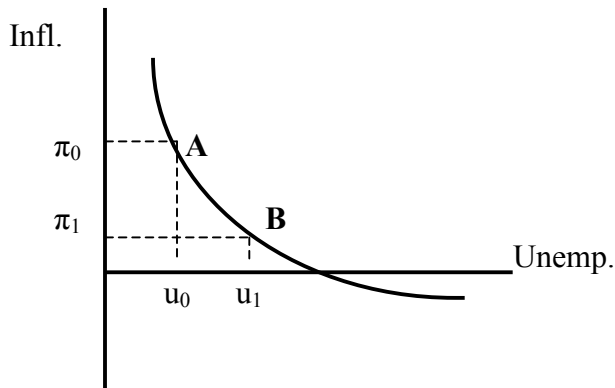


1. For each part below draw a Phillips Curve diagram consistent with the situation described. Label the initial point A and the final point B. (Note that you *might* need to shift the Phillips Curve.) Briefly explain what causes *movements along or shifts of* the Phillips Curve.

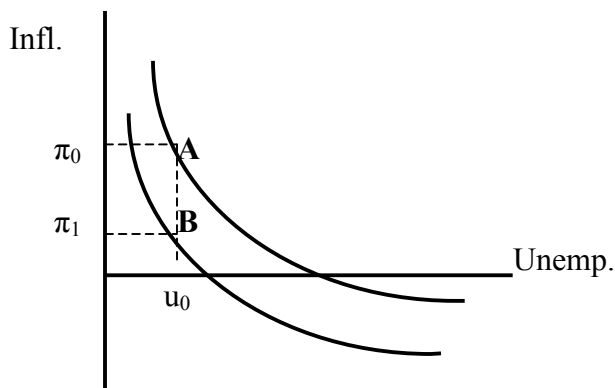
a) The Fed raises interest rates and unemployment increases.

Inflation falls because workers bargaining power is reduced with higher unemployment. The economy moves down the existing Phillips Curve from point A to point B. You could also say that firms' pricing power is reduced in weak markets, but you need some explanation for *why* inflation falls with higher unemployment to explain, as the question explicitly asks, the "movement along" the Phillips Curve.



b) Unemployment is unchanged, but some major oil exporting countries raise crude oil production in an attempt to gain market share.

If oil producers try to increase their market share, they will undercut the price of their competitors. This action lowers the price of oil and creates a "favorable" "supply shock" for oil-importing countries. Firms' costs decline, and competition among firms will lower prices for their customers. For given unemployment, inflation falls, shifting the Phillips Curve up from point A to point B.



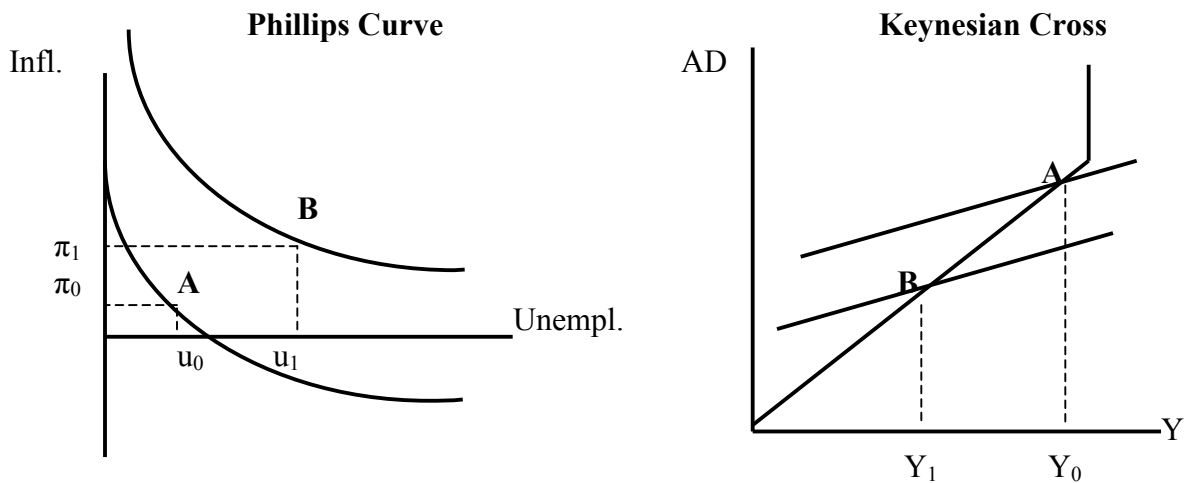
c) A new person is appointed to lead the Fed who has a reputation for not worrying too much about inflation.

