Lecture 18

The Phillips Curve

Evaluating short run inflation/unemployment dynamics

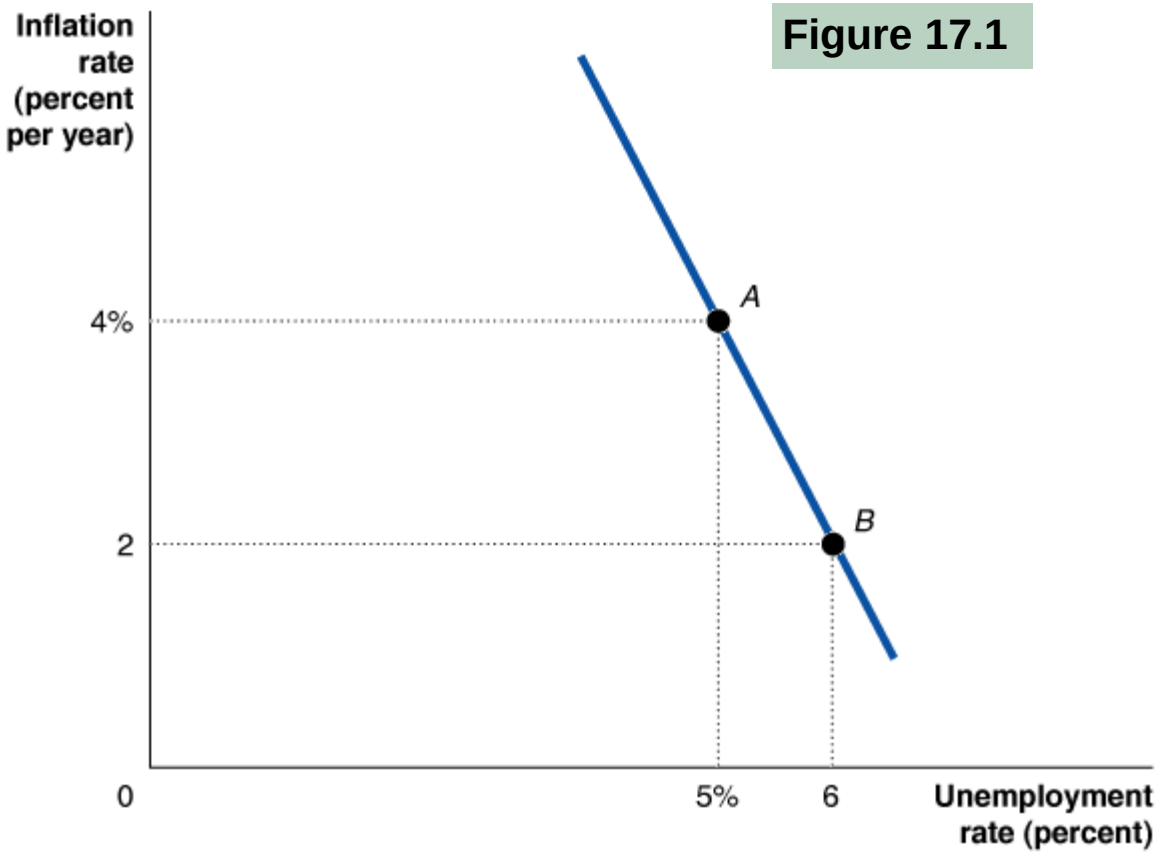
October 16th, 2019

Unemployment and inflation

The two great macroeconomic problems that the Fed deals with (in the short run) are unemployment and inflation.

The ***Phillips curve***, after economist A.W. Phillips.

Phillips curve: The short-run relationship between the unemployment rate and the inflation rate.



Why should a very low unemployment rate lead to an acceleration for price increases?

When there are very few unemployed workers, EMPLOYERS must compete to fill empty job slots.

If I am forced to pay more to my workers, over time, I will try and raise the prices of my products, to protect my profits

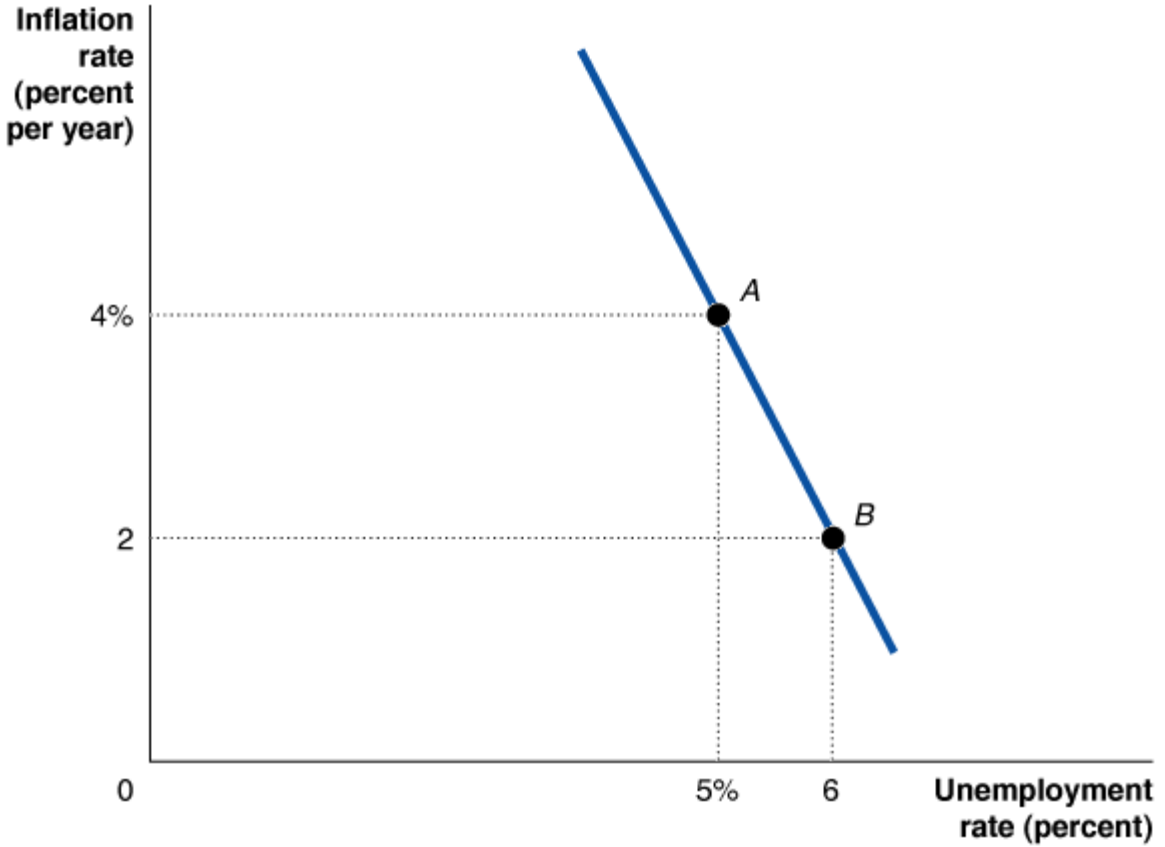
(That is not strictly true, if my workers are more productive, I can raise their hourly wage, as they raise their output per hour, and preserve my profit rate. More on that later)

Is the Phillips curve a policy menu?

During the 1960s, some economists argued that the Phillips curve was a ***structural relationship***: a relationship that depends on the basic behavior of consumers and firms, and that remains unchanged over long period.

If this was true, policy-makers could *choose* a point on the curve.

Not so: allowing more inflation *doesn't* lead to permanently lower unemployment.



The long-run Phillips curve

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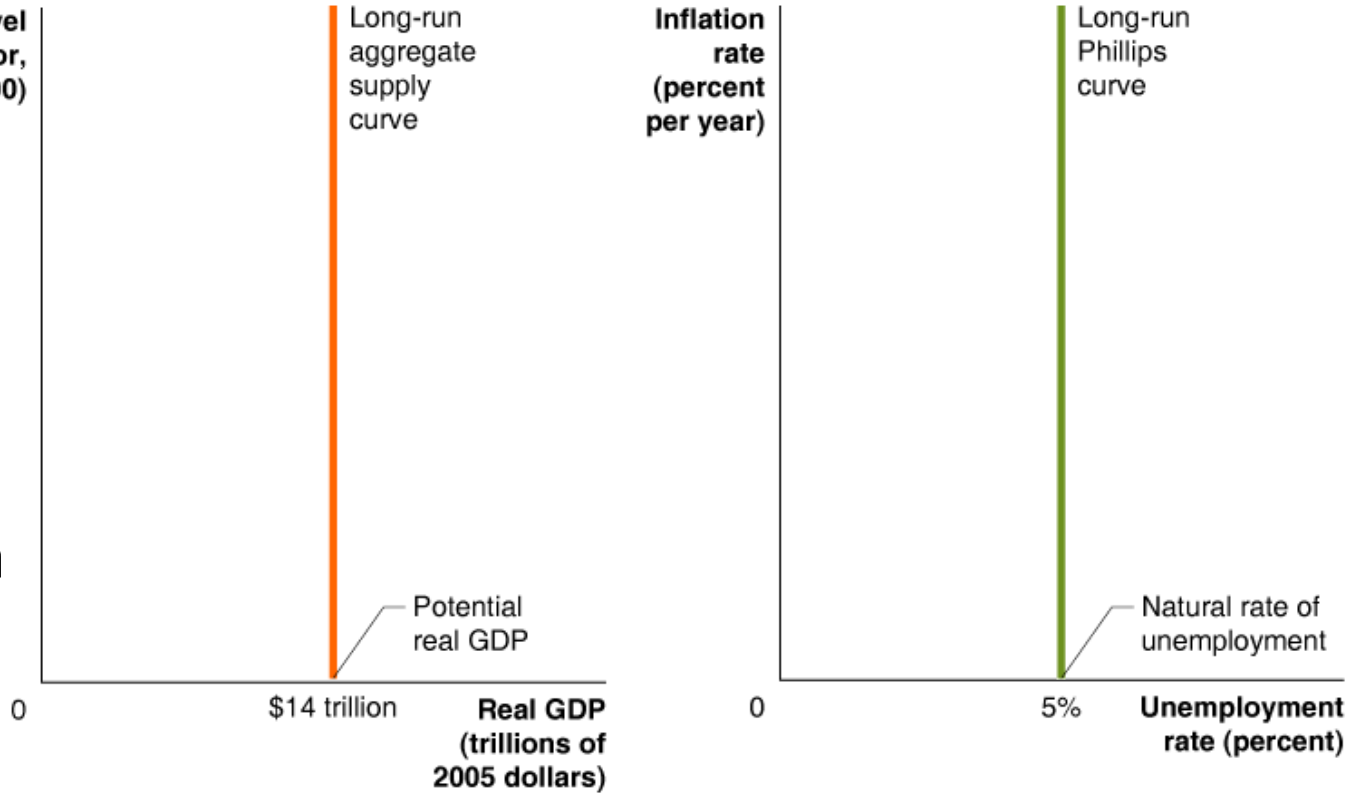
A vertical long-run AS curve.

