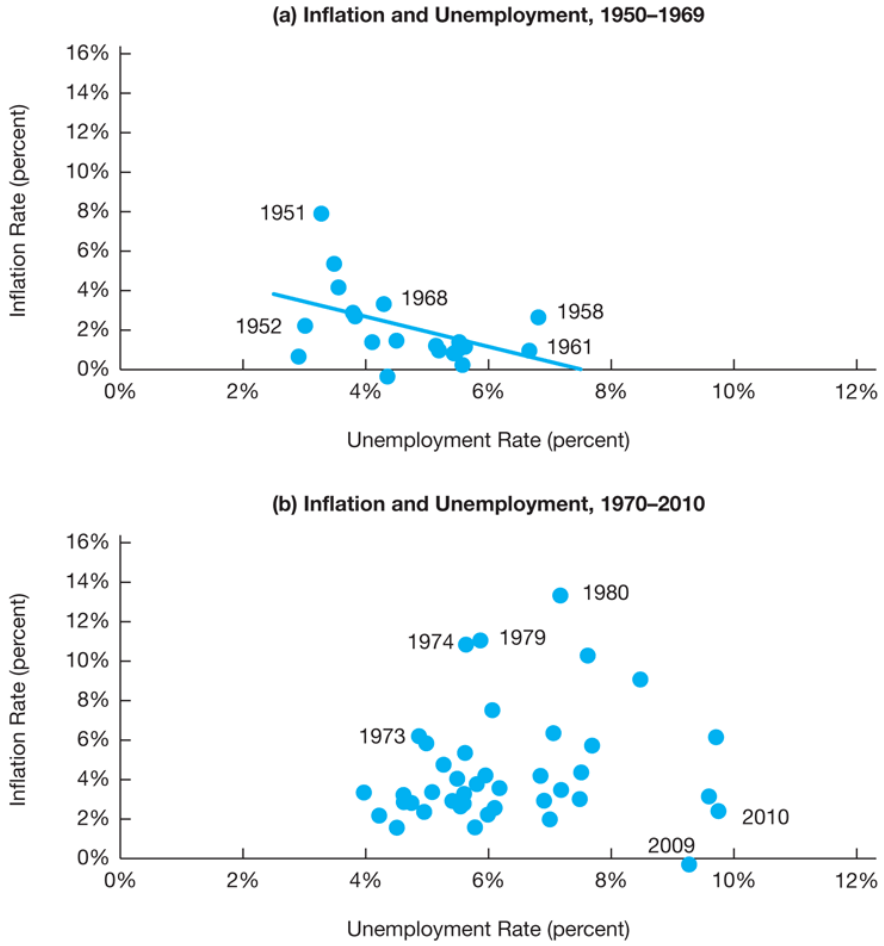
The Phillips Curve

- **The Phillips Curve**: the negative relationship between unemployment and inflation

- The idea behind the Phillips curve is intuitive. When the unemployment rate is low, firms will raise wages to attract needed workers and raise their prices at a more rapid rate because of the shortage of workers in the labor market.

Figure: Inflation and Unemployment in the United States, 1950–1969 and 1970–2010



Source: Economic Report of the President. www.gpoaccess.gov/eop/.

The Phillips Curve

- A sharp critique of Keynesian Phillips Curve by Milton Friedman (1968):

  "…the monetary authority controls nominal quantities directly, the quantity of its own liabilities. In principle, it can use this control to peg a nominal quantity … It cannot use its control over nominal quantities to peg a real quantity – the real rate of interest, the rate of unemployment,…"

- Friedman argued that if policy tried to keep output above its potential (equilibrium) level, then wage bargainers would get used to the higher level of inflation and adjust their wage demand upwards. The result would be higher inflation without the sustainable low unemployment.

