

recession. Its second option is to increase aggregate demand by increasing the money supply, bringing the economy back toward the natural rate of output, as in Figure 9-5.

This policy leads to a permanently higher price level at the new equilibrium, point C. Thus, in the case of a supply shock, there is no way to adjust aggregate demand to maintain both full employment and a stable price level.

Total: 20

Problems and Applications

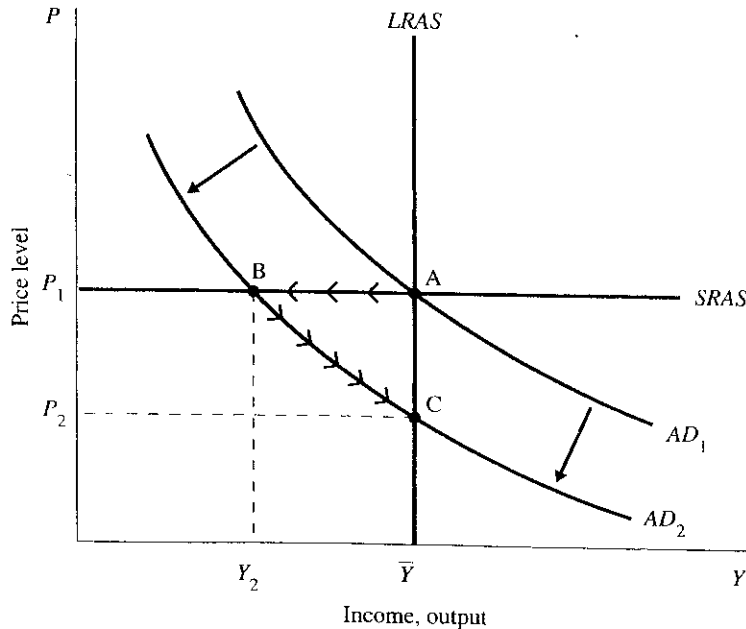
1. a. Interest-bearing checking accounts make holding money more attractive. This increases the demand for money. ↓
 b. The increase in money demand is equivalent to a decrease in the velocity of money. Recall the quantity equation ↓

$$M/P = kY,$$

where $k = 1/V$. For this equation to hold, an increase in real money balances for a given amount of output means that k must increase; that is, velocity falls. Because interest on checking accounts encourages people to hold money, dollars circulate less frequently.

- c. If the Fed keeps the money supply the same, the decrease in velocity shifts the aggregate demand curve downward, as in Figure 9-6. In the short run when prices are sticky, the economy moves from the initial equilibrium, point A, to the short-run equilibrium, point B. The drop in aggregate demand reduces the output of the economy below the natural rate. 0.5

Figure 9-6



Over time, the low level of aggregate demand causes prices and wages to fall. As prices fall, output gradually rises until it reaches the natural-rate level of output at point C. 0.5

0.5

- 2/ d. The decrease in velocity causes the aggregate demand curve to shift downward. The Fed could increase the money supply to offset this decrease and thereby return the economy to its original equilibrium at point A, as in Figure 9-7.

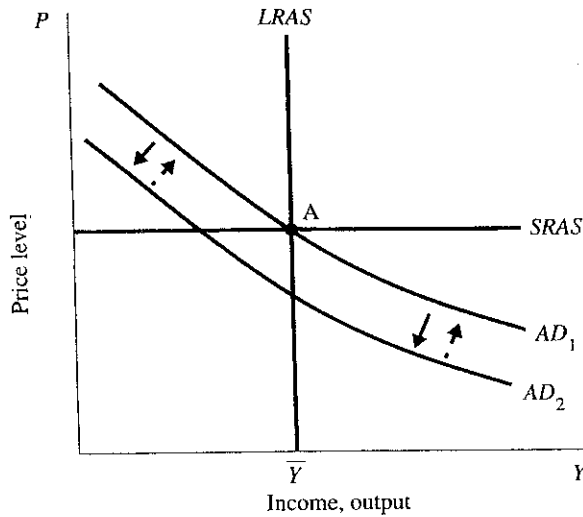


Figure 9-7

To the extent that the Fed can accurately measure changes in velocity, it has the ability to reduce or even eliminate the impact of such a demand shock on output. In particular, when a regulatory change causes money demand to change in a predictable way, the Fed should make the money supply respond to that change in order to prevent it from disrupting the economy.

4

- 2/ 2. a. If the Fed reduces the money supply, then the aggregate demand curve shifts down, as in Figure 9-8. This result is based on the quantity equation $MV = PY$, which tells us that a decrease in money M leads to a proportionate decrease in nominal output PY (assuming that velocity V is fixed). For any given price level P , the level of output Y is lower, and for any given Y , P is lower.