Compatible to a vertical long-run Phillips curve.



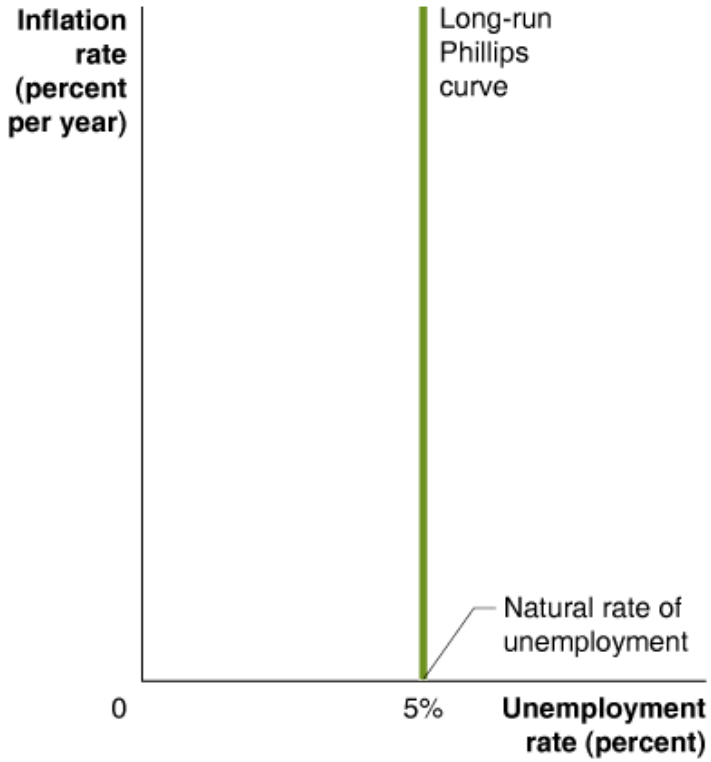
In the long run, employment is determined by output, which in the long run does not depend on the price level.

Natural rate of unemployment

Since employment was determined by potential GDP, so must be unemployment.

When Unemployment is at the ***natural rate***, output equals potential GDP.

At this output level, there is no cyclical unemployment, only *structural* and *frictional unemployment.*



Natural rate of unemployment: The unemployment rate that exists when the economy is at potential GDP.

The Natural Rate of Unemployment: The optimal level of joblessness in an economy

Recall: There are 3 kinds of unemployment:

frictional: *the fact that people change jobs results in some unemployment*

structural: *some people have skills that don't match any available jobs*

cyclical: *when the economy is operating below full potential, willing workers can't find work.*

Dynamic Inference: Long Term sustainable growth

Potential GDP grows over time.

LTSG = %Δ LF + %Δ LP

LTSG is the speed limit for economic growth.

monetary policy cannot produce faster growth for LF or LP.

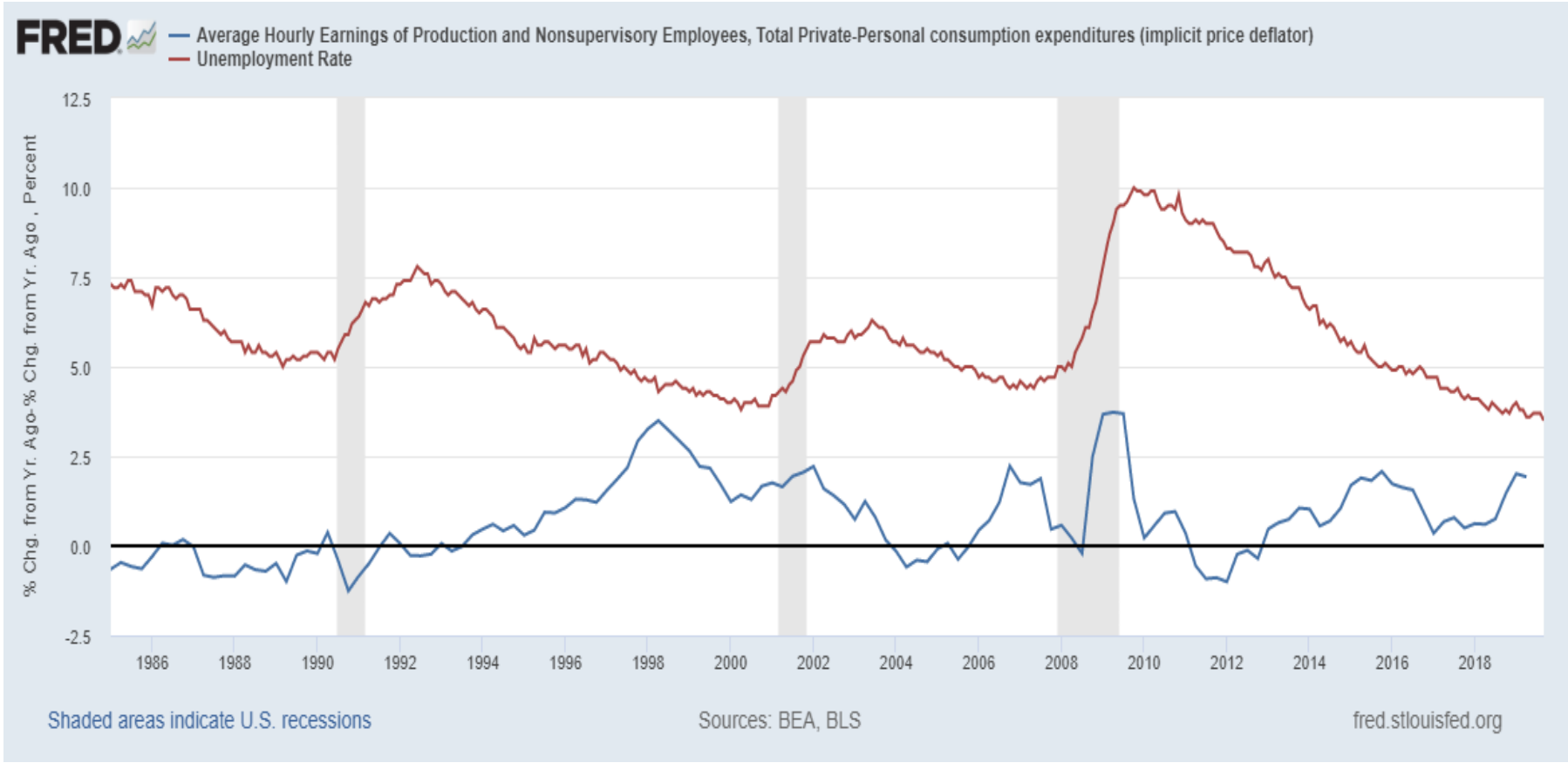
The Natural Rate of Unemployment: it is not a FIRM NUMBER, our guesses about its level change overtime

Economists today are unclear about the natural rate, but many posit that 4% to 4.5% is a reasonable guesstimate for the natural rate of unemployment.

If that is right, today's 3.5% U3 rate suggests it would be unwise to pursue a policy that took the U3 rate sharply lower.

(Why the confusion? The LFPR remains depressed. Hourly wage rate increases have done little. So there is some case to be made that slack remains (LFPR) and there is no evidence of accelerating wage or price pressures, as of 9/2019)

We can try and define U*, by looking at what level for U, is associated with an acceleration for real hourly wage increases.
(Data from 1985 through 9/2019)



The Natural Rate of Unemployment: What happens to an Economy that operates below the natural rate?

When the economy is below the natural rate of unemployment there is great competition for workers:

too many jobs for too few workers

Firms bid up the price of workers—wage rates—and soon find they need to raise prices to cover their higher labor costs

soon wages and prices are rising rapidly

When is it safe to exceed the LTSG speed limit?

When U is very high, the economy can safely grow FASTER than the LTSG pace.

Why? Economic growth produces jobs for both new entrants to the labor force and the cyclically unemployed members of the labor force.

The Phillips curves in the 1960s

Throughout the early 1960s, inflation was low—about 1.5%.

Monetary and fiscal policy were stimulative.

Firms and workers expected 1.5% inflation.

Instead, inflation rose and joblessness fell.