If the new leadership of the Fed does not worry too much about fighting inflation, inflation expectations will rise shifting the Phillips Curve upward. There is no reason for actual unemployment to change, so the unemployment rate stays the same while inflation rises. The diagram should look the same as for part b.

2. Some analysts worried that high energy prices caused by Hurricanes Katrina and Rita in 2005 would cause stagflation in the U.S. economy. Part of the concern was that high energy prices would increase spending on imported oil and reduce the amount that consumers spend on domestically produced products.

a) Show the initial effects of this scenario in the Phillips Curve and Keynesian Cross diagrams; explain shifts or movements along the relevant curves.

Lower consumer spending shifts aggregate demand downward, reducing equilibrium output and raising unemployment. Higher oil prices raise firms' costs and they therefore charge higher prices, increasing inflation for any rate of unemployment, which shifts the Phillips Curve upward. The economy moves from points A to points B on the following Keynesian Cross and Phillips Curve diagrams.



b) Suppose that the oil price increases stop after a period of time. What might cause the change of inflation caused by the hurricanes to be persistent nonetheless?

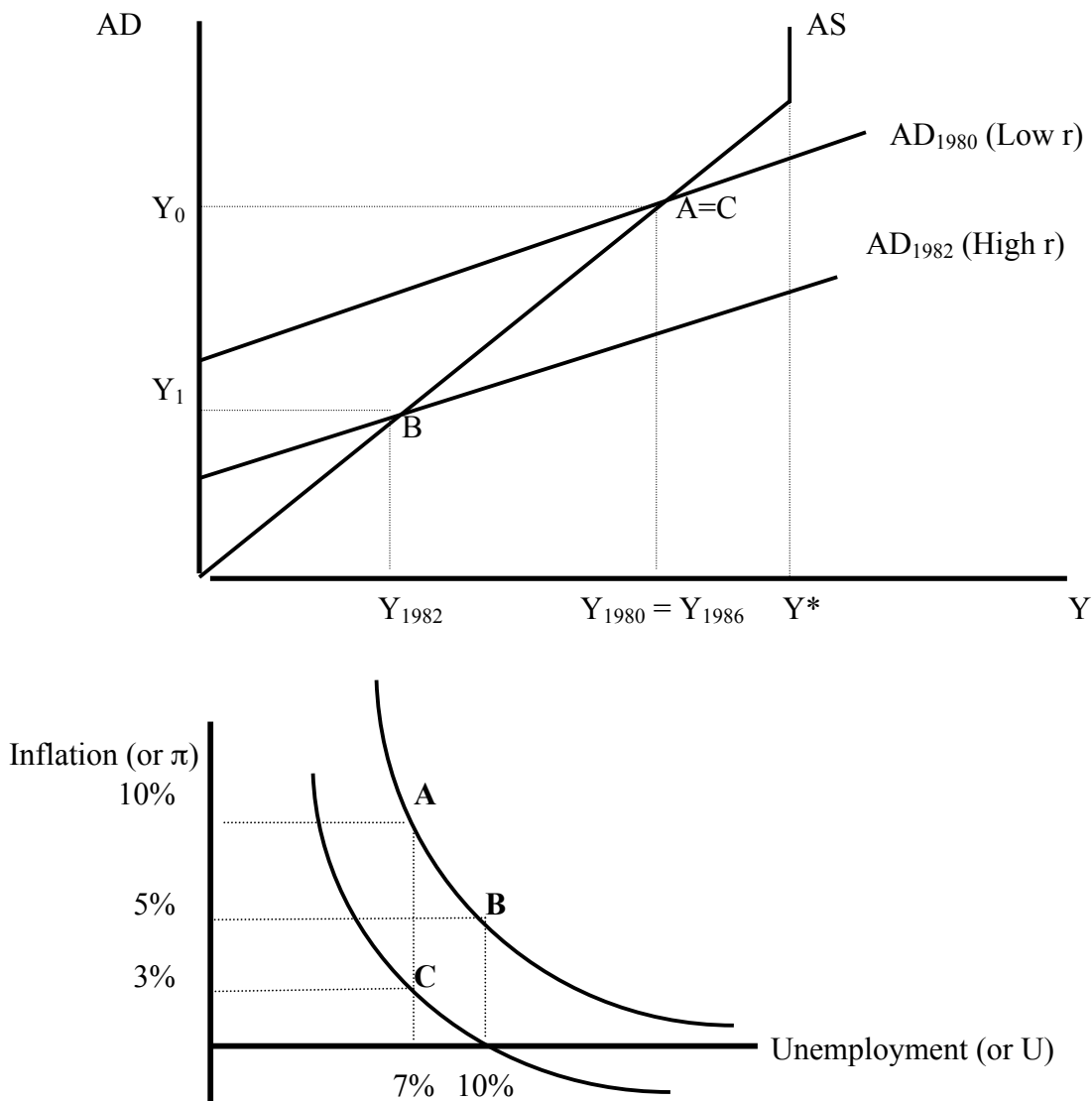
The shock raises the inflation rate. If higher actual inflation raises peoples' expectations of inflation, workers will begin to demand higher wage increases. The Phillips Curve may stay high, or even shift up more due to higher inflation expectations, even though energy costs stop rising. (Although this was a concern in the immediate aftermath of Katrina, it seems that inflation expectations did not change significantly even after the high energy prices that followed the hurricanes. Perhaps this is because modern households and businesses better trust the Fed to keep long-term inflation low, even