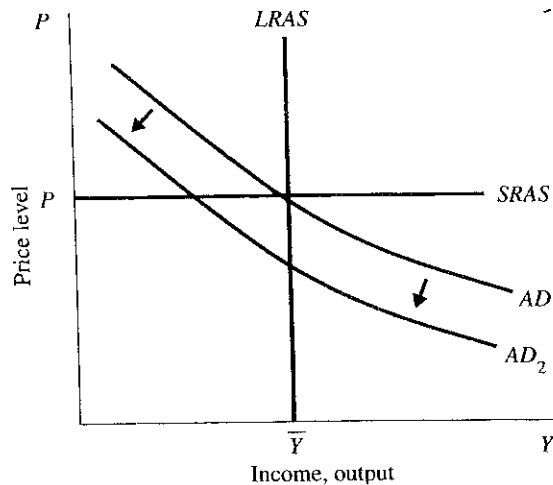


Figure 9-8

- b. Recall from Chapter 4 that we can express the quantity equation in terms of percentage changes:

$$\% \Delta \text{ in } M + \% \Delta \text{ in } V = \% \Delta \text{ in } P + \% \Delta \text{ in } Y.$$

If we assume that velocity is constant, then the $\% \Delta \text{ in } V = 0$. Therefore,

$$\% \Delta \text{ in } M = \% \Delta \text{ in } P + \% \Delta \text{ in } Y.$$

We know that in the short run, the price level is fixed. This implies that the $\% \Delta \text{ in } P = 0$. Therefore,

$$\% \Delta \text{ in } M = \% \Delta \text{ in } Y.$$

Based on this equation, we conclude that in the short run a 5-percent reduction in the money supply leads to a 5-percent reduction in output. This is shown in Figure 9-9.

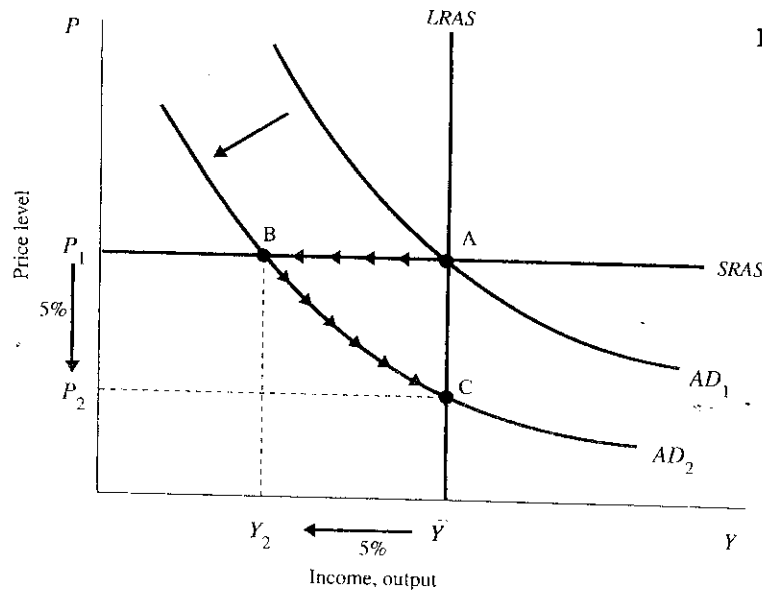


Figure 9-9

In the long run we know that prices are flexible and the economy returns to its natural rate of output. This implies that in the long run, the $\% \Delta \text{ in } Y = 0$. Therefore,

$$\% \Delta \text{ in } M = \% \Delta \text{ in } P.$$

Based on this equation, we conclude that in the long run a 5-percent reduction in the money supply leads to a 5-percent reduction in the price level, as shown in Figure 9-9.

Okun's law refers to the negative relationship that exists between unemployment and real GDP. Okun's law can be summarized by the equation:

$$\% \Delta \text{ in Real GDP} = 3\% - 2 \times [\Delta \text{ in Unemployment Rate}].$$

That is, output moves in the opposite direction from unemployment, with a ratio of 2 to 1. In the short run, when Y falls 5 percent, unemployment increases 2-1/2 percent. In the long run, both output and unemployment return to their natural rate levels. Thus, there is no long-run change in unemployment.

4. The national income accounts identity tells us that saving $S = Y - C - G$. Thus, when Y falls, S falls. Figure 9-10 shows that this causes the real interest rate to rise. When Y returns to its original equilibrium level, so does the real interest rate.

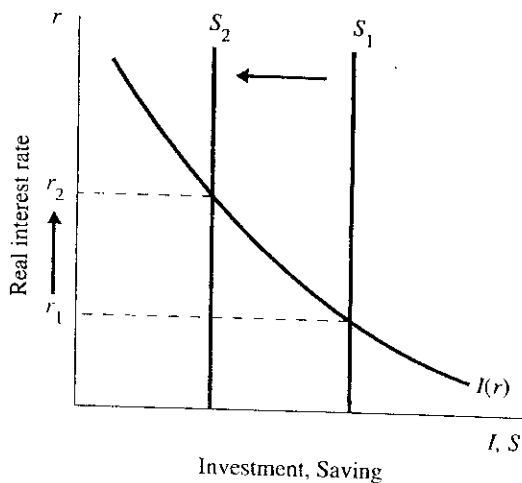


Figure 9-10

3. a. An exogenous decrease in the velocity of money causes the aggregate demand curve to shift downward, as in Figure 9-11. In the short run, prices are fixed, so output falls.