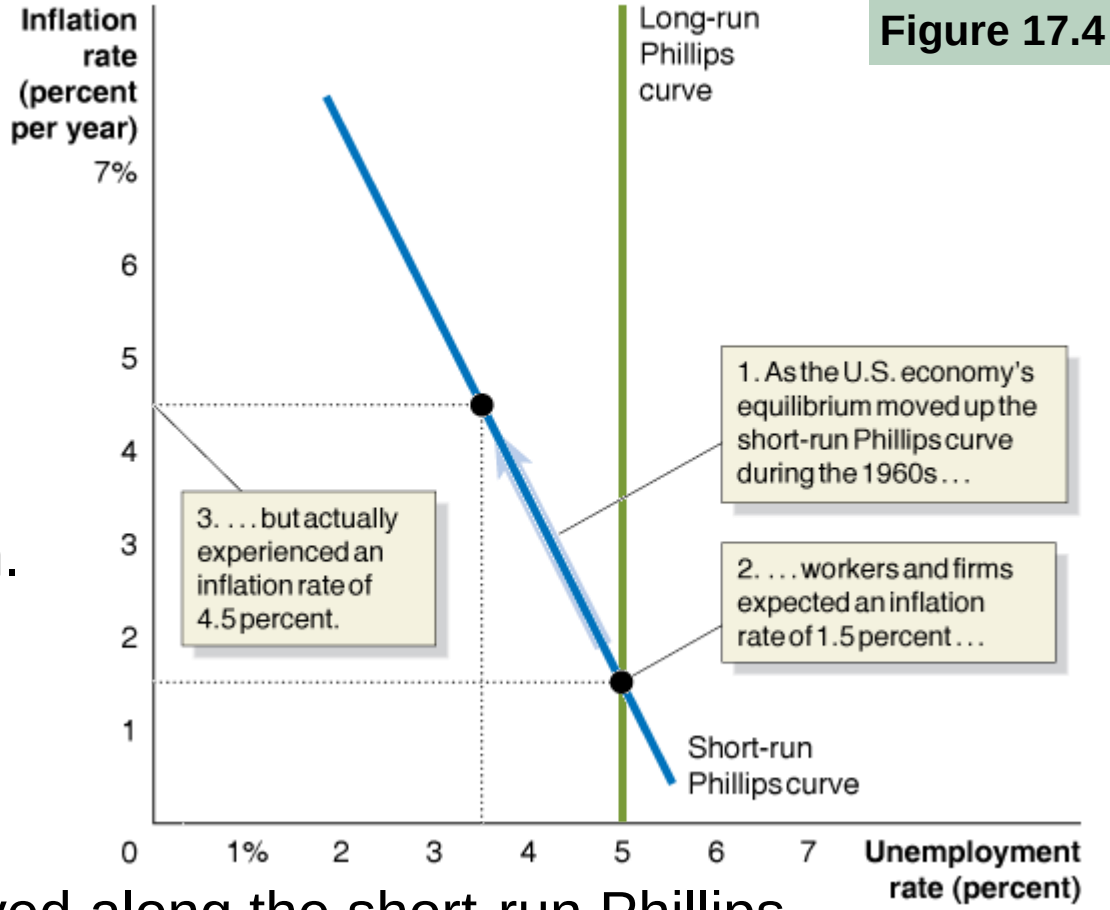


Figure 17.4

Thus the economy moved along the short-run Phillips curve, unemployment fell to 3.5%, as inflation climbed to 4.5%

Shifts in the short-run Phillips curve

Firms and workers then adjusted expectations accepting that inflation was 4.5%.

When the Fed tightened, driving U

to 6%, inflation fell, but only to 3%.

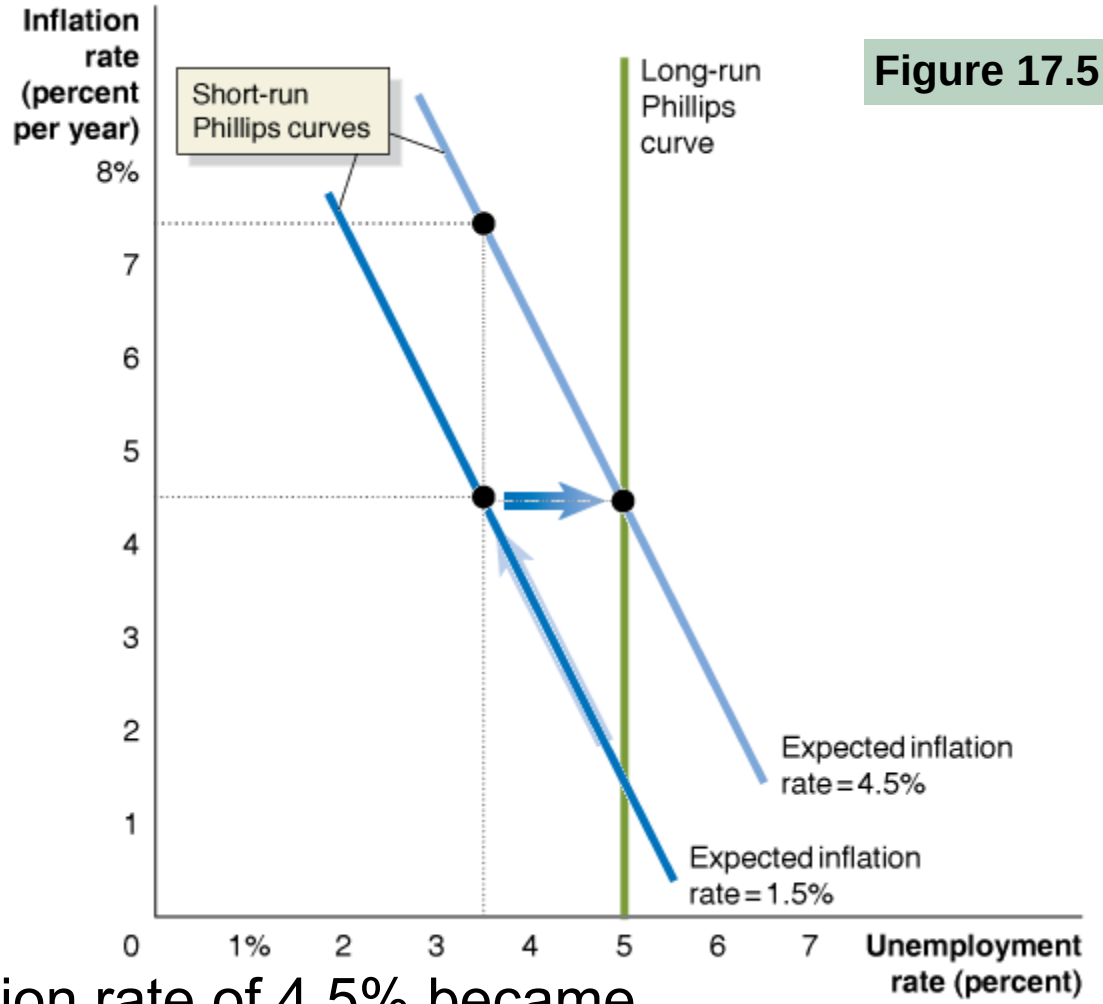


Figure 17.5

The "new normal" inflation rate of 4.5% became *embedded* in the economy, in the form of the short-run Phillips curve shifting to the right. 3.5% unemployment would require *another* unexpected increase in the rate of inflation.

Can we write a formula for the Short Run Phillips curve?

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

inflation in period t

= expected inflation in period t-1 plus alpha times the deviation of unemployment from NAIRU

Note: π_e can be greatly influenced by π_{t-1}

What does our simple Phillips curve formula reveal about inflation and unemployment?
If U is Below NAIRU? We get accelerating inflation

Note: we assume that $\pi_e = \pi_{t-1}$

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

assume $\alpha = 0.5$

Phillips Curve π PREDICTION	EXPECTED π	JOBLESS RATE	NAIRU	JOBS GAP
2	2	4.5	4.5	0
2.5	2	3.5	4.5	1
3.25	2.5	3.0	4.5	1.5
3.75	3.25	3.5	4.5	1

Note our simple Phillips curve formula is profoundly influenced by our opinions about the level for NAIRU, and the value FOR α. *Note: we assume that $\pi_e = \pi_{t-1}$*

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

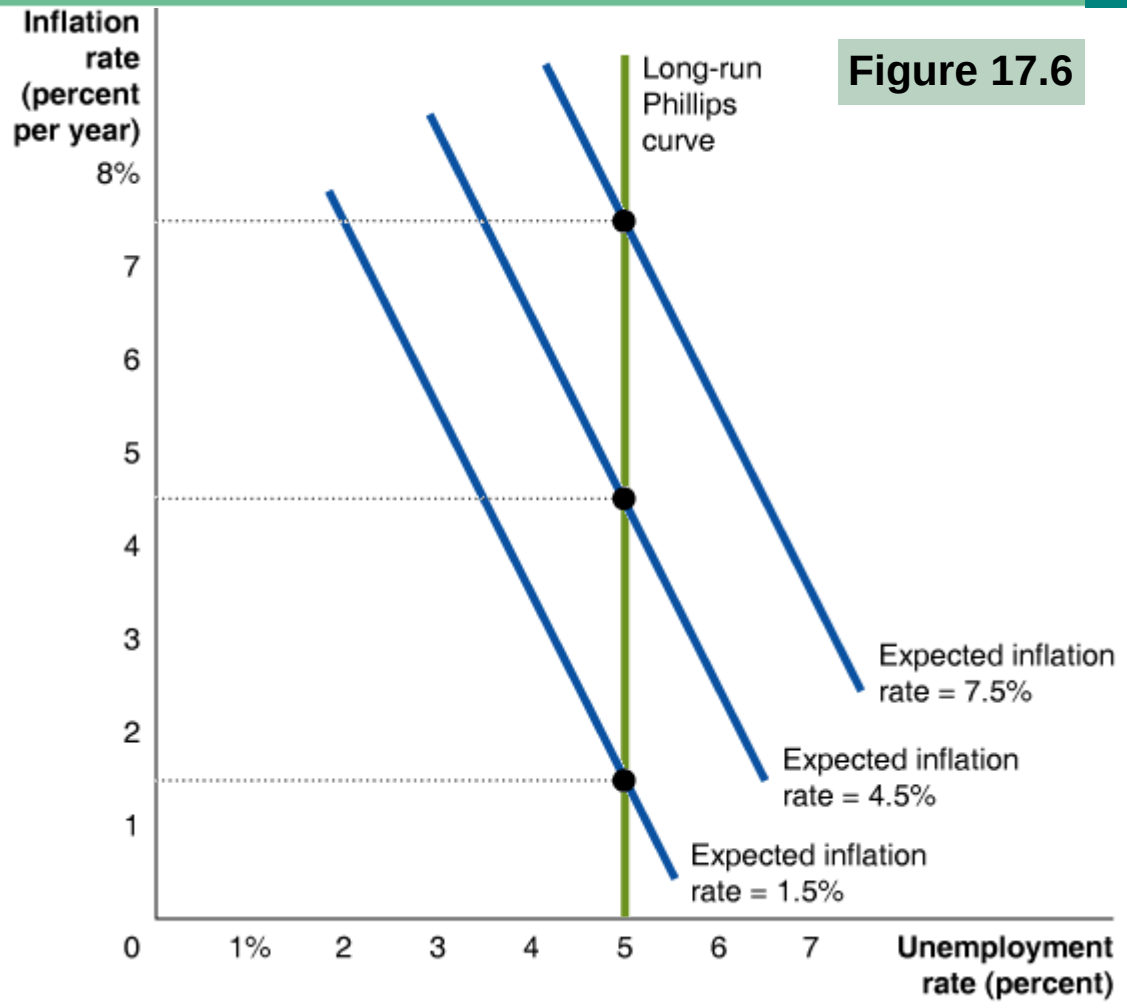
assume α = 0.1

Phillips Curve π Prediction	Expected π	Jobless Rate	NAIRU	jobs gap
2	2	4.5	4.5	0
2.1	2	3.5	4.5	1
2.3	2.1	2.5	4.5	2
2.5	2.3	3.0	4.5	1.5

A short-run Phillips curve for every inflation rate

Each expected inflation rate generates a different short-run Phillips curve.