though inflation may temporarily spike upward when there is an unfavorable energy price “shock.”)

3. In the early 1980s, monetary policy was extremely restrictive and interest rates rose dramatically. The U.S. economy entered a deep recession with a large rise in unemployment from about 7 percent in 1980 to above 10 percent in 1982. Inflation fell significantly during the recession from about 10 percent in 1980 to 5 percent in 1982. In the middle 1980s, unemployment and output recovered due to looser monetary policy and massive tax cuts. Inflation continued to decline, however, to about 3 percent in 1986 while unemployment returned to about 7 percent. Answer the questions below about these events.

a) Depict the events from 1980 to 1982 described using both a Keynesian Cross diagram and a Phillips Curve diagram. Use point “A” to label 1980 and point “B” to label 1982 on both diagrams. Explain what causes the changes in the diagrams.

See points A and B on the diagrams below. The AD curve shifts downward in the Keynesian Cross diagram because higher interest rates discourage borrowing for both consumption and investment. They also might raise the value of the dollar and therefore reduce exports and stimulate imports. All these factors lower aggregate demand. Lower equilibrium output causes higher unemployment, which reduces the bargaining power of workers. Workers therefore receive smaller wage increases which translates into lower inflation. You could also say that the recession weakens the product markets for firms and they therefore do not raise prices as quickly. Either effect will push the economy down the Phillips Curve from A to B as shown below.



b) On the same diagrams used above for part a), label 1986 as point “C.” Explain what happened to the Phillips Curve between 1982 and 1986 in terms of inflation expectations and their effect on wage bargaining.

Point C is shown on the diagrams above. In the Keynesian Cross diagram, AD shifts up because looser monetary policy reduces interest rates and offsets the downward shift of several years earlier. (The AD curve need not move back to exactly the same point. In fact, output in 1986 was higher than output in 1980.) The Phillips Curve must shift downward to get lower inflation with lower unemployment. Lower actual inflation during the recession reduced workers' inflation expectations. When workers expect less inflation, the wage increases they bargain for will not be as large even for a given level of unemployment. Firms will therefore not raise prices as quickly and inflation will be lower for any level of unemployment, implying a downward shift in the Phillips Curve.

Note this is an excellent example of how short-term economic events can cause a persistent change in inflation if the short-term events change inflation expectations.

4. Some time ago, an article in the *St. Louis Post Dispatch* stated: “The Fed cares so much about inflation because when it starts spiraling it can be hard – and painful – to control.” Answer the questions below about this statement.

a) What kind of open market operation will the Fed take if it wants to “control,” that is, reduce, inflation? How does this action affect bank reserves and the federal funds interest rate?

To reduce inflation, the Fed will sell government bonds (“open-market sale”) to banks who pay for them with reserves, thus bank reserves fall. Because the supply of bank reserves has declined, the price at which banks lend reserves to each other, the federal funds interest rate, increases.

b) Describe the “transmission mechanism” that causes this Fed policy to affect the broader economy and explain why this policy will reduce inflation.” Be specific about each step in the process.

