

LECTURE X

27 March 2012

TOPIC II (CONT.)

Inflation

CORRECTING FOR INFLATION

- Minimum wage: In 1978 the minimum wage was \$2.65, in 2009 it was \$7.25
 - Are workers better off today based on this wage?
 - Need to adjust for inflation!!!
 - Amount in base year dollars = Amount in year T dollars *
(Inflation index)
 - Inflation index = Price level in base year / price level in year T

CORRECTING FOR INFLATION

- From the BLS with base year 1982, the CPI in 1978 = 65.2, CPI in 2009 = 213
 - Use 1978 as our base year
 - Real wage in 1978: $\$2.65 * (65.2 / 65.2) = \2.65
 - Real wage in 2009: $\$7.25 * (65.2 / 213) = \2.22
- So, minimum-wage workers today are slightly worse off in terms of wage

INTEREST RATES AND INFLATION

- How much is your savings really worth?
- In an (unreal) good year, I make 2% / year on my savings
 - If I deposited \$1000 in 2011, I have \$1020 in 2012
 - In 2011 I can spend \$1000 to get 500 cups of \$2 Starbucks
 - In 2012?
 - If inflation is 1%, then Starbucks costs \$2.02 per cup so 500 cups costs \$1010
 - I only *really* made \$10, not \$20
- Ability to use my money to buy real things is the money's **purchasing power**

INTEREST RATES AND INFLATION

- Because of purchasing power, inflation is central to determining *real* interest rates
- Real interest rate = nominal interest rate - inflation
 - Above nominal interest is 2% and inflation is 1% so real interest is $2 - 1 = 1\%$
 - If Real interest rate > 0 , depositing the money is (anticipated) inflation-beating!
- Real and nominal interest tend to move together

MONEY AND INFLATION



VELOCITY

- Recall that in 2007, money in circulation was about \$759 billion, but GDP was over \$10 trillion. How?
- Call using money multiple times **velocity of money** (rate at which money changes hands)
- E.g. If I spend \$10 at Starbucks, they use that \$10 to buy coffee or muffins, and the muffin man uses \$10 to buy coffee, etc.

VELOCITY

- Velocity of money is tightly linked to prices:

	2004	2005
Quantity of Money	100	100
Velocity		
Price Level	\$1.50	\$2.00
RGDP	1000	1000

- Can back out velocity given this information:
 - $V = (P * Y) / MS$, where Y is GDP and MS is money supply
 - So $V(2004) = 15, V(2005) = 20$

VELOCITY

- So prices from 2004 to 2005 increased because money swapping increased
- In reality, velocity is fairly stable and quantity of output is determined by other factors (remember LRAS?)
- So if the Fed increases the money supply, what must increase?
 - Prices increase with money supply
 - Inflation follows from expansionary monetary policies
- **Quantity theory of money:** Quantity of money available determines the price level, and the growth rate of that quantity determines inflation rates

