Key determinant of the costs of disinflation: how quickly expected inflation adjusts.
- This depends on credibility of disinflation policy; if people believe the government and if the government carries through with its policy, expected inflation should drop rapidly.
- Credibility can be enhanced if the government gets a reputation for carrying out its promises.
- Also, having a strong and independent central bank that is committed to low inflation provides credibility.

The U.S. disinflation of the 1980s and 1990s

- Fed chairmen Volcker and Greenspan gradually reduced the inflation rate in the 1980s and 1990s:
 - They sought to eliminate inflation as a source of economic instability
 - They wanted people to be confident that inflation would never be very high again
- To judge the Fed's success, we look at inflation expectations (Fig. 12.10):
 - Inflation expectations were erratic before 1990
 - Inflation expectations fell gradually from 1990 to 1998 and have been stable since then
- Inflation expectations were slow to decline initially (in the late 1970s and early 1980s) because Volcker and the Fed lacked credibility.
- But as inflation continued to fall, the Fed's credibility increased, and inflation expectations declined gradually.
- To solidify those expectations, the Fed declared a 2% long-run inflation target in 2012.



Figure 12.10 Expected inflation rate 1971–2012



Sources: *Survey of Professional Forecasters*, Federal Reserve Bank of Philadelphia, available at www.philadelphiafed.org.