In each case, when the inflation rate is actually at the expected level, the unemployment level is at its natural rate—i.e. the long-run Phillips curve.

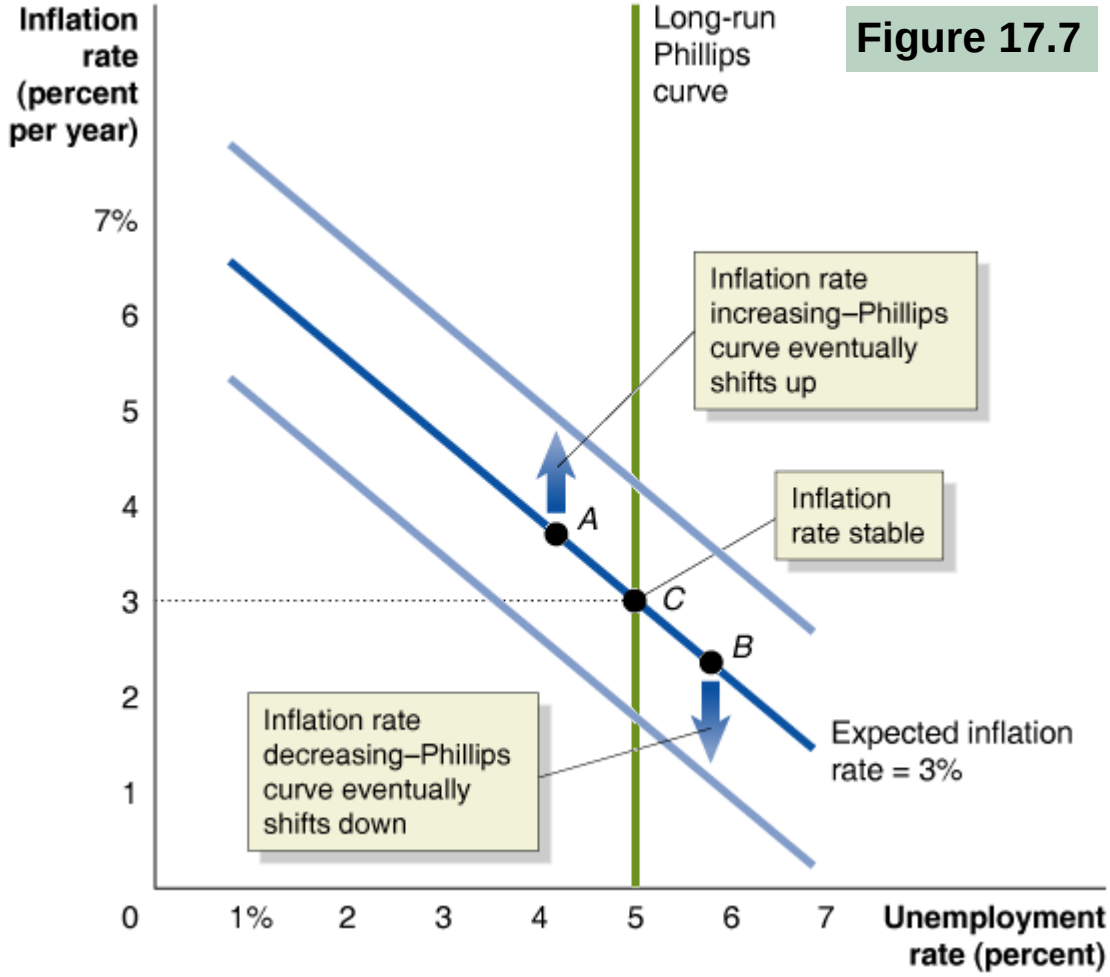


Implications for monetary policy

By the 1970s, most economists agreed that the long-run Phillips curve was vertical; so it was *not* possible to "buy" a permanently lower unemployment rate at the cost of permanently higher inflation.

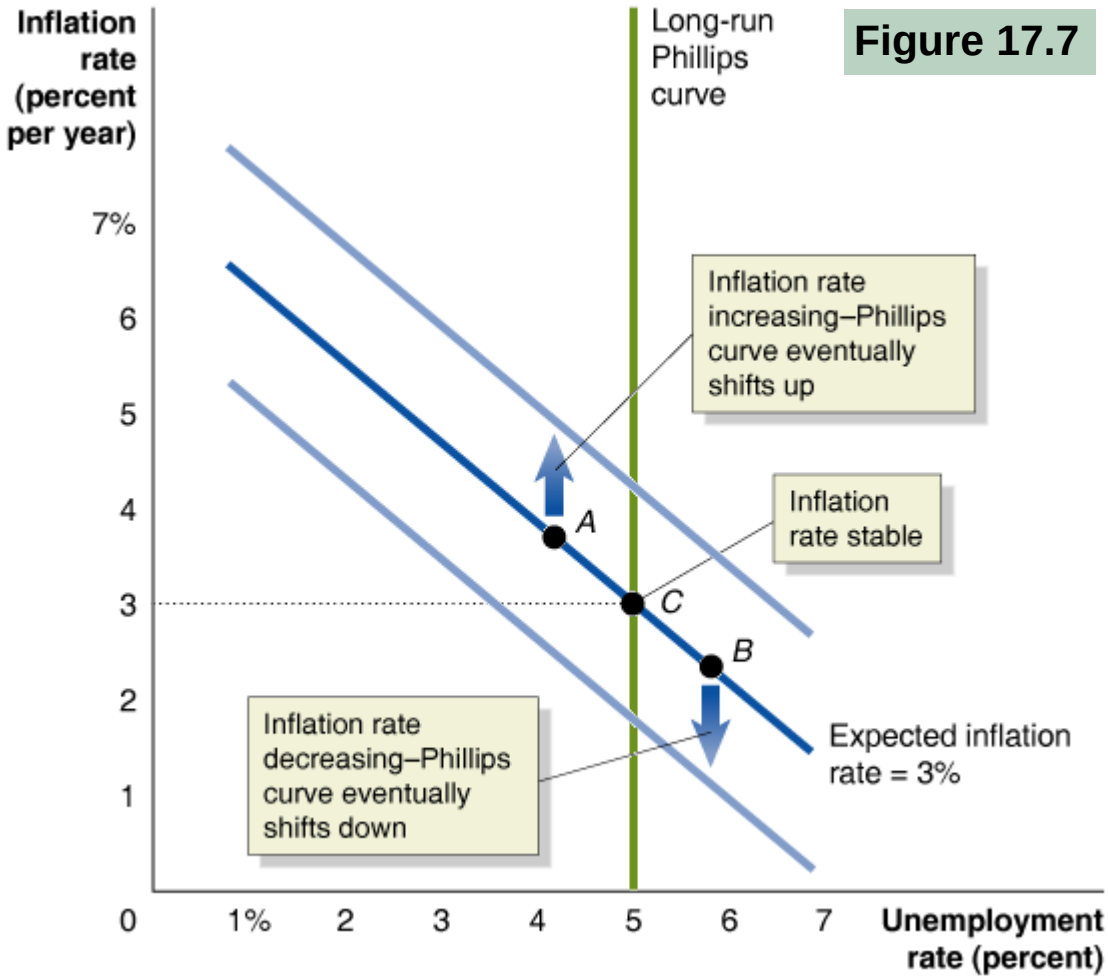
To keep U lower than U*, the Fed would need to accept continually increasing inflation.

The Fed could decrease inflation, by temporarily raising U above U*.