VALUE OF MONEY

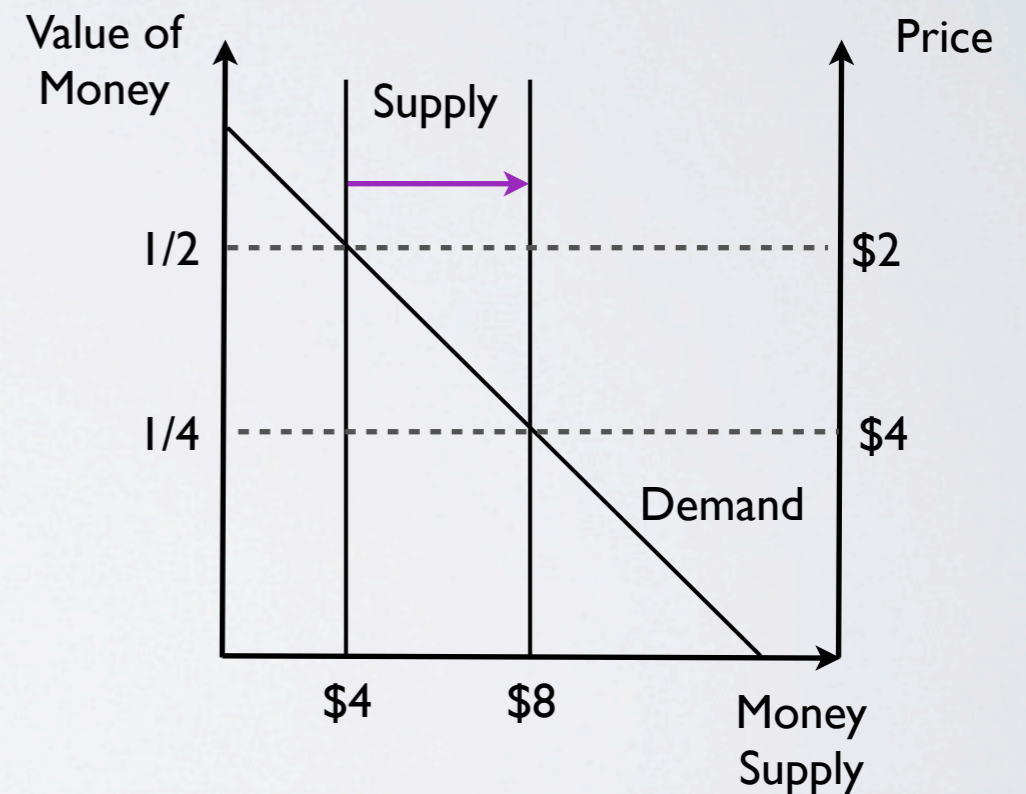
- Money only important for how much stuff I can buy; what was the worth of that 1946 Hungary dollar?
- (Suppose we want 2 pieces of bread) So as prices increase, the value of money decreases -- Value of money = $1 / \text{prices}$

Price of Bread	% of Bread bought with \$1	Value of Money	Money Demand
\$2	0.50	0.50	\$4
\$4	0.25	0.25	\$8

- So if the Fed increases money supply from \$4 to \$8, what can happen to prices?

VALUE OF MONEY

- Can map this similarly to interest rates...
- What happened to output?
- Notice prices can change without changing real variables
- **Classical Dichotomy:**
theoretical separation of nominal and real variables



MONEY NEUTRALITY

- Recall we proposed that there is a price-invariant long run output. Finally, how is it invariant??
- **Monetary neutrality:** Proposition that changes in the money supply do not affect real variables
 - Consider, if we double money supply --> double prices --> wages double, etc.
- Then what good is monetary policy?
- To neo-Keynesians, monetary neutrality is only relevant in the long run because of short-run price stickiness

INFLATION TAX

- What is the easiest way for the US to pay off its \$9 trillion (publicly held) debt?
- Governments can print money (!). So the US could print \$9 trillion and pay off the debt immediately (like Zimbabwe)
- Recall $P * Y = MS * V$
- If MS increases, output stays the same, and V stays the same ... prices must increase by quite an amount
- **Inflation tax**: this is called an inflation tax because the government is essentially taxing your money holdings through higher inflation

