

**Problem 1.** Which of the following statements is true about the relationship between price level and inflation rate over several years?

- (a) the price level can go up while the inflation rate is going down
- (b) the price level can go up with the inflation rate is negative
- (c) the price level can stay the same while the inflation rate is negative
- (d) the price level can go down while the inflation rate is positive
- (e) all of the above smell bad

**Answer 1: a.** Inflation is the rate of change of the price level. If inflation falls from 5% to 3%, it still means that the price level is increasing since 3% is still a positive number.

**Problem 2.** U.S. data shows that in most of the past recessions,

- (a) the general price level had gone down, but inflation had remained steady
- (b) both general price level and inflation rate had increased
- (c) both general price level and inflation rate had decreased
- (d) the general price level had gone up, but inflation rate had gone down
- (e) all of the above have had bad breath

**Answer 2: d.** The price level rarely actually goes down, i.e. deflation is pretty rare. But the rate of inflation will fall during recessions.

**Problem 3.** Suppose the following:

- rate of growth of money supply: 5%
- rate of growth of real GDP: 3%

What is the rate of inflation?

**Answer 3.** Use the equation of exchange. In particular, we can write

$$MV = PY \implies \frac{\Delta M}{M} + \frac{\Delta V}{V} = \frac{\Delta P}{P} + \frac{\Delta Y}{Y}.$$

Plug in what we know (recalling that  $V$  is assumed constant):

$$5\% + 0\% = \frac{\Delta P}{P} + 3\% \implies \frac{\Delta P}{P} = 2\%.$$

And  $\Delta P/P$  is just the definition of inflation. More generally, in the long run the economy will gravitate towards an inflation rate of

$$\pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}.$$

Note the book denotes the rate of money growth with  $m$  and the rate of GDP growth with  $g$ .

**Problem 4.** Which of the following statements is true about the relationship between the inflation and unemployment rates *in the long run*?

- (a) Total unemployment rate is zero regardless of inflation
- (b) total cyclical unemployment rate is zero at high rates of inflation
- (c) cyclical unemployment and inflation rates are negatively related
- (d) cyclical rate of unemployment is zero regardless of the rate of inflation
- (e) none of the above

**Answer 4: d.** In the long run, there is no relationship between inflation and unemployment rates. Indeed, in the long run the unemployment rate will be  $u = u_n$ , regardless of inflation.

**Problem 5.** Which of the following statements is true about the *short-run* relationship between unemployment and inflation rates?

- (a) in the case of a demand shock, they will both move in the same direction
- (b) in the case of a demand shock, they will move in opposite directions
- (c) in the case of a demand shock, unemployment rate will change but the inflation rate will remain the same
- (d) in the case of a demand shock, inflation rate will change but the unemployment rate will remain the same
- (e) all of the above have sweet mullets

**Answer 5: b.** If there's a negative demand shock (e.g. a recession), then inflation will decrease whereas unemployment will increase. If there's a positive demand shock (e.g. a boom), then inflation will increase whereas unemployment will decrease.

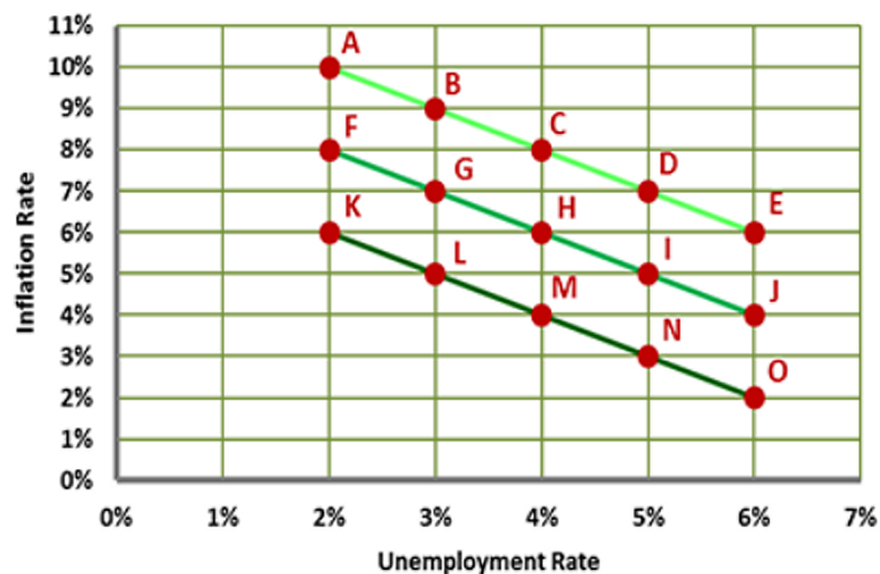
**Problem 6.** What does the Phillips Curve show?