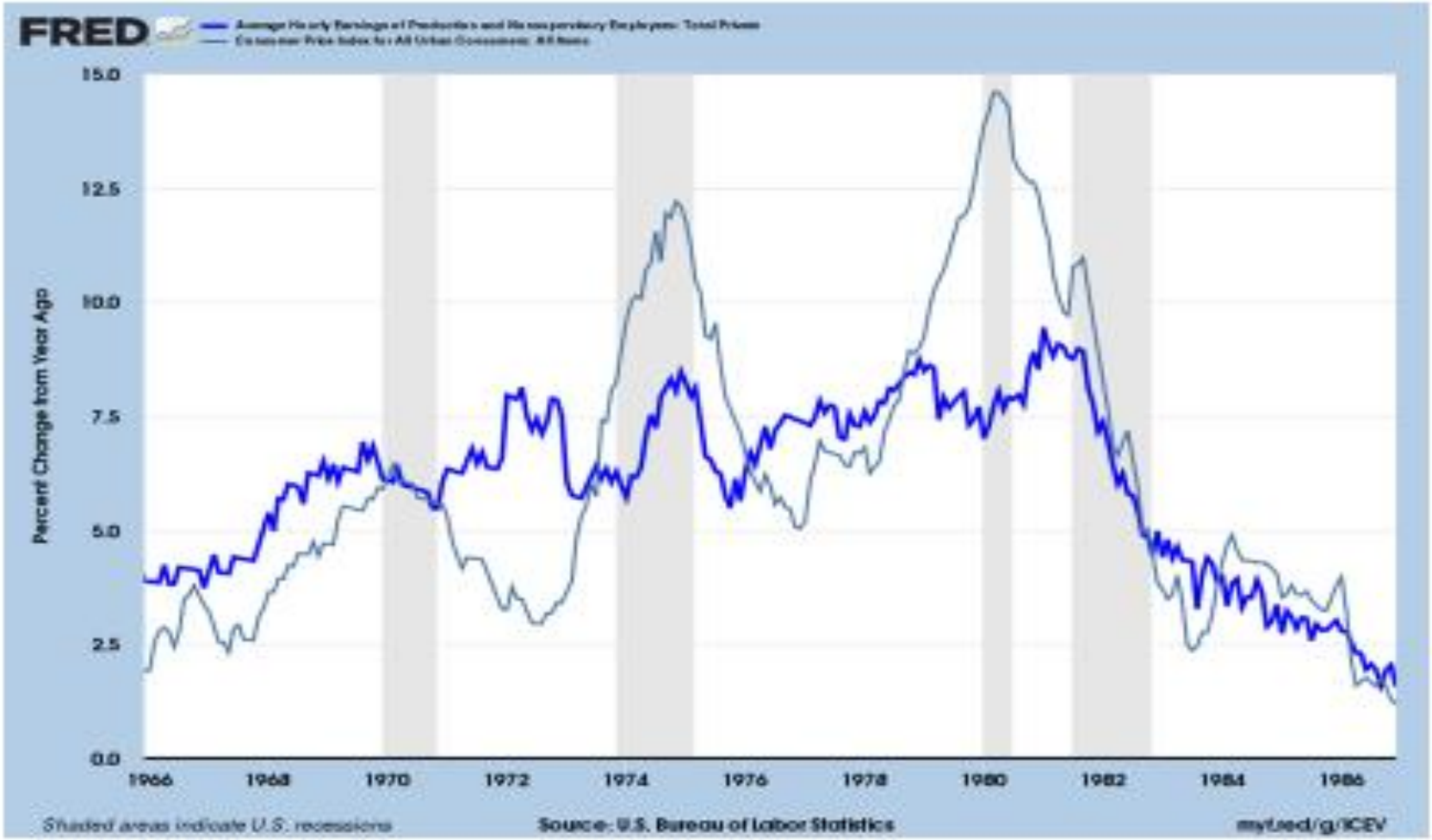


Non-accelerating inflation rate of unemployment

Since any rate of unemployment other than the natural rate results in the rate of inflation increasing or decreasing, the natural rate of unemployment is sometimes referred to as the ***non-accelerating inflation rate of unemployment***, or NAIRU.



The Great Inflation:



High inflation: must it continue?

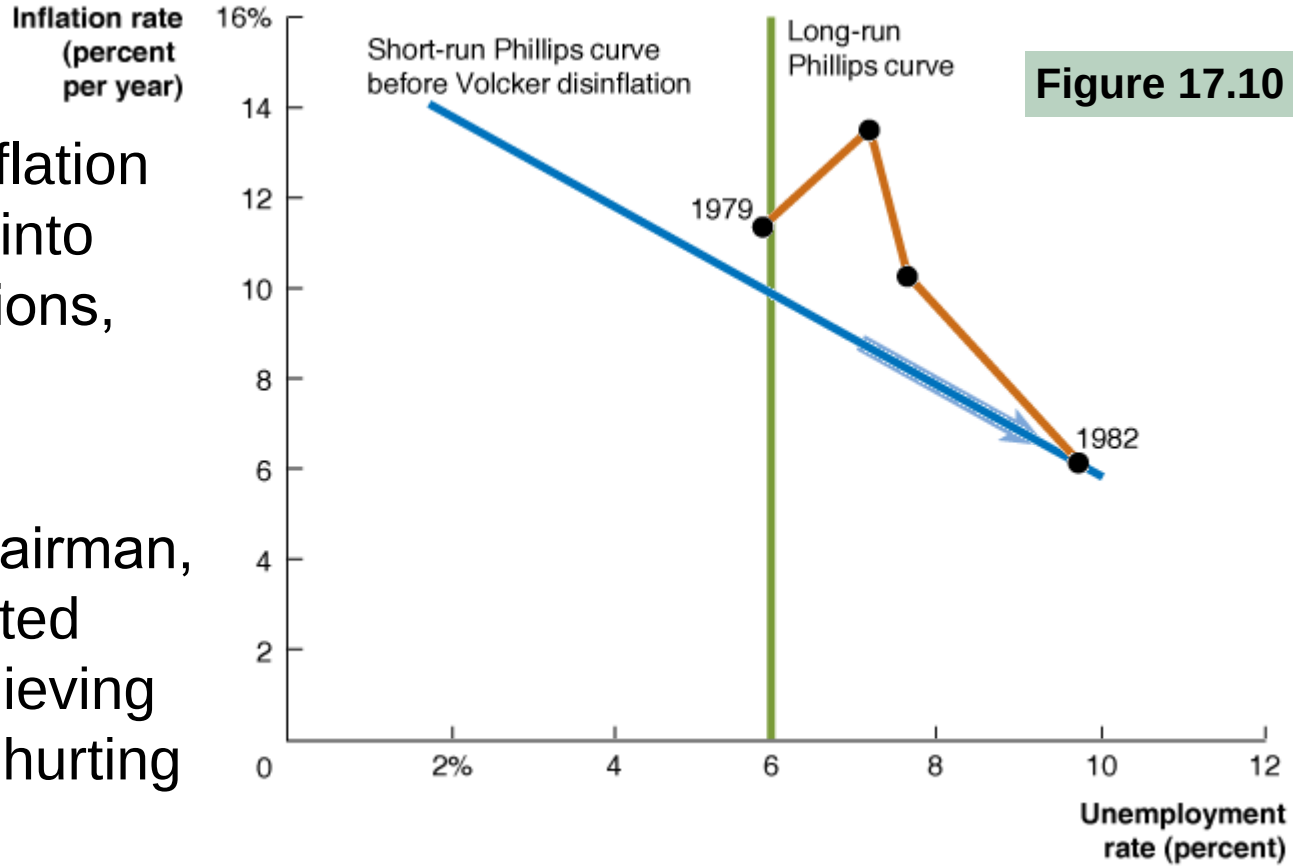


Figure 17.10

The newly high inflation was incorporated into people's expectations, and became self-reinforcing.

The Fed's new chairman, Paul Volcker, wanted inflation lower, believing high inflation was hurting the economy.

So Volcker announced and enacted a contractionary monetary policy. If people believed the announcement, they would adjust down to a lower Phillips curve.

But for several years, the Phillips curve appeared not to move.

Did rational expectations fail?