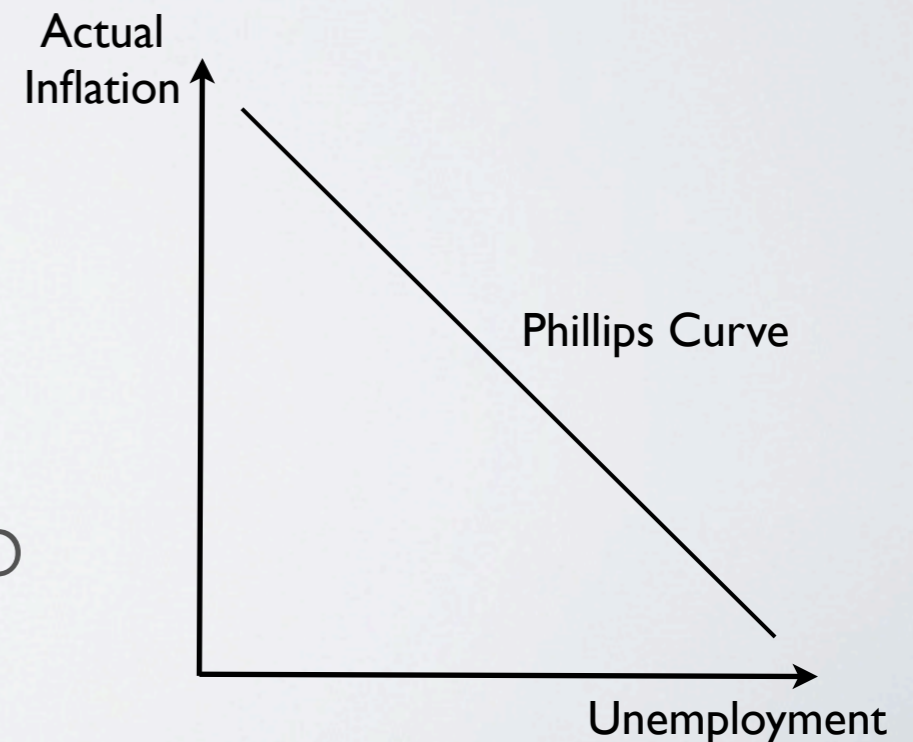
FISHER EFFECT

- Money neutrality claims no real variables are affected by the money supply, this includes real interest rates
- Recall real interest rates = nominal - inflation
- **Fisher effect:** claim that if inflation increases, nominal interest rates will increase one-to-one
 - So if nominal is 4% and expected inflation is 3%, real = 1%
 - Suppose the government prints money, and inflation increases to 4%
 - In the short run, nominal interest rates cannot change so real interest rate is 0%
 - In the long-run, new nominal interest rate will increase to 5% so real = 1%

INFLATION AND UNEMPLOYMENT

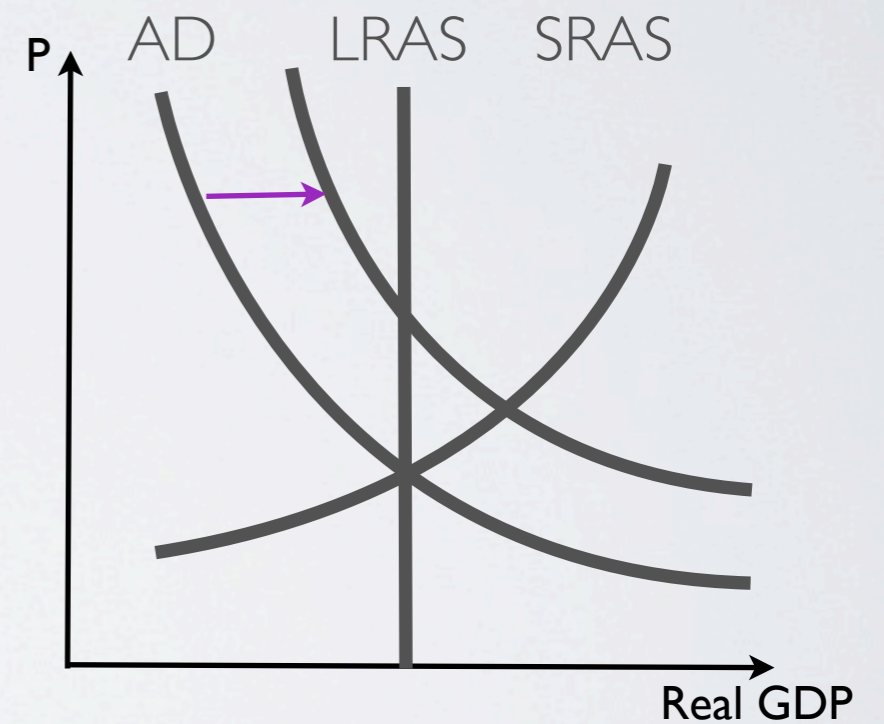
PHILLIPS CURVE

- Introduced in the 1950s to explain the relationship between inflation and unemployment
- Relying on data from the UK, he found a negative relationship
 - Low inflation --> High unemployment
 - High inflation --> Low unemployment
- **Phillips curve** depicts this relationship