Modifications of the Phillips Curve

- The Phillips curve augmented with expectations

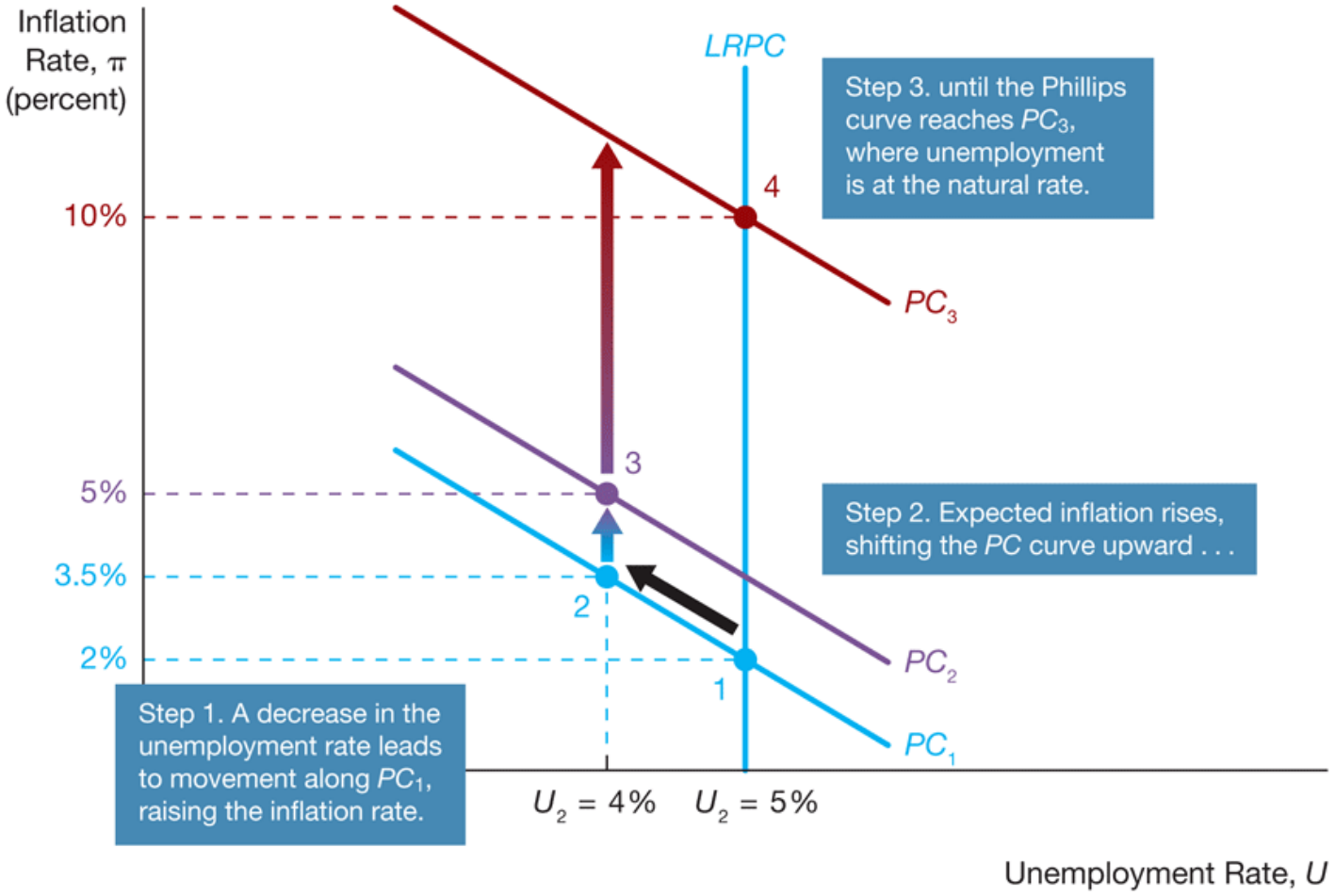
$$\pi_t = E_{t-1}\pi_t + \beta(u_t - u_n)$$

- Long-run unemployment will be at the natural level and expected inflation incline to actual inflation

$$\pi_t - E_{t-1}\pi_t = \epsilon_t$$

- Phillips curve is vertical at the natural rate of unemployment
- Under rational expectations, agents do not make systematic forecast mistakes

Figure: The Short- and Long-Run Phillips Curve



Three Important Conclusions

1. There is no long-run trade-off between unemployment and inflation

2. There is a short-run trade-off between unemployment and inflation

3. There are two types of Phillips curves, long run and short run

Modifications of the Phillips Curve

- Expectations augmented Phillips curve was extended with supply shocks.