- (a) it shows a positive relationship between the rate of growth of money supply and the rate of inflation
- (b) it shows a positive relationship between the rate of unemployment and the rate of inflation
- (c) it shows a negative relationship between the rate of unemployment and the rate of inflation
- (d) it shows a positive relationship between the rate of unemployment and the rate of change of Cambridge k
- (e) the curvature of Phillip's spine

**Answer 6: c.** It shows the negative relationship between the rate of unemployment and the rate of inflation. This seems to imply that in the short run you face a tradeoff: you can reduce unemployment but it comes at the expense of higher inflation; or you can reduce inflation but it comes at the expense of higher unemployment.

There is a long-run Phillips curve as well, which is just a vertical line representing the natural rate of unemployment. Note that the Phillips Curve intersects the long-run Phillips Curve where  $\pi = \pi^e$ . So if expected inflation is 5% and  $u_n = 7\%$ , then the Phillips curve will be a downward sloping curve that contains this point. Shifts in expected inflation will shift the Phillips curve.

## Problem 7.



Suppose the natural rate of unemployment is 4%. If the actual rate of inflation equals the expected rate of inflation, then the economy would be at which points?

**Answer 7: C, H, or M.** If expected inflation matches actual inflation, then we will be somewhere on the long-run Phillips curve, i.e. a vertical line at 4% unemployment rate. The expected inflation rate is going to determine which curve we are on, however.

Suppose  $\pi^e = 6\%$ . Then we are on the line containing point H.<sup>1</sup> If actual inflation is above 6%, then it means we are at point G or F; if actual inflation is below 6%, then we are at point I or J. Point I, for instance, implies that  $u_c = 1\%$ .

<sup>1</sup>because H is also on the long run Phillips curve

**Problem 8.** The natural rate of unemployment is 4%. Which of the following sequences of points best describes the processes of the Volcker Disinflation?



(a)  $C \rightarrow H \rightarrow M$

(b)  $C \rightarrow K \rightarrow L \rightarrow M$

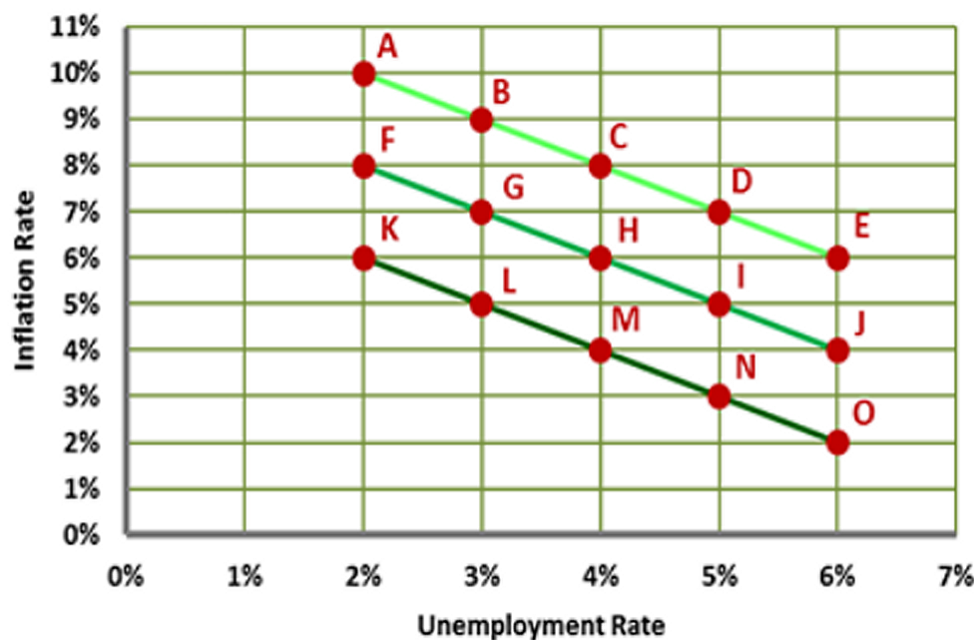
(c)  $C \rightarrow G \rightarrow H$

(d)  $C \rightarrow E \rightarrow I \rightarrow M$

(e)  $\frac{1}{\sqrt{2\pi}} \int_{-\infty}^x e^{-\frac{1}{2}y^2} dy \rightarrow :$



**Answer 8: d.** Inflation got too high in the late 1970s and Fed chairman Paul Volcker decided to engineer a recession in order to bring inflation back down by substantially reducing the growth rate of money,  $m$ . Initially this took the economy from  $C$  to  $E$  as the unemployment rate increased and inflation fell a little bit. Then people realized he was serious about this—that the reduction in  $m$  was permanent—so their inflation expectations fell. The fall in expected inflation meant the economy moved to a lower Phillips curve as unemployment slowly moved back to its natural rate; this can be seen as moving from  $E$  to  $I$ . Eventually they got back to  $M$  with full employment and a tolerable rate of inflation.