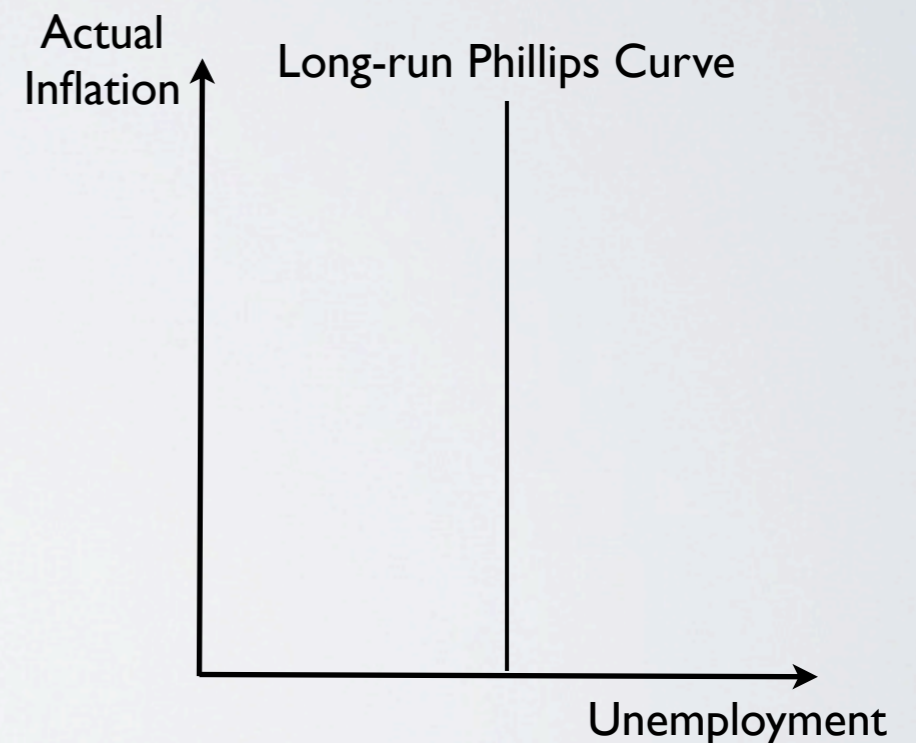
PHILLIPS CURVE

- Can find motivation for the relationship in the AD-AS model
- Recall higher output implies higher employment, but also higher prices in the case where output is driven by demand
- Later Samuelson and Solow found the same relationship in the 1960s



LONG-RUN PHILLIPS

- In the 1970s Friedman and Phelps hypothesized that the same relationship does not exist in the long-run
- Neutrality of money means inflation should not affect real variables like unemployment
- Indeed, the vertical line represents the natural rate of unemployment



