

Inflation and Unemployment

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Econ520

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Objectives

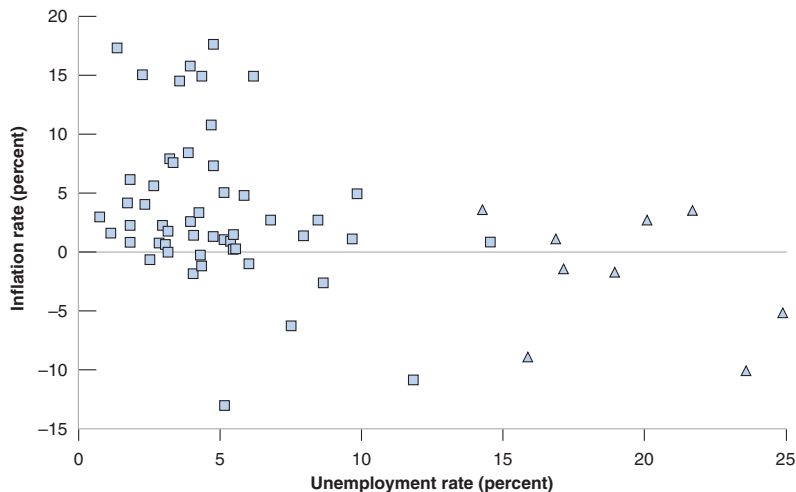
In this section you will learn:

1. how and when lax monetary policy reduces unemployment
2. how to derive and interpret the Phillips Curve
3. about the importance of expectations for monetary policy

The Question

- ▶ Monetary policy stimulates aggregate demand.
- ▶ Why not always use it gain more employment / output?
- ▶ Lax monetary policy creates inflation.
- ▶ Can we buy more employment with more inflation?

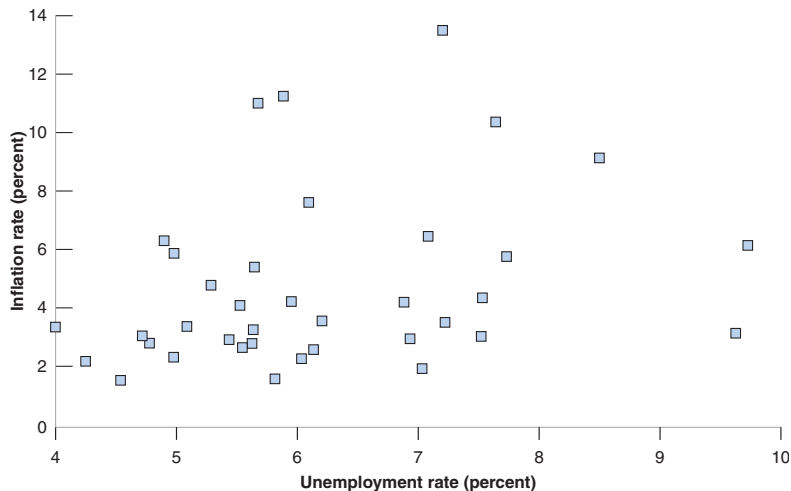
The Phillips Curve



Data: 1900-1960

High inflation - low unemployment

Modern Data



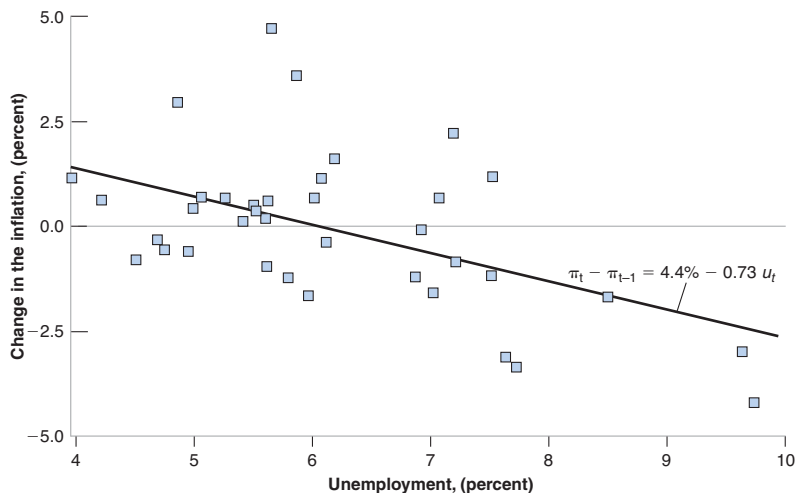
Data: 1970-2010

Breakdown of the Phillips Curve

Why Might the Phillips Curve Break Down?