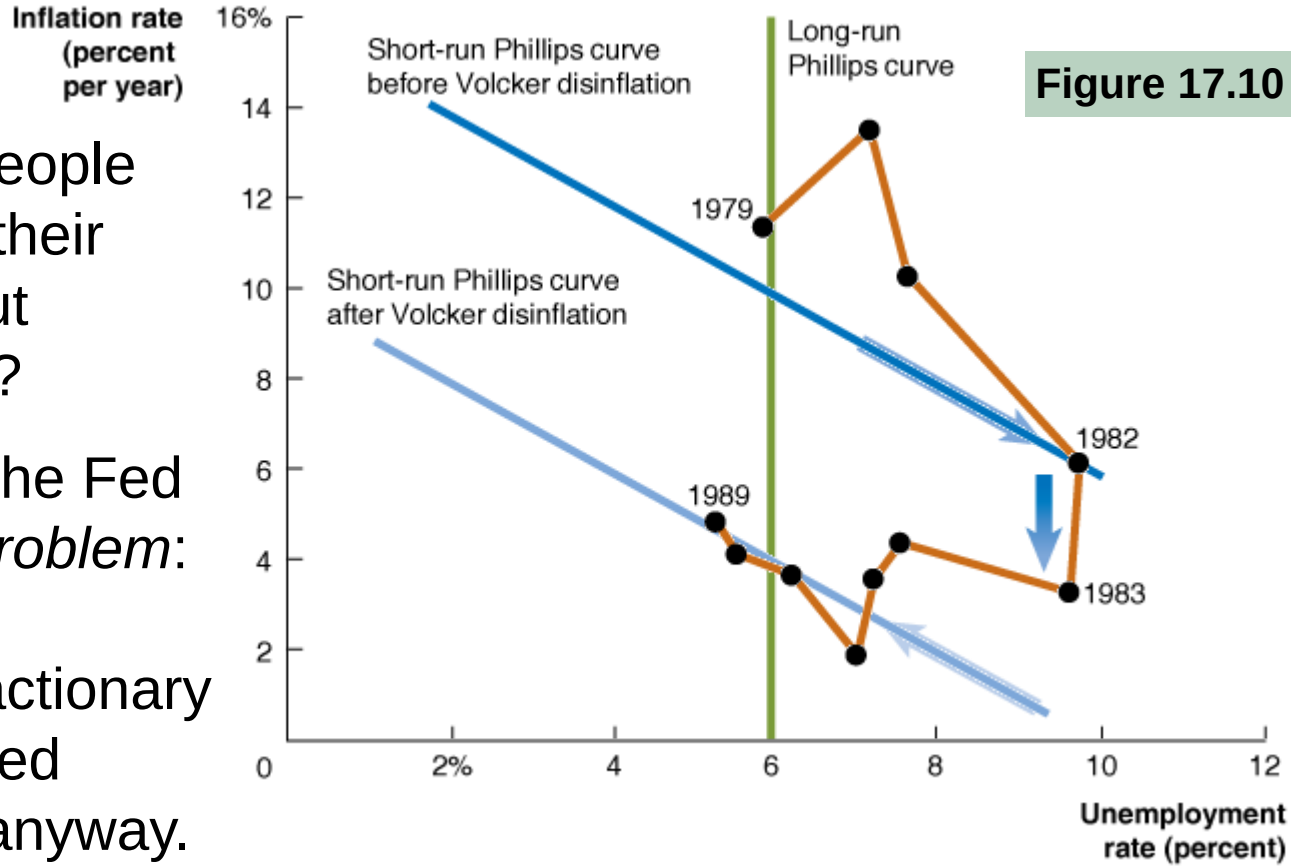


Figure 17.10

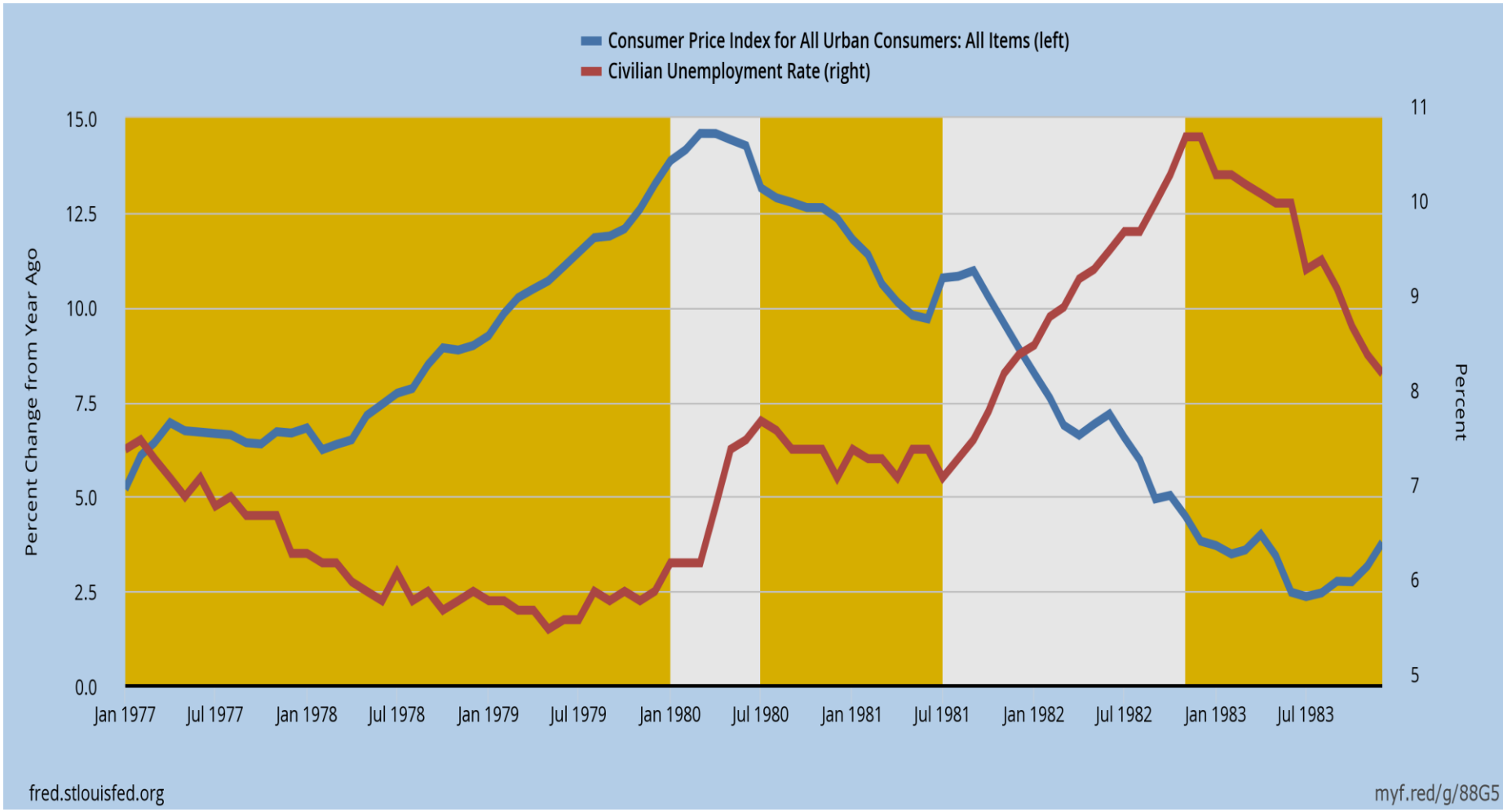
Does this prove people were not forming their expectations about inflation rationally?

Not necessarily. The Fed had a *credibility problem*: it had previously announced contractionary policies, but allowed inflation to occur anyway.

Eventually, several years of *tight money* convinced people that inflation would be lower.

Prices fell, and so did expectations about inflation: a new, lower short-run Phillips curve.

Rational Expectations OR
A Brutal Demonstration of the Phillips Curve At Work



Brutal Real Economy Effects Dominate Expectations as Volcker Triumphed Over Inflation in the early 1980s

Hubbard States:

'So Volcker announced and enacted a contractionary monetary policy. If people believed the announcement, they would adjust down to a lower Phillips curve.'

'Eventually, several years of tight money convinced people that inflation would be lower.'

SEVERAL YEARS OF TIGHT MONEY : a Euphemism. Super tight money (super high interest rates)

PRODUCED BACK TO BACK RECESSIONS AND A RISE TO NEAR 11% FOR JOBLESSNESS.

THE PHILLIPS CURVE EXPLAINS THE FALL FOR INFLATION: CREDIBILITY WAS VERY HARD TO EARN

Let's restate the formula for the Phillips curve?

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

inflation in period t

= expected inflation plus alpha times the deviation of unemployment from NAIRU

Can we EXERCISE OUR Phillips curve FORMULA?

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

Let π_e *= last year's inflation rate (overstates the case for no rational expectations)*

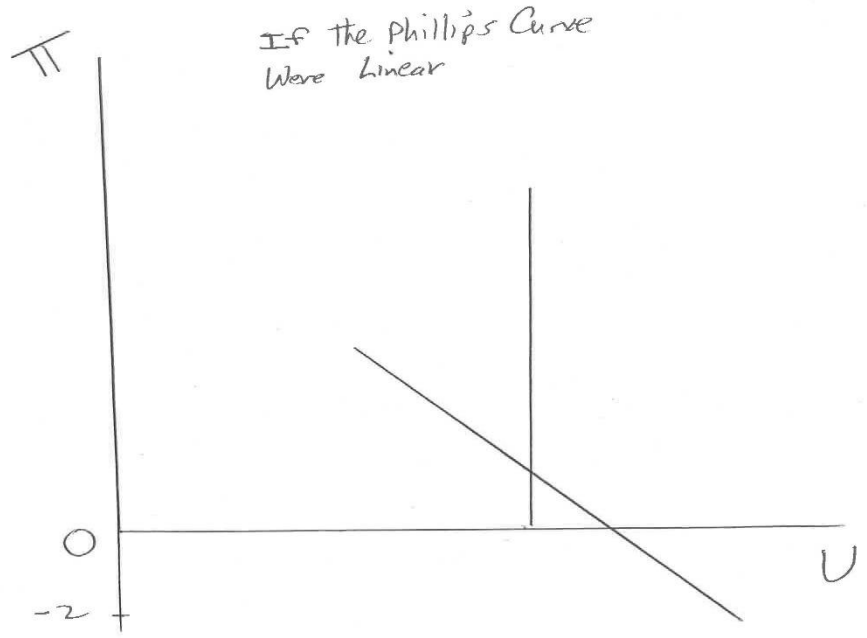
$$\pi_e = \pi_{t-1}$$

Let $\alpha = 1.4$

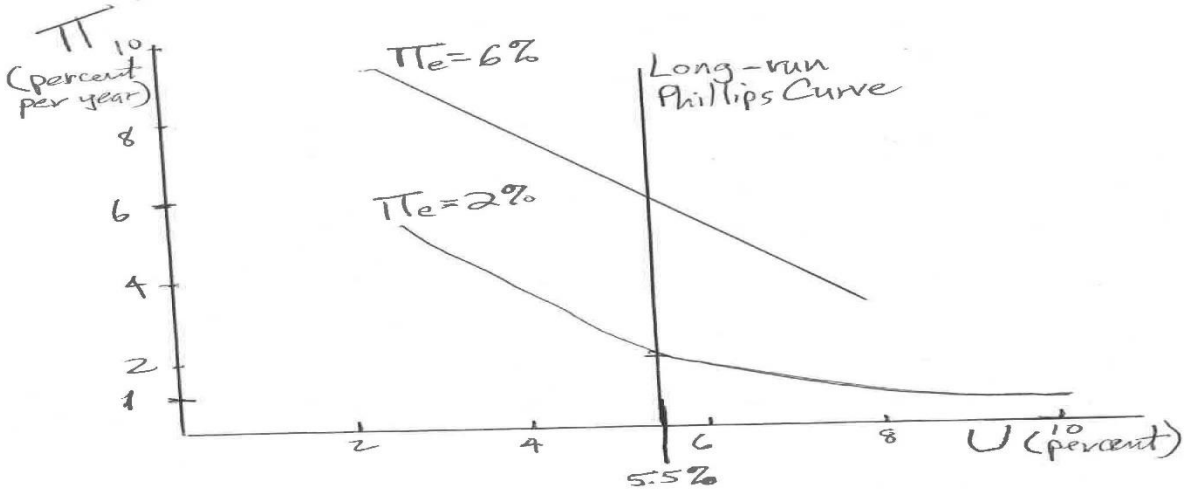
Now lets use the formula to try and predict the disinflation during the back-to-back Volcker Recessions

t	π_t	U*	U_t	π_e	π_f
1978	9.5	6.5	6.0		
1979	13.3	6.5	6.0	9.5	10.2
1980	12.5	6.5	7.4	13.3	12.0
1981	8.9	6.5	8.2	12.5	10.1
1982	3.8	6.5	10.7	8.9	3.0

Life is not so simple as we approach zero:
WE WROTE A LINEAR EQUATION:
AT HIGH INFLATION RATES THIS WORKED



The Zero Bound is a problem for disinflation and Phillips curves as well.