INFLATION ON UNEMPLOYMENT

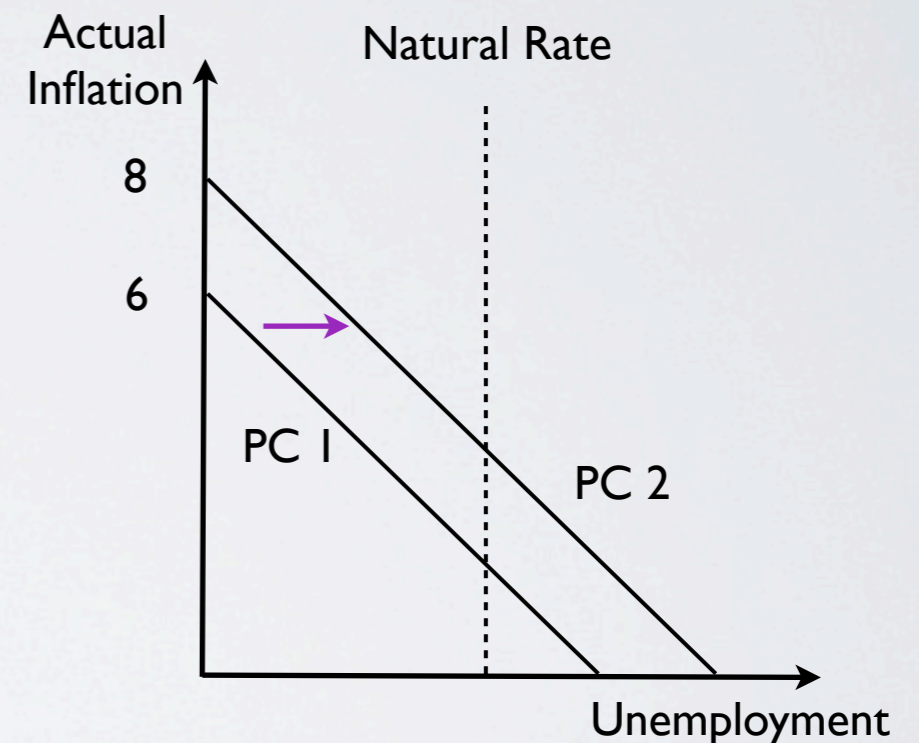
- Expected inflation should not impact any real variables, as we discussed (a smart person would negotiate a wage contract to rise with inflation)
- Unexpected inflation, however, is an unexpected rise in prices, and can impact short-run real variables
 - E.g. wage contract anticipated 1% inflation and then it went up to 3%... real wage lower so firms will hire more people
 - Consider **Unemployment rate = NRU - A(actual inflation - expected inflation)**, where A is some constant
 - Formula captures some impact on unemployment of having some unexpected inflation
 - And more inflation is better for employment (consider the Phillips curve)

NATURAL RATE HYPOTHESIS

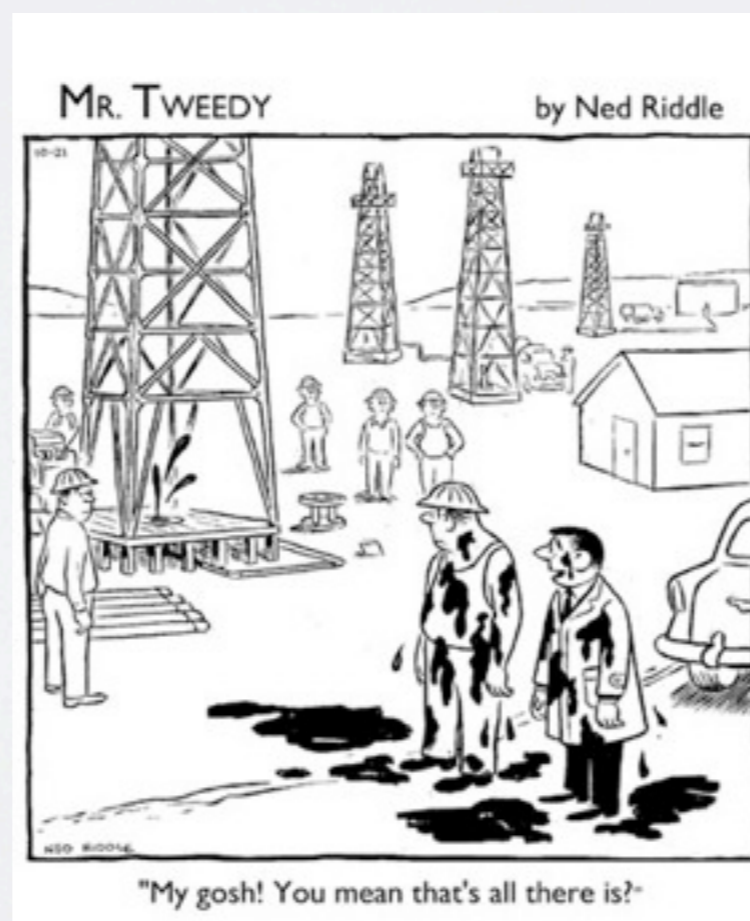
- **Natural Rate Hypothesis:** Unemployment eventually returns to its normal, or natural rate, regardless of the rate of inflation
- What implications does this have for the policymaker following a Phillips curve?
- Using inflation to generate employment will be an endless cycle of driving up inflation