- ▶ We know: monetary policy works only when not anticipated.
- ▶ AS/AD:
 - ▶ higher than expected inflation reduces real wages
 - ▶ but expectations eventually catch up with reality
- ▶ A new idea:
 - ▶ can we buy more output by **raising** inflation?

The New Phillips Curve



Data: 1970-2010

Rising inflation – low unemployment

Theory Underlying the Phillips Curve

Deriving the Phillips Curve

- ▶ Start from aggregate supply

$$P = P^e(1 + m)F(u, z) \quad (1)$$

- ▶ For simplicity impose

$$F(u, z) = 1 - \alpha u + z \quad (2)$$

- ▶ Then

$$P = P^e(1 + m)(1 - \alpha u + z) \quad (3)$$

- ▶ Some algebra yields (approximately)

$$\pi = \pi^e + (m + z) - \alpha u \quad (4)$$

- ▶ π : inflation rate

Derivation

- ▶ Add time subscripts and divide by P_{t-1} :

$$\frac{P_t}{P_{t-1}} = \frac{P_t^e}{P_{t-1}}(1+m)(1-\alpha u+z) \quad (5)$$

- ▶ Inflation: $\pi_t = P_t/P_{t-1} - 1$. So

$$1 + \pi_t = (1 + \pi_t^e)(1+m)(1-\alpha u+z) \quad (6)$$

- ▶ Approximately

$$(1+m)(1-\alpha u+z) \simeq 1+m-\alpha u+z \quad (7)$$

- ▶ Approximately

$$(1 + \pi_t^e)(1+m-\alpha u+z) \simeq 1 + \pi_t^e + m + z - \alpha u \quad (8)$$

Implications

$$\pi = \pi^e + (m + z) - \alpha u \quad (9)$$

1. $\pi^e \uparrow \implies \pi \uparrow$

Intuition:

2. $m \uparrow \implies \pi \uparrow$

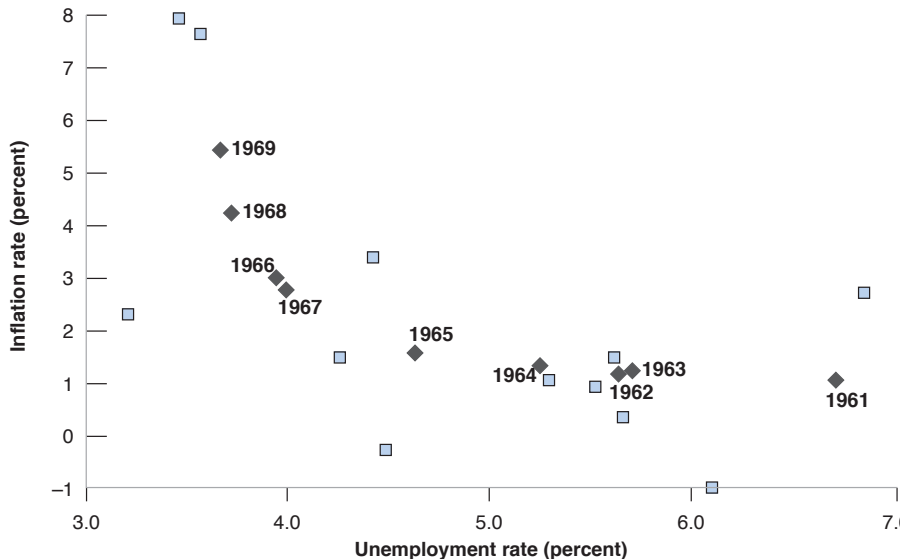
Intuition:

3. $u \uparrow \implies \pi \downarrow$

Intuition:

The Phillips Curve Through Time

The 1950s and 60s



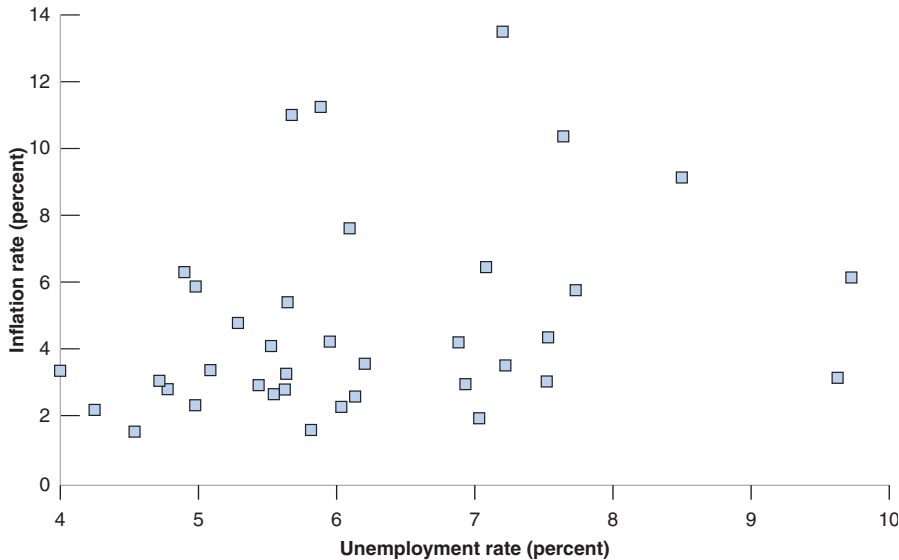
The economy moves up along a stable Phillips Curve

Interpretation

- ▶ Inflation had been stable for a long time
- ▶ π^e remained roughly fixed
- ▶ Then the original Phillips curve emerges

$$\pi = \underbrace{\pi^e}_{\text{fixed}} + (m + z) - \alpha u \quad (10)$$

The 1970s and Beyond

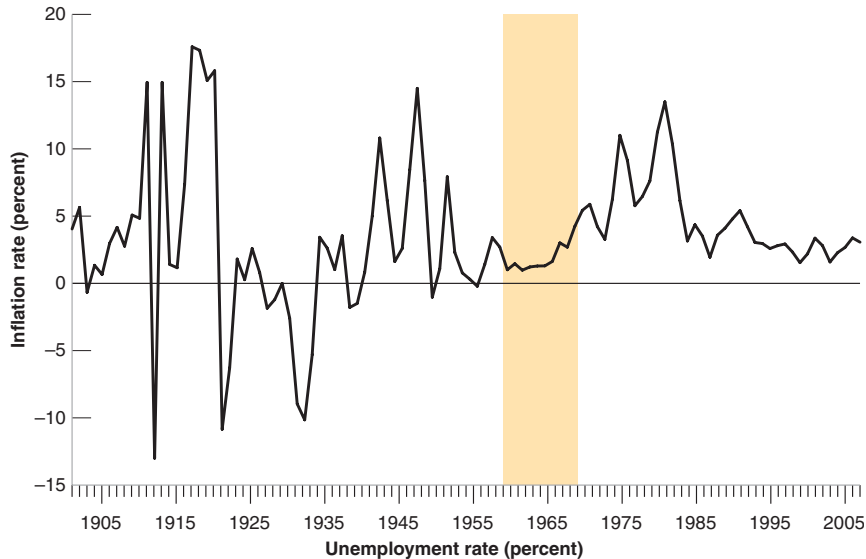


No relationship between inflation and unemployment

Interpretation

- ▶ A change in inflation expectations.
- ▶ Before the 1960s: inflation fluctuated around 0
 - ▶ little persistence
- ▶ It was reasonable to expect roughly zero inflation
- ▶ After 1960s: inflation was generally positive
 - ▶ strong persistence
- ▶ Zero inflation would have been a poor forecast

Inflation Rates



Modified Phillips Curve

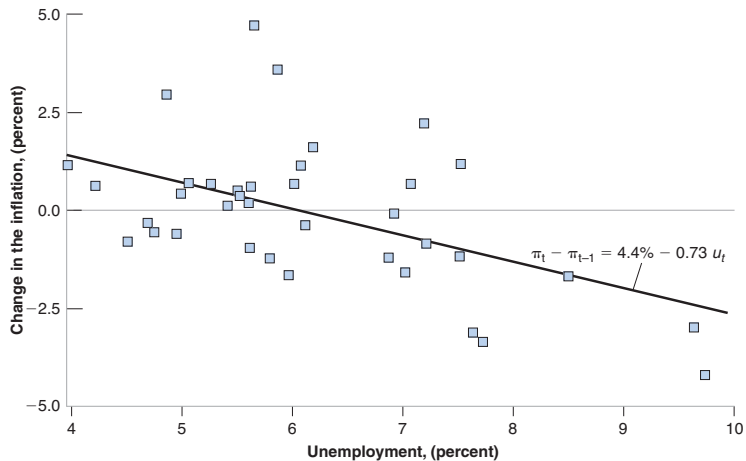
- ▶ Assume that agents form expectations according to