$$\pi_t = E_{t-1}\pi_t + \beta(u_t - u_n) \; + \; \rho$$

The Short-Run Aggregate Supply Curve

- To complete our aggregate demand and supply model, we need to use our analysis of the Phillips curve to derive a short-run aggregate supply curve, which represents the relationship between the total quantity of output that firms are willing to produce and the inflation rate

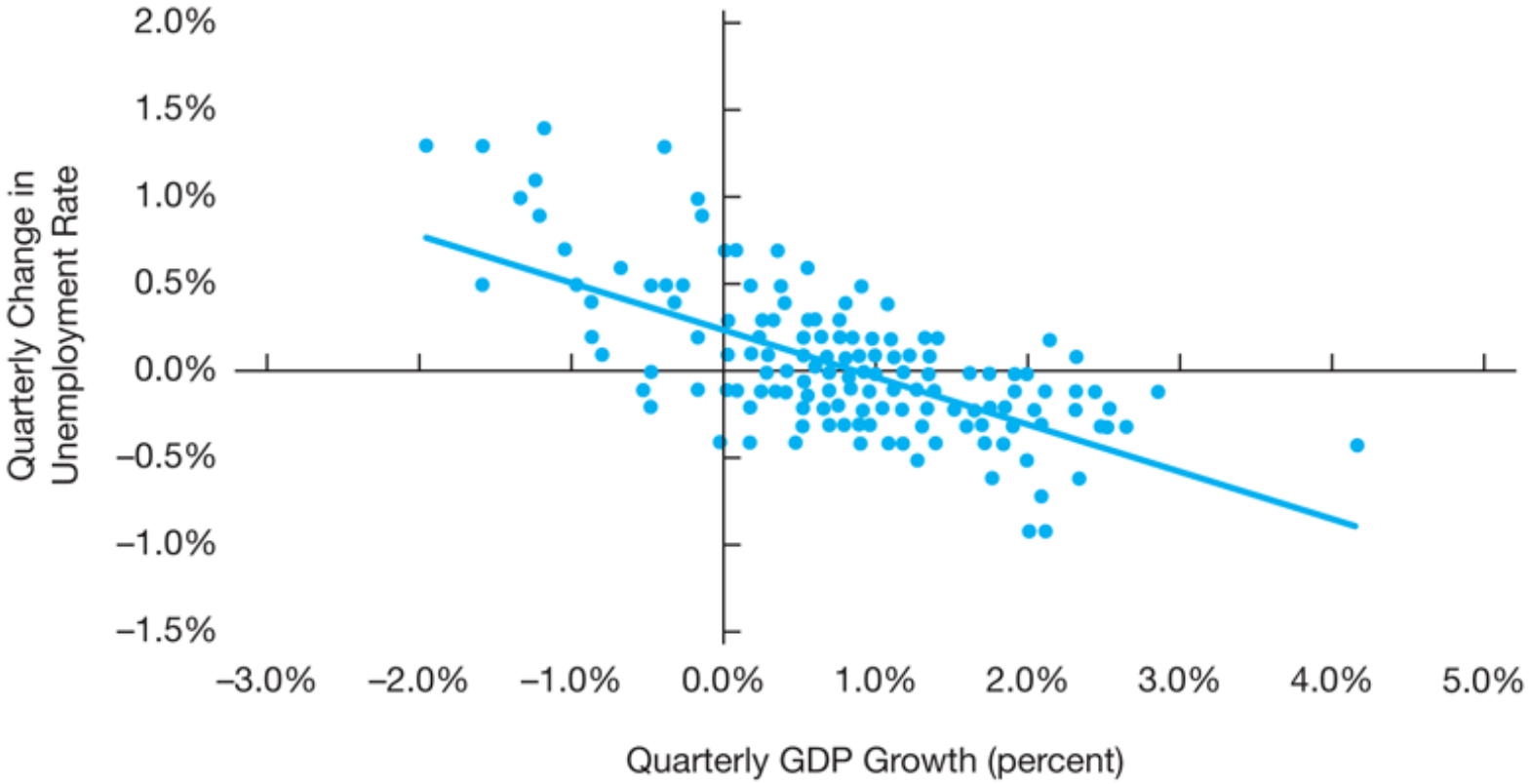
- We can translate the modern Phillips curve into a short-run aggregate supply curve by replacing the unemployment gap ($U - U^n$) with the *output gap*, the difference between output and potential output ($Y - Y^P$)