NATURAL RATE HYPOTHESIS

- Notice Phillips curve is dependent on *expectations*
 - $UR = NRU - A(\text{actual inflation} - \text{expected inflation})$
 - As expectations are updated, the curve will shift
- Suppose $NRU = 5, A = 1$, and initial expected inflation is 1
 - $UR = 5 - 1(\text{Actual} - 1) = 6 - \text{Actual}$
 - If expected inflation is 3? $UR = 8 - \text{Actual}$
- Need higher level of inflation to achieve the same level of unemployment with new expectations

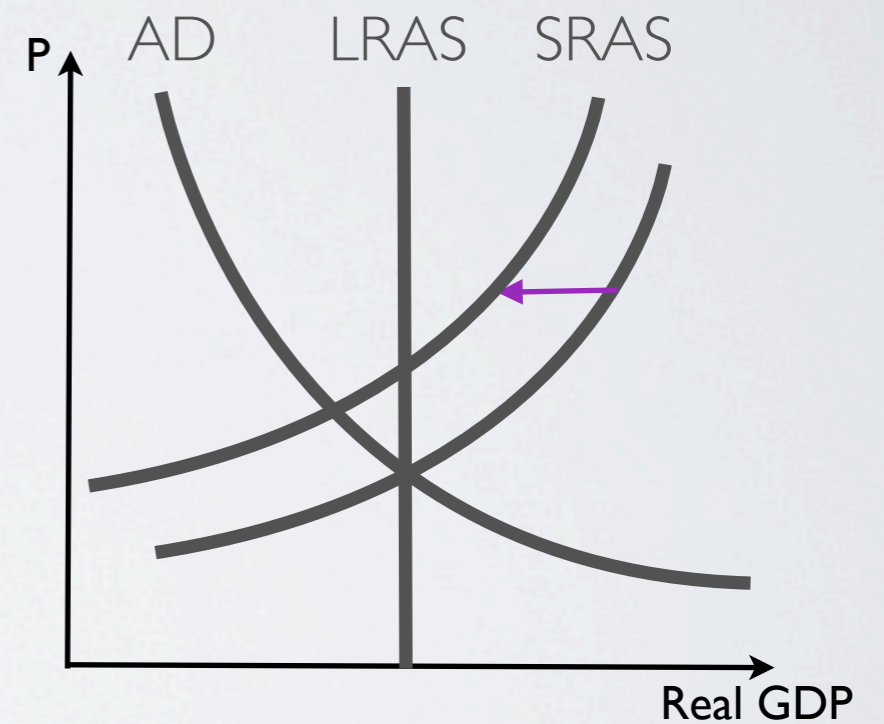


SUPPLY SIDE SHOCKS