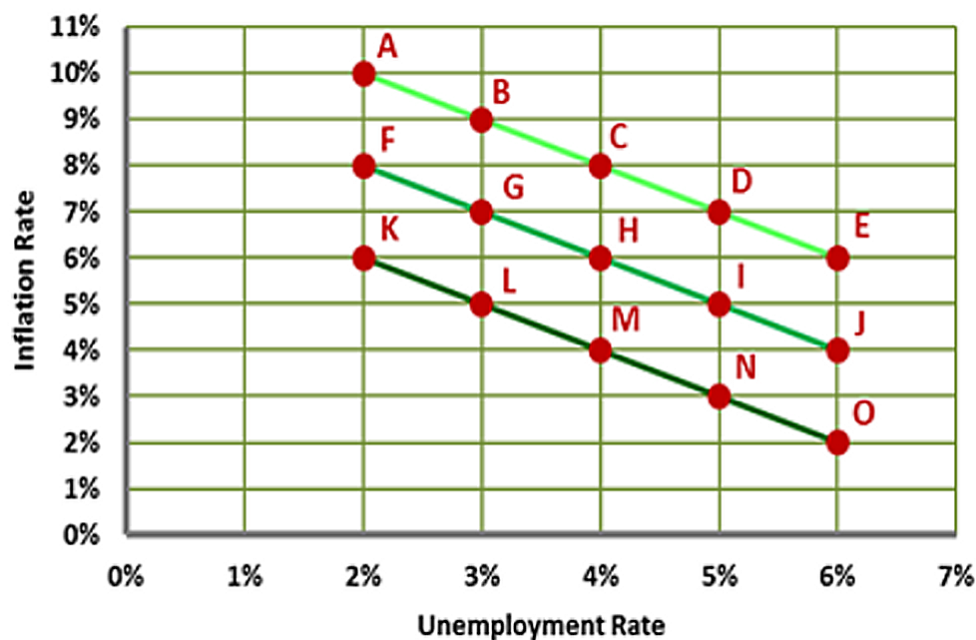
**Problem 9.**

The natural rate of unemployment is 4%. The growth rate of the money supply is  $m = 7\%$  and real GDP grows at the rate of  $g = 3\%$ . The economy is in long-run equilibrium. Which of the following events could cause the economy to move to point  $K$  in the short run?

- (a) an increase in the money supply
- (b) an increase in taxes
- (c) a decrease in transfer payments
- (d) a decrease in government spending
- (e) an increase in hotdog trees

**Answer 9: a.** The expected rate of inflation is  $m - g = 4\%$ . Since it tells us the economy is in long-run equilibrium, it means that actual inflation is also 4%. So we are starting at the point M.

So we want to think of a way that will get us to point  $K$ . Since we're not shifting to a different Phillips curve, it means inflation expectations are unchanged, i.e. there is no *permanent* change in  $m$  or  $g$ . Instead some sort of expansionary policy must occur that increases inflation and decreases unemployment. Of these options, only the increase in the money supply is expansionary. (It is not implied that the increase in the money supply constitutes a permanent increase in the growth of the money supply over time.)

**Problem 10.**

The natural rate of unemployment is 4%. The rate of money supply growth is 8% and the real GDP grows at the rate of 2%. The economy is in long-run equilibrium. What event would cause the economy to move from point D and then to H?

- (a) an increase in expected future profits
- (b) an increase in uncertainty about future profits
- (c) an oil shock
- (d) a decrease in real wealth
- (e) one too many clowns crammed into a clown car

**Answer 10: c.** We're starting at the long-run equilibrium inflation rate of  $8 - 2 = 6\%$  and at  $u_n = 4\%$ , so point H.

An oil shock means there is a sudden increase in the price of oil—perhaps OPEC decides to restrict how much oil they're exporting. This creates a recession where inflation increases *and* unemployment increase—which must mean we move to a higher Phillips curve. So we go from H to D.

However, neither  $m$  nor  $g$  have changed. The idea is that eventually the higher oil price will be “incorporated” into all of the economy's prices, and therefore prices will stop rising because of the oil shock. This means people will expect inflation will gravitate back towards  $m - g = 6\%$ . So we'll go right back from D to H as the oil shock loses its effect on the economy.