



EC 205 Macroeconomics I
Fall 2023
Problem Session 5

- 1) An economy begins in long-run equilibrium, and then a change in government regulations allows banks to start paying interest on checking accounts. Recall that the money stock is the sum of currency and demand deposits, including checking accounts, so this regulatory change makes holding money more attractive.

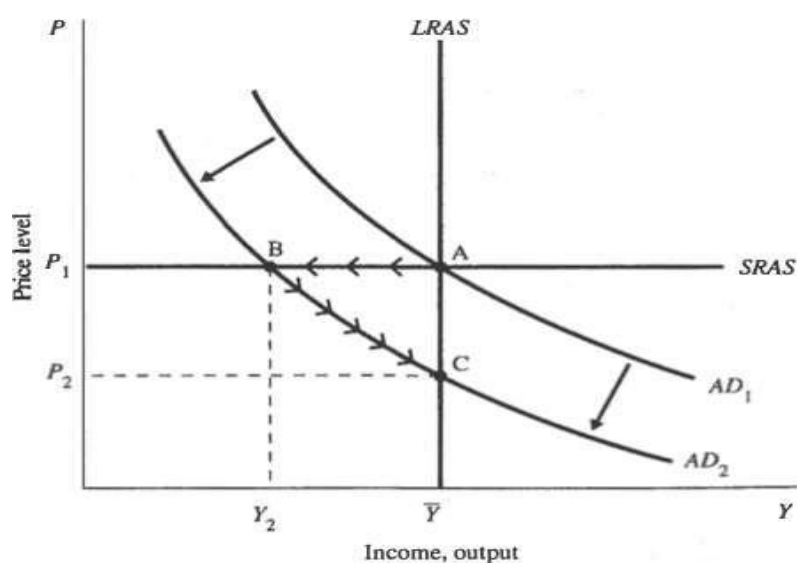
- a) How does this change affect the demand for money?

Interest-bearing checking accounts make holding money more attractive. This increases the demand for money.

- b) If the Fed keeps the money supply constant, what will happen to output and prices in the short run and in the long run?

If the Fed keeps the money supply the same, the decrease in velocity shifts the aggregate demand curve downward, as in Figure 10-6. 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.

Figure 10-6



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.

- c) If the goal of the Fed is to stabilize the price level, should the Fed keep the money supply constant in response to this regulatory change? If not, what should it do? Why?

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 10-7.

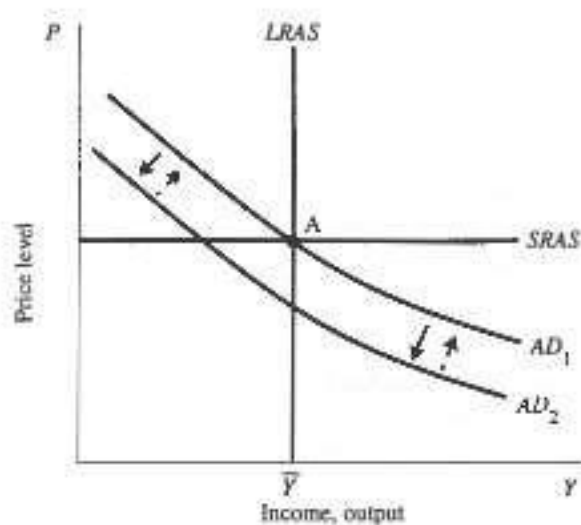


Figure 10-7

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.

- d) If the goal of the Fed is to stabilize output, how would your answer to part (c) change?

The decrease in velocity shifts the aggregate demand curve down and to the left. In the short run, the price level remains the same and the level of output falls below the natural rate. If the Fed wants to stabilize output and return it to the natural rate, they should increase the money supply. Note that increasing the money supply in this case will stabilize both output and the price level so that the answer here is the same as in part c.

- 2) Assume that the long-run aggregate supply curve is vertical at $Y = 3000$ (due to fixed factors of production), while the short-run aggregate supply curve is horizontal at $P = \$1$ (due to sticky prices)

The aggregate demand curve is given as $Y = 2(M/P)$ and $M = 1500$.

- a) If the economy is initially in its long-run equilibrium, what are the values of P and Y ?

The short-run price level is determined by the SRAS, which is at $P = 1$, hence price level is $P=1$.

Since the economy is in the long run equilibrium, output level equals $Y = 3,000$ in the short-run, as well.

- b) What is the velocity of money in this case?

The quantity theory of money states that $PY=MV$. Plugging $P=1$, $Y=3,000$, and $M=1,500$, this equation yields $V=2$, therefore velocity equals 2.

- c) Suppose because banks start paying interest on checking accounts, the aggregate demand function shifts to $Y = (1.5)(M/P)$. What are the short-run values of P and Y ?

Since in the short-run, it must be that prices are sticky (due to SRAS), P is still at its old value $P=1$.

Now, since the demand equation implies $Y = (1.5)(M/P)$, and money supply is still fixed at $M=1,500$ unless otherwise told, the new output level is $Y=1.5(1500/1)=2,250$. (Note that the AD curve implies $Y=2(1500/1) = 3,000$ initially since we were in the long-run equilibrium.)