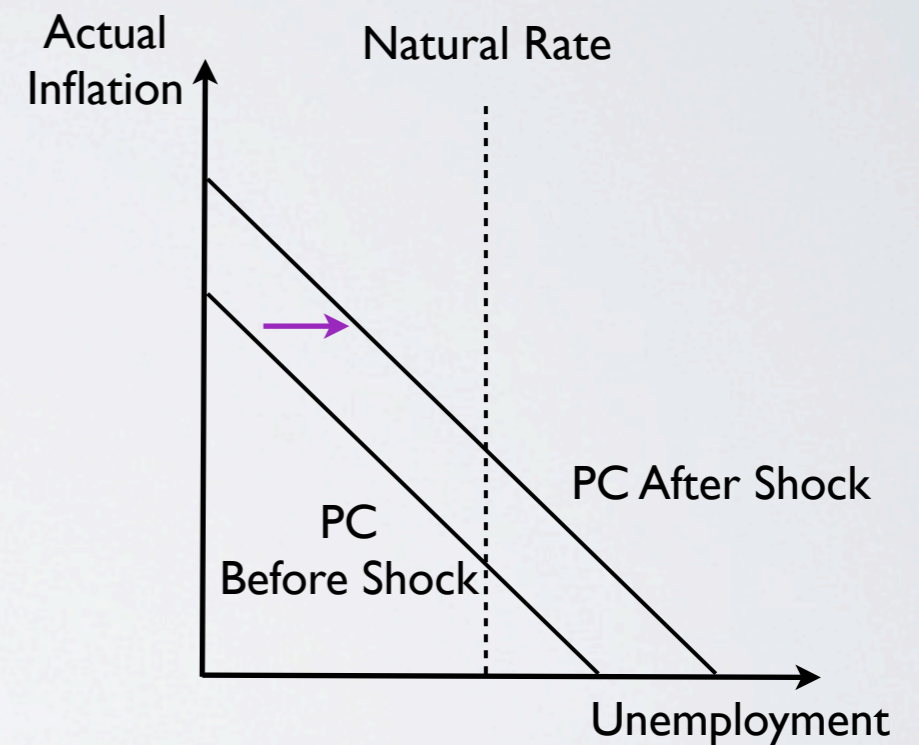
1970S OIL SHOCKS

- Oil c/rises shattered empirical support for the Phillips curve
- Phillips curve relied on demand-pull inflation, but oil shocks cause *cost-push inflation*
 - Output decreases (lower employment) AND higher costs



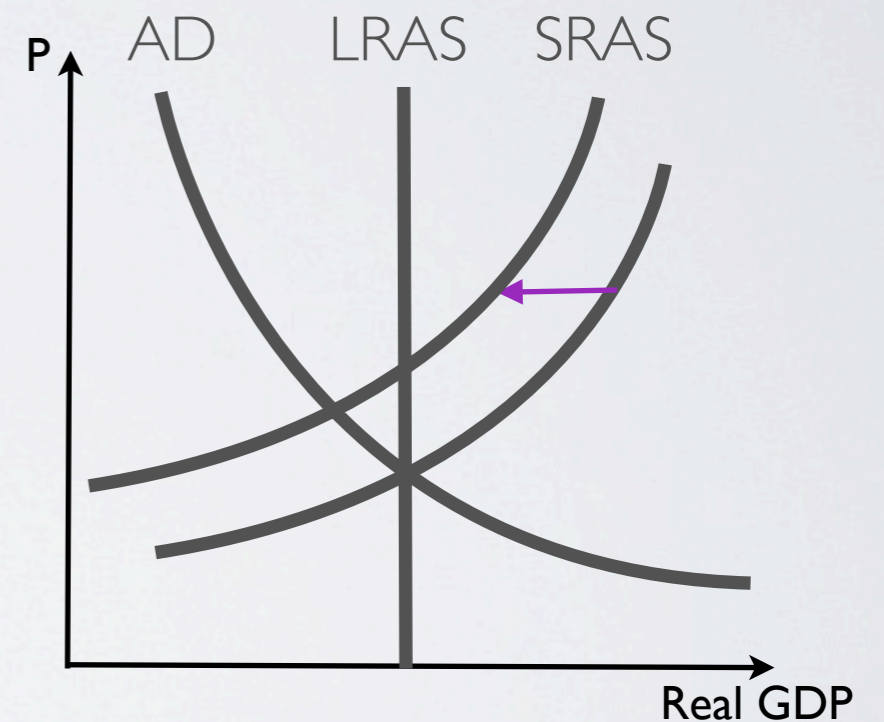
1970S OIL SHOCKS

- To represent higher unemployment AND higher inflation, a cost push shift moves the Phillips curves right
- Notice at any fixed level of unemployment, we now have higher inflation as well