The higher federal funds rate raises the cost of funds for banks. For banks to cover these higher costs they need to charge more to their borrowers, so they increase the interest rate on loans to consumers and businesses. Higher loan rates reduce aggregate demand for (at least) three different reasons:

- (i) The reward on saving rises (or you could say the cost of borrowing for consumption rises) so households consume less.
- (ii) The cost of capital rises (or you could say the cost of borrowing for investment rises) so investment falls. Note that even if firms use their own funds (“cash flow”) for investment, the opportunity cost of these funds to the firms’ owners rises with higher market interest rates.
- (iii) Higher interest rates make U.S. assets more attractive to foreign savers, which increases the value of the dollar so imports fall and exports rise.

Lower aggregate demand reduces output which causes firms to raise prices less quickly (or actually lower prices). Alternatively, you could say that lower AD leads to higher unemployment that reduces the growth of wages, lowers firm costs, and therefore reduces inflation.

Note that the objective of the Fed is not to create unemployment to bring inflation down, they just want to keep AD from rising *above* the level consistent with full employment because excessive AD will likely create higher inflation. But it may be difficult to hit this “sweet spot” just right. Hence the lower AD due to higher interest rates can create “painful” unemployment, even if the objective is just to control inflation.

c) Use the theory discussed in class to explain why inflation, once it gets going, can be persistent.

High actual inflation will cause firms and households to raise their inflation expectations. When inflation expectations increase workers will demand higher wage increases, which makes costs rise faster, and therefore firms raise prices more quickly. So inflation becomes persistent, that is, the higher expectation of inflation becomes “self fulfilling.”

d) Describe the most obvious event from U.S. economic history over the past 50 years during which the Fed pursued a policy specifically to reduce inflation. In what sense was this event “painful?”

In the early 1980s, the Fed increased interest rates with explicit objective of bringing down inflation. The Volcker Fed did not explicitly want to create a recession, but it happened anyway. The recession was, at the time, most likely the worst since the Great Depression with very high unemployment, a truly “painful” period of U.S. macro history.

This is the only clear example of the Fed explicitly trying to lower inflation with the effect of a bad recession. We discussed this period extensively in class. Note that the “stagflation” of the 1970s was “painful,” but this set of events was not caused by the Fed.

5. Many monetary economists argue that the Fed should announce an explicit target for inflation. Evaluate this policy by answering the questions below.

a) Explain how such a policy “anchors” inflation expectations.

If the Fed sets an explicit inflation target, and credibly demonstrates that it will take actions necessary to return inflation to the target when economic shocks occur, households and firms will have a better idea of what medium-term inflation will be. Their inflation expectations, therefore, will be more firmly anchored because they know where Fed policy is headed.

b) If the policy provides an effective inflation expectation anchor, describe how it would likely improve the performance of the economy after an unfavorable supply shock like a rise in energy prices.

An unfavorable supply shock raises actual inflation. This kind of event will likely cause some, perhaps most, agents in the economy to raise their forecast of future inflation. As discussed in class, higher inflation expectations are an important source of inflation on their own. If inflation expectations rise after a supply shock, the shock will likely have much more persistent effects on actual inflation. If the Fed provides a credible, transparent inflation anchor, however, firms and households are less likely to adjust their longer term inflation expectations upward even if a shock pushes actual inflation higher for a few months.

Suppose that the Fed credibly targets a 2 percent inflation rate. If a geopolitical crisis causes a short-term rise in oil prices actual inflation might easily reach 3 or 4 percent. But if people believe the Fed’s commitment to keep inflation at 2 percent in the long term, they are less likely to raise their long-term inflation expectations after the short-

term increase in oil prices. Thus, wage negotiations, in particular, are less likely to be affected by temporary inflation disruptions. This “anchoring” of expectations prevents a wage-price “spiral” similar to what the U.S. experienced in the 1970s and early 1980s.

c) Explain why an inflation target policy might have some costs for society.

An inflation target, if it is credible, requires the Fed to give up some flexibility to respond to specific economic circumstances. Suppose that inflation rises when the economy is weak for other reasons so unemployment is high and possibly rising (what might be characterized as “stagflation”). An inflation target may compel the Fed to tighten monetary policy, that is, raise interest rates, which would lower aggregate demand and make the unemployment *worse*. Such a policy would magnify the social costs of unemployment and also create potentially serious political problems for the Fed that may compromise its ability to carry out its objectives.

Some people, including former Fed chair Alan Greenspan, seem to favor a policy approach that commits to controlling inflation in the long term, but without announcing an explicit numerical inflation target. The hope is that the long-term commitment to low inflation will adequately anchor inflation expectations while allowing the Fed to use some discretion and flexibility in responding to specific macro circumstances.

Obviously, running practical monetary policy in an uncertain world poses a significant economic and political challenge.