$$\pi_t^e = \theta \pi_{t-1} \quad (11)$$

- ▶ Of course, one could do better than that...
- ▶ A coarse approximation:
 - ▶ 1960s: $\theta = 0$
 - ▶ 1970s: $\theta = 1$
- ▶ Modified Phillips Curve

$$\pi_t - \pi_{t-1} = (m + z) - \alpha u_t \quad (12)$$

Modified Phillips Curve



Implications

- ▶ Original Phillips Curve:
 - ▶ government can buy lower unemployment by raising inflation
 - ▶ intuition: wage setters never catch on to the fact that tomorrow's prices will be higher than today's
- ▶ Modified Phillips Curve:
 - ▶ government can buy lower unemployment by raising inflation over time
 - ▶ intuition: wage setters never catch on to the fact that tomorrow's inflation will be higher than today's
- ▶ Clearly, this can't work either (at least not forever)

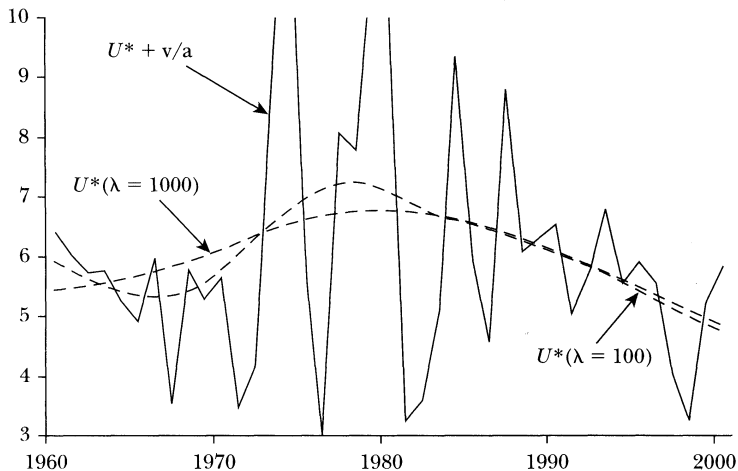
NAIRU and Policy

NAIRU

- ▶ If the modified PC is correct, there is one unemployment rate that is consistent with constant inflation (at any level)
- ▶ NAIRU: “Non-accelerating inflation rate of unemployment”
 - ▶ the point where the PC crosses 0
- ▶ In the US: about 6%
 - ▶ but with major fluctuations over time

NAIRU Fluctuations

Time Varying NAIRUs, 1960–2000



Source: ?

Money Is Neutral

- ▶ In the medium run:

$$\pi = \pi^e \xRightarrow{\text{Phillips Curve}} u = u_n \xRightarrow{\text{Technology}} Y = Y_n \quad (13)$$

- ▶ Aggregate demand:

$$Y_n = Y(M/P, G, T) \quad (14)$$

fixes M/P

- ▶ Money is neutral:

Doubling $M \implies$ doubling P with no change in Y .

- ▶ $\pi = g(P) = g(M)$

“Inflation is always and everywhere a monetary phenomenon.”

– Friedman

Policy Implications

- ▶ Can governments exploit the Phillips Curve?
- ▶ For money to be non-neutral, inflation must be **unexpected**.
- ▶ This is the key difficulty of monetary policy.
- ▶ Simply raising inflation every year cannot work.

Policy Implications

- ▶ Disinflation need to cause a major recession
- ▶ The key is to be credible
- ▶ Examples:
 - ▶ Germany after WW2

Persistent Inflation Erodes Monetary Policy

- ▶ In countries with high inflation, wages are indexed to inflation
- ▶ Higher inflation does not erode real wages as much
 - ▶ and has smaller effects on real variables

A simple model of wage indexation

- ▶ fraction λ of wage contracts are indexed
- ▶ they set prices as if $\pi^e = \pi$
- ▶ PC:

$$\pi_t = [\lambda \pi_t + (1 - \lambda) \pi_{t-1}] - \alpha(u_t - u_n) \quad (15)$$

- ▶ Solve:

$$\pi_t - \pi_{t-1} = -\frac{\alpha}{1 - \lambda}(u_t - u_n) \quad (16)$$

- ▶ Higher $\lambda \implies$ smaller effect of inflation on unemployment.

Caveats

- ▶ The parameters of the Phillips Curve are not fixed.
- ▶ Labor market policies affect m and z
 - ▶ see our discussion of European unemployment
- ▶ Cost shocks affect m

Reading

Text: ?, ch 8

On NAIRU: ?

References I