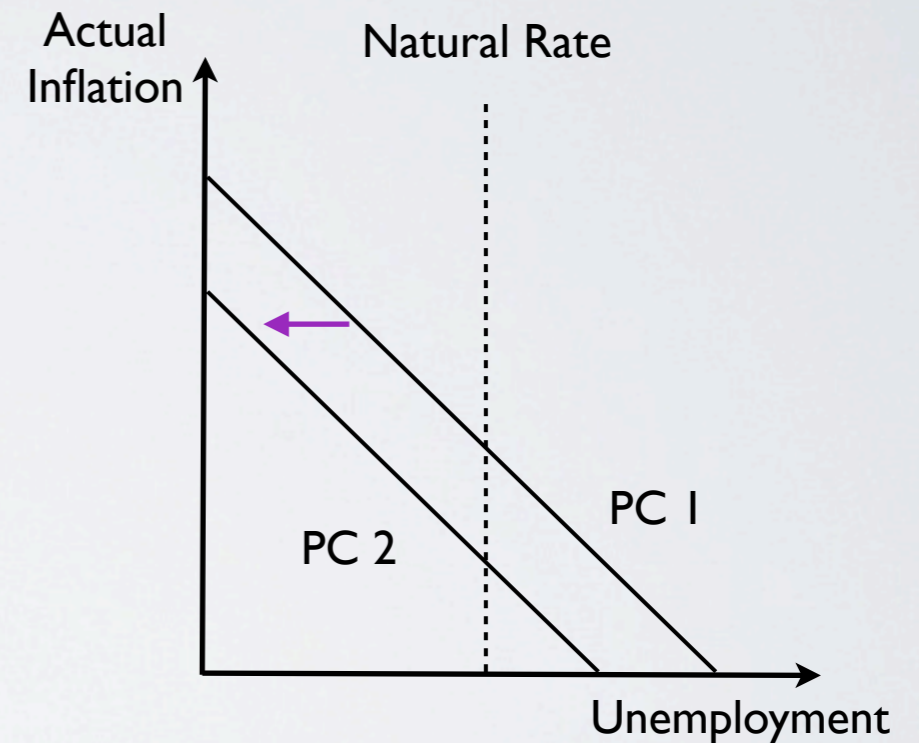
1970S OIL SHOCKS

- How can the government respond to inflation?
 - Decrease AD: results in more unemployment
- Address the recession?
 - Increase AD: inflation increases
- By 1980 the US had unemployment of 7% and inflation at 9% (now, it's 9% and ~0%)



1970S OIL SHOCKS

- Federal Reserve Response
 - Paul Volcker employed a *contractionary monetary policy*, addressing which problem?
 - Contractionary monetary policy hurts output, but fights inflation
 - Unemployment increases, but what is the impact on the Phillips?
- Lower actual inflation reduces expectations



RECOVERY

- To overcome stagflation, a period of high unemployment and low output was required
- **Sacrifice cost:** Number of percentage points of annual output lost in the process of reducing inflation by 1%
 - Typically, estimated at 5, so 5% of output is sacrificed for 1% inflation reduction
 - Volcker tried to reduce inflation by 6% points, so ... cost was 30% output
 - Ultimately spread out over many years

THE BIG INSIGHT: RATIONAL EXPECTATIONS

- 400 years of macroeconomics led to:
- **Rational expectations:** People optimally use all the information they have, including information about government policies, when forecasting the future
 - Implies that the Fed can impact not only actual inflation but also expected inflation
 - So if people believe the Fed will lower inflation, a change in expectations could create a “costless” disinflation

RATIONAL EXPECTATIONS

- Is rational or non-rational expectations correct?
 - Entirely because of monetary policy, inflation fell from 10% in 1980 to 6% in 1982 to 4% in 1983-87
 - Real GDP fell by 3% over the time period (huge recession)
- Non-rational expectations saw the huge recession as theoretical victory
- Rational expectations saw a cost lower than the 5 points per inflation percentage predicted and most did not believe Volcker anyway

INFLATION TARGETING

- Germans love low inflation, to wit:
 - “The primary objective of the ECB’s monetary policy is to maintain price stability. The ECB aims at inflation rates of below, but close to, 2% over the medium term.”
- Should the Fed aim for zero inflation?
 - Results in big costs to GDP as discussed and makes monetary policy less effective
 - Advantages of inflation: lower cost to service debt, wage cuts are easier to pull off ...

REVIEW

- Inflation is a measure of the general rise of prices in an economy
- More interested in the consumer price index, which focuses on the price of goods people actually purchase
- Money and inflation are intricately tied through $M * V = P * Y$, since GDP and velocity of money are relatively stable
- In the 1950s Phillips posited a negative relationship between inflation and unemployment
- Because of the oil crises of the 1970s and cost push inflation, new theories arrived to explain the existence of high inflation AND high unemployment