THE GREAT RECESSION DROVE JOBLESS RATES TO VERY HIGH LEVELS. BUT INFLATION DID NOT FALL BELOW ZERO: CONSIDER THE ITALIAN EXPERIENCE

Italy	2008	2009	2010	2011	2012	2013	2014
jobless rate	6.8	8.3	8.2	9.5	11.4	12.4	12.3
hourly earnings*	4.0	2.8	1.7	1.4	1.7	1.4	1.1
*(YOY, percent change)							

Imagine Italy had a linear Phillips Curve. Suppose U = 8%, and α = 0.75, due to frictions where should inflation be, in 2014?*

Six year of a jobless rate that averaged 10%

$$\pi_t = \pi_e + \alpha(U^* - U_t)$$

$$\pi_{2009} = 4.0\% + 0.5 \text{ X } (8\%\text{-}10\%) = 2.5\%$$

$$\pi_{2010} = 2.5\% + 0.5 \text{ X } (8\%\text{-}10\%) = 1\%$$

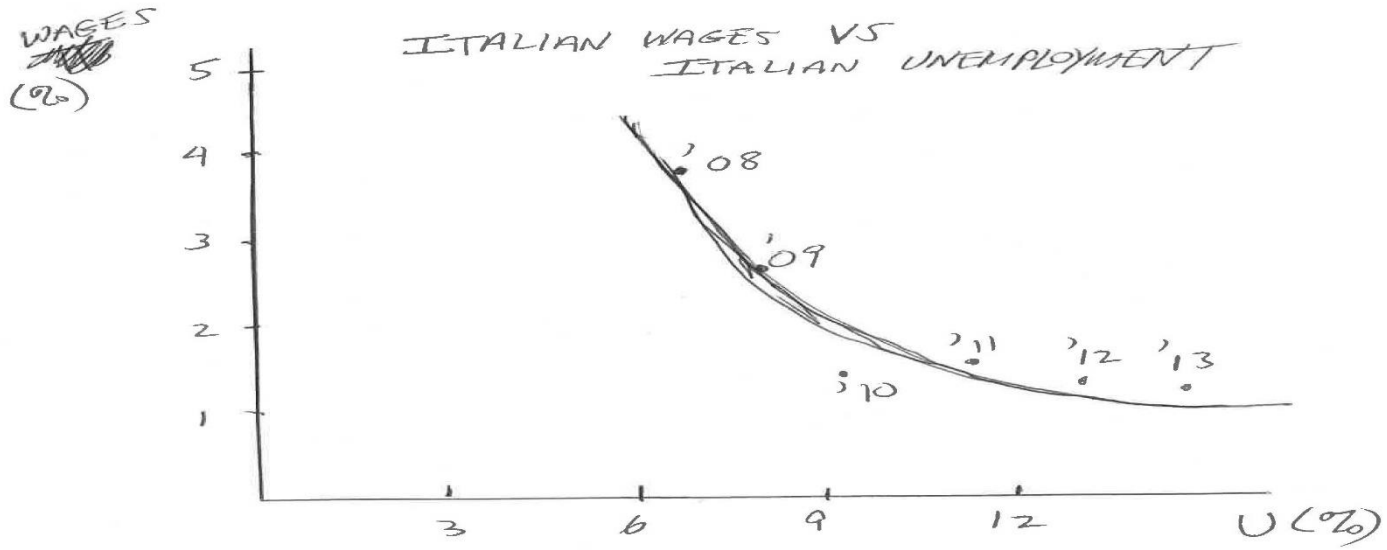
$$\pi_{2011} = 1\% + 0.5 \text{ X } (8\%\text{-}10\%) = -0.5\%$$

$$\pi_{2012} = -0.5\% + 0.5 \text{ X } (8\%\text{-}10\%) = -2.0\%$$

$$\pi_{2013} = -2.0\% + 0.5 \text{ X } (8\%\text{-}10\%) = -3.5\%$$

$$\pi_{2014} = -3.5\% + 0.5 \text{ X } (8\%\text{-}10\%) = -5\%$$

It turns out that the Phillips Curve is a *CURVE.* (Wages bounce along, just above zero)



PLOGS DON'T DELIVER DEFLATION!

P *PERSISTANT*

L *LARGE*

O *OUTPUT*

G *GAPS*

PLOGS, LONG PERIODS OF VERY HIGH UNEMPLOYMENT, DON'T PUSH PRICE AND WAGE GAINS BELOW ZERO:

THE ZERO BOUND SEEMS TO MATTER.

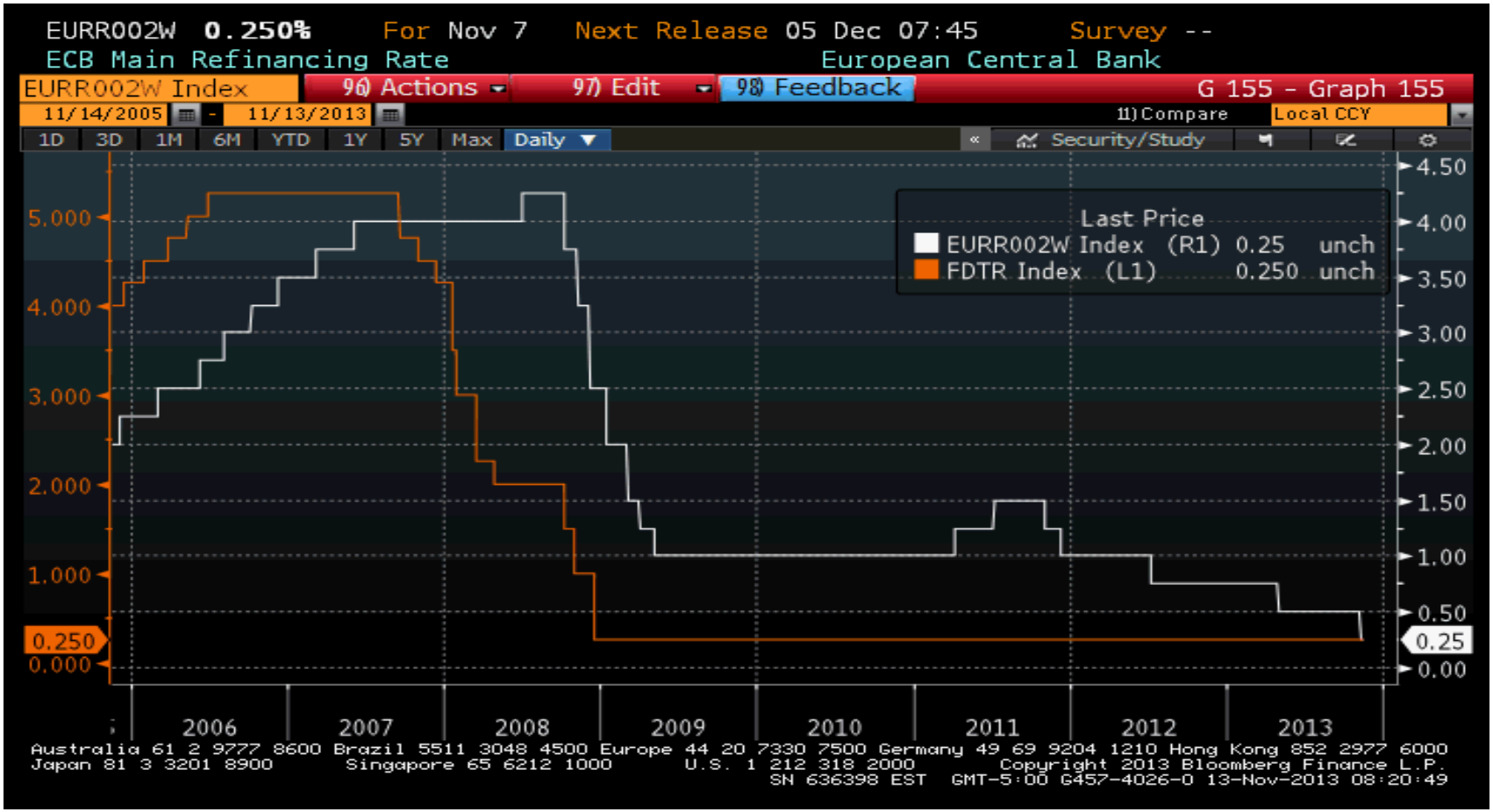
THE ZERO BOUND FOR WAGE RESTRAINT KILLS THE DIVINE COINCIDENCE

THE DIVINE COINCIDENCE:

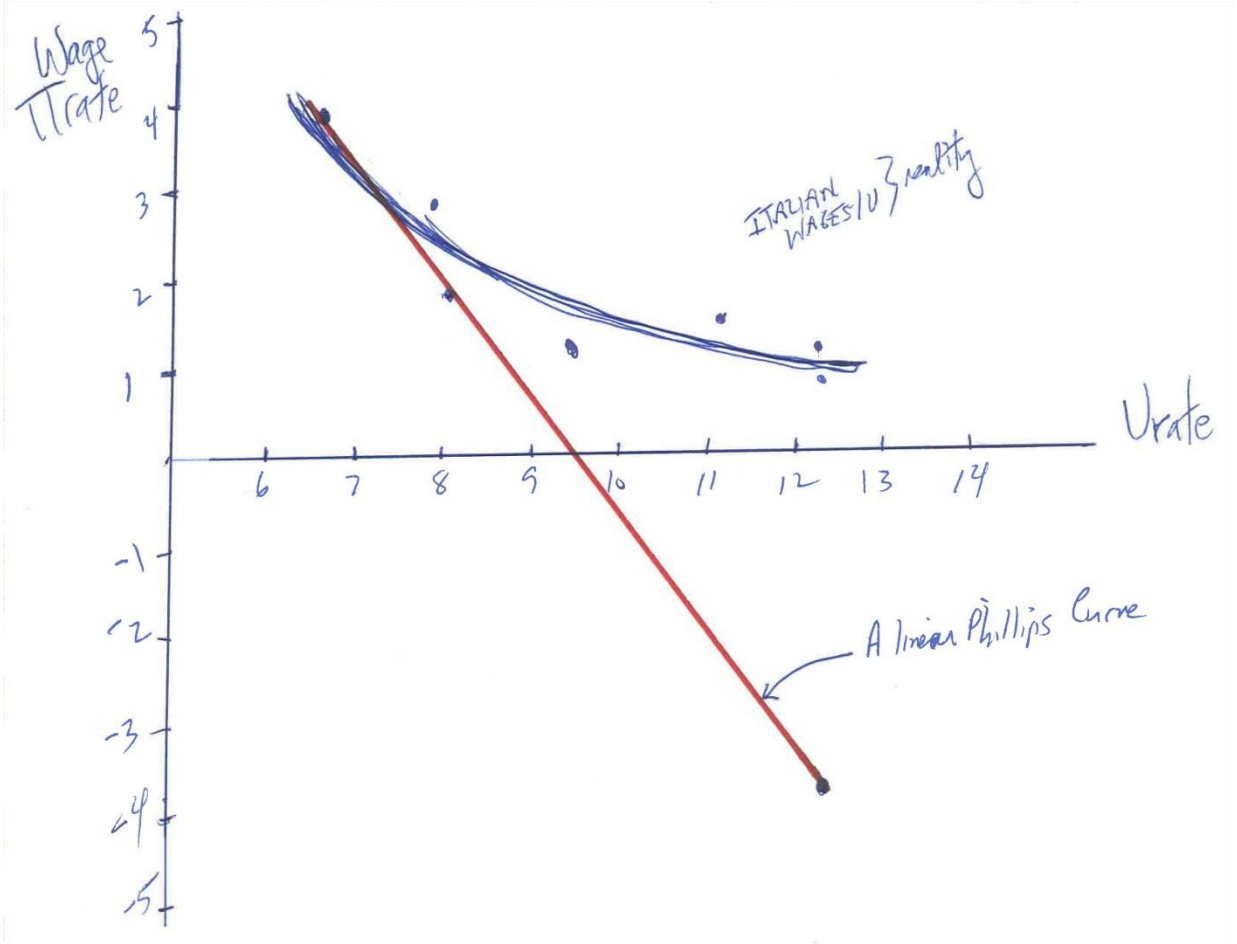
AN INFLATION FIGHTING CENTRAL BANK WILL EASE, SEEING FALLING PRICES, AND BE JUST AS ACCOMODATIVE AS A DUAL MANDATE CENTRAL BANK

NOT TRUE! THE FAILURE OF WAGES TO FALL KEEPS THE INFLATION FIGHTING CENTRAL BANK TOO TIGHT FOR TOO LONG

THE ABSENCE OF A DIVINE COINCIDENCE. It may explain ECB tightening alongside FRB easing in 2008 and 2011.



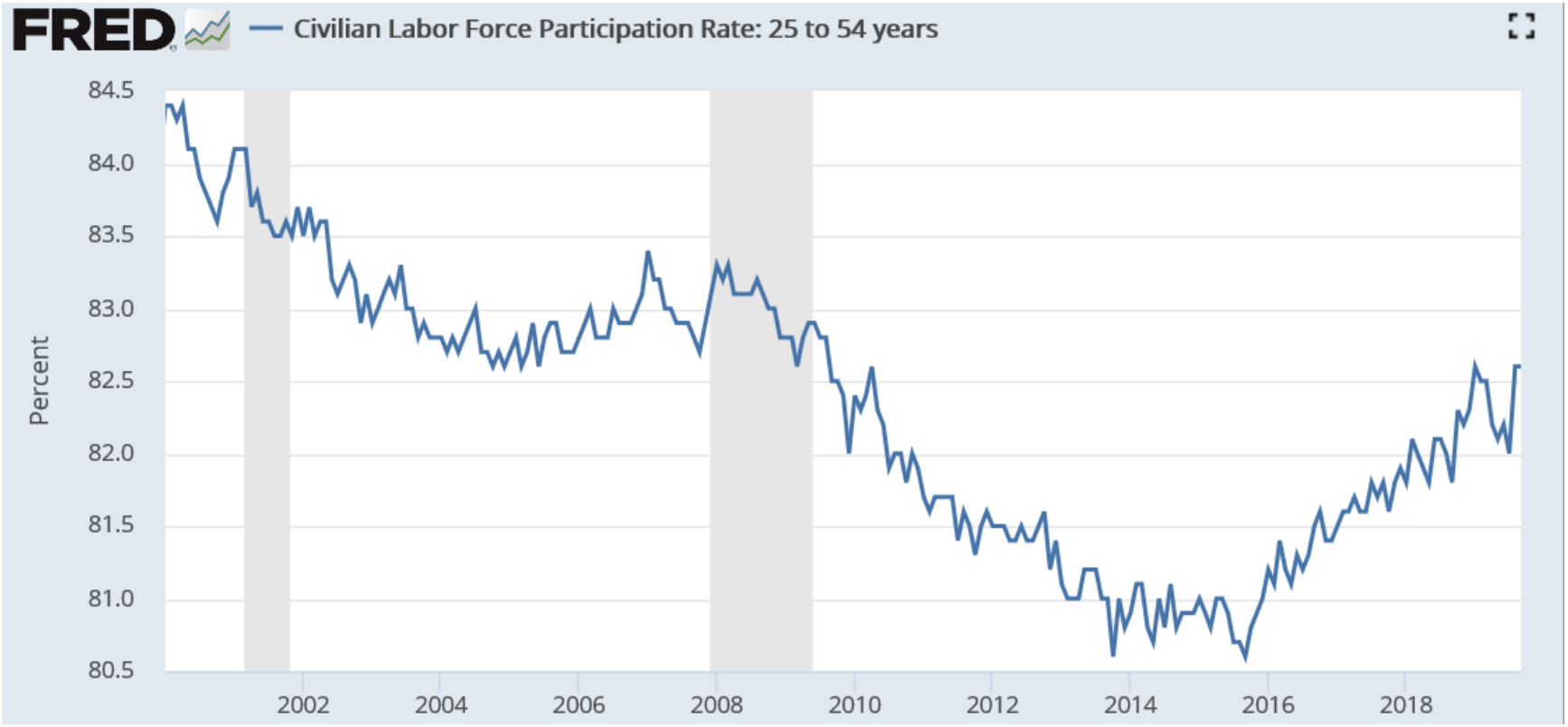
A 4% fall for wages might get the ECB's attention



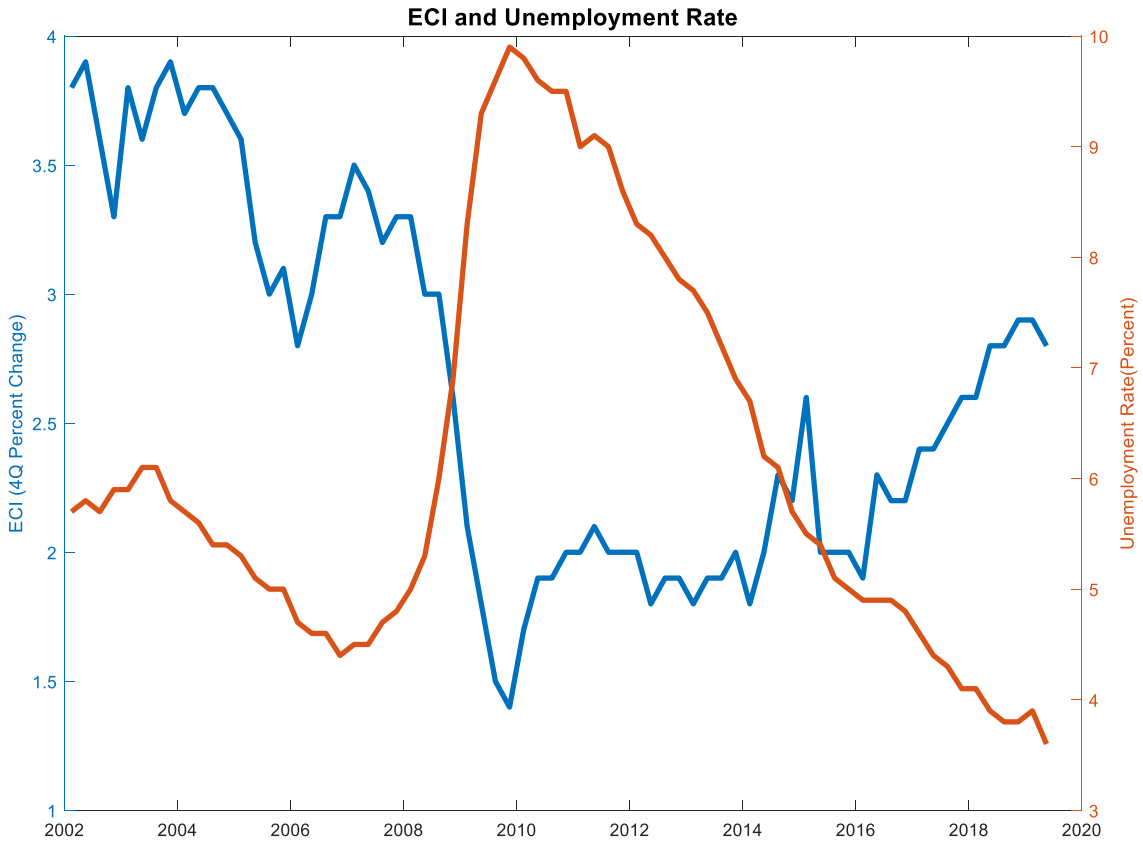
Why is inflation so low today?

- *3.5 percent unemployment rate but no sign of price inflation (yet)*
- *Two possibilities:*
  - *Natural rate is lower than we thought*
  - *Phillips curve is **very** flat*

Other labor market indicators suggest more slack than U3



ECI Phillips Curve: Relationship seems alive and well



CPI Phillips Curve: Hard to See any relationship

Has the Phillips curve flattened?

- *Stronger evidence for Phillips curve in recent data in wage inflation than in price inflation*
- *Also, stronger evidence in services than in goods*
- *Possible answer: global competition (esp China) means that goods sellers can't pass on higher wage costs*