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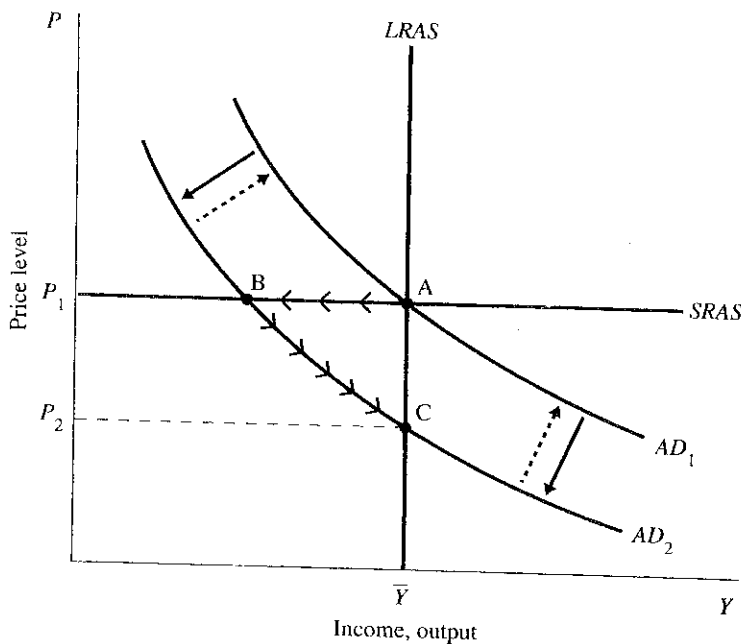


Figure 9-11

1.5 If the Fed wants to keep output and employment at their natural-rate levels, it must increase aggregate demand to offset the decrease in velocity. By increasing the money supply, the Fed can shift the aggregate demand curve upward, restoring the economy to its original equilibrium at point A. Both the price level and output remain constant.

1.5
 If the Fed wants to keep prices stable, then it wants to avoid the long-run adjustment to a lower price level at point C in Figure 9-11. Therefore, it should increase the money supply and shift the aggregate demand curve upward, again restoring the original equilibrium at point A.

Thus, both Feds make the same choice of policy in response to this demand shock.

- b. An exogenous increase in the price of oil is an adverse supply shock that causes the short-run aggregate supply curve to shift upward, as in Figure 9-12.

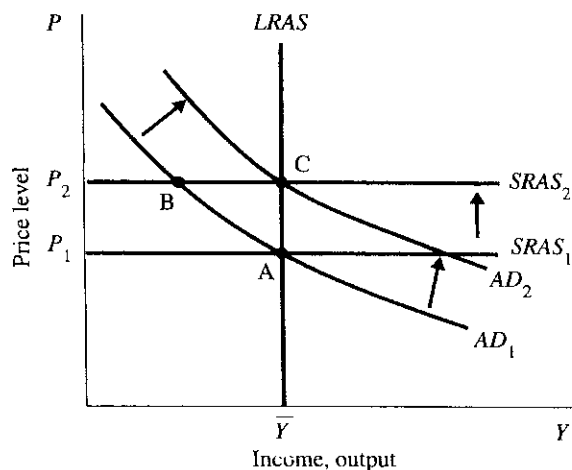


Figure 9-12

If the Fed cares about keeping output and employment at their natural-rate levels, then it should increase aggregate demand by increasing the money supply. This policy response shifts the aggregate demand curve upwards, as shown in the shift from AD_1 to AD_2 in Figure 9-12. In this case, the economy immediately reaches a new equilibrium at point C. The price level at point C is permanently higher, but there is no loss in output associated with the adverse supply shock.

If the Fed cares about keeping prices stable, then there is no policy response it can implement. In the short run, the price level stays at the higher level P_2 . If the Fed increases aggregate demand, then the economy ends up with a permanently higher price level. Hence, the Fed must simply wait, holding aggregate demand constant. Eventually, prices fall to restore full employment at the old price level P_1 . But the cost of this process is a prolonged recession.

Thus, the two Feds make a different policy choice in response to a supply shock.

4. From the main NBER web page (www.nber.org), I followed the link to Business Cycle Dates (<http://www.nber.org/cycles.html>, downloaded February 10, 2002). As of this writing, the latest turning point was in March 2001, when the economy switched from expansion to contraction.

Previous recessions (contractions) over the past three decades were July 1990 to March 1991; July 1981 to November 1982; January 1980 to July 1980; and November 1973 to March 1975. (Note that in the NBER table, the beginning date of a recession is shown as the "peak" (second column shown) of one expansion, and the end of the recession is shown as the "trough" (first column shown) of the next expansion.)

from March 2001 to November 2001

Nov 1973 - Mar 1975
 Jan 1980 - July 1980
 July 1981 - Nov 1982
 List of cycles 2
 July 1990 - March 1991
 March 2001 - Nov 2001

1.5
 1.5
 March 10th, 2004
 1