Okun's Law

- Okun's law describes the negative relationship between the unemployment gap and the output gap

- Okun's law states that for each percentage point that output is above potential, the unemployment rate is one-half of a percentage point below the natural rate of unemployment. Alternatively, for every percentage point that unemployment is above its natural rate, output is two percentage points below potential output

Figure: Okun's Law, 1960–2010



Source: Unemployment, quarterly, 1960–2010 and real GDP growth, quarterly, 1960–2010. Bureau of Labor Statistics and Bureau of Economic Analysis.

Modifications of the Phillips Curve

- A consequence of rational expectations together with instantaneous market clearing was that government fiscal or monetary policies could have no impact on output and employment. As Lucas suggested, monetary policy could have real effects only to the extent that its impact on prices was unanticipated.
- Perfectly foreseen changes in monetary policy would induce rational wage and price setters to instantaneously adjust wages and prices proportionally so as to leave output and employment constant.
- However, this policy ineffectiveness proposition conflicts with empirical evidence on the efficacy of monetary policies on real activity and with the aim of central bankers to affect economic outcomes.

The New Keynesian Phillips Curve

- Effects of a monetary policy shock:

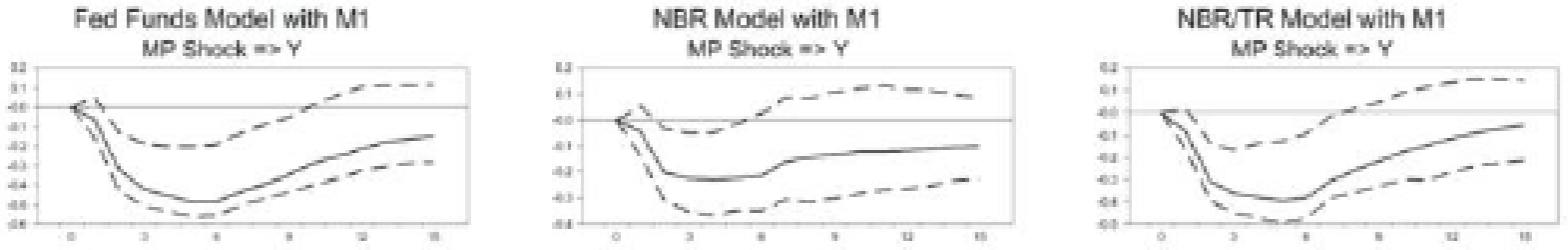


Figure: Source: Christiano, Eichenbaum and Evans (1997)

- Monetary policy decisions have relatively persistent real effects
- How can it be explained?

The New Keynesian Phillips Curve

- The New Keynesian Phillips Curve

$$\pi_t = \beta E_t \pi_{t+1} + \kappa \hat{x}_t$$

where $\hat{x}_t$ denotes the deviation of output from its steady state under flexible prices.

- Keynesian economists incorporated rational expectations and microeconomic justification (i.e. sticky prices) into their models having at least short-run effects.
- This modern approach featuring rational expectations and microfoundations is known as New Keynesian macroeconomics.

The New Keynesian Phillips Curve

- Ben Bernanke (10 July 2007):

"Undoubtedly, the state of inflation expectations greatly influences actual inflation and thus the central bank's ability to achieve price stability.“

- Jean-Claude Trichet (31 May 2010):

"Credibility is crucial for ensuring price stability. As long as inflation expectations remain well-anchored in line with our definition of price stability, long-term interest rates do not need to reflect the risks stemming from an uncertain inflationary process. In an environment in which the central bank fully preserves its credibility, economic agents do not need to try to anticipate uncertain inflationary developments, thus potentially fuelling inflationary pressures."