- d) What is the velocity of money in this case?

Again, using the quantity theory of money, $PY=MV$, velocity equals $V=PY/M=(1 \times 2,250)/1,500=1.5$.

- e) With the new aggregate demand function, once the economy adjusts to long-run equilibrium, what are P and Y ?

In the long-run, output level has to equal to the long-run output level $Y=3,000$. We need to figure out the new price level with $Y=3,000$ using the aggregate demand equation.

Since $Y=(1.5)(M/P)$, and money supply is still fixed at $M=1,500$, price level has to equal $P=1.5(M/Y)=1.5(1500/3000)=1.5(0.5)=0.75$.

Therefore, lower aggregate demand lowers prices in the long run, while economy returns back to its natural level of output.

f) What is the velocity now?

The velocity has to be constant along the same aggregate demand curve, and we calculated it to equal to 1.5. To convince yourself, note that using the quantity theory of money, $PY=MV$ also suggests $V=PY/M=0.75 \times 3000/1500=1.50$.

3) Explain the impact of an increase in the money supply in the short run and in the long run.

If the Fed increases the money supply, then the aggregate demand curve shifts outward, as in Figure 10-2. In the short run, prices are sticky, so the economy moves along the short-run aggregate supply curve from point A to point B. Output rises above its natural rate level Y : the economy is in a boom. The high demand, however, eventually causes wages and prices to increase. This gradual increase in prices moves the economy along the new aggregate demand curve AD_2 to point C. At the new long-run equilibrium, output is at its natural-rate level, but prices are higher than they were in the initial equilibrium at point A.

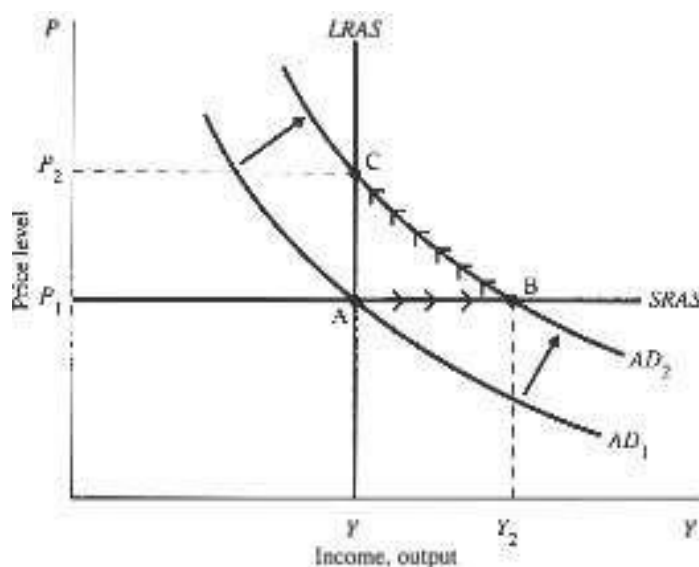
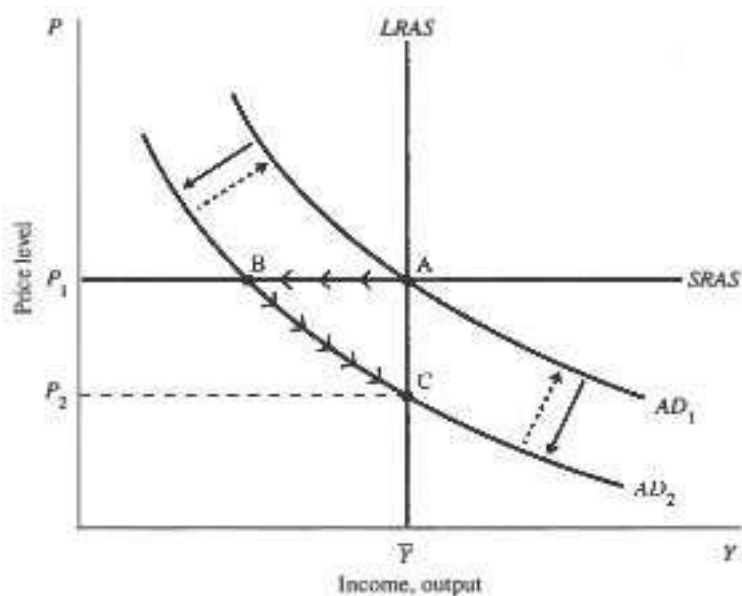


Figure 10-2

- 4) Let's examine how the goals of the Fed influence its response to shocks. Suppose that in scenario A the Fed cares only about keeping the price level stable and in scenario B the Fed cares only about keeping output and employment at their natural levels. Explain how in each scenario the Fed would respond to the following.

- a) An exogenous decrease in the velocity of money.

An exogenous decrease in the velocity of money causes the aggregate demand curve to shift downward, as in Figure 10-11. In the short run, prices are fixed, so output falls.



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.

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 10-11. 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.

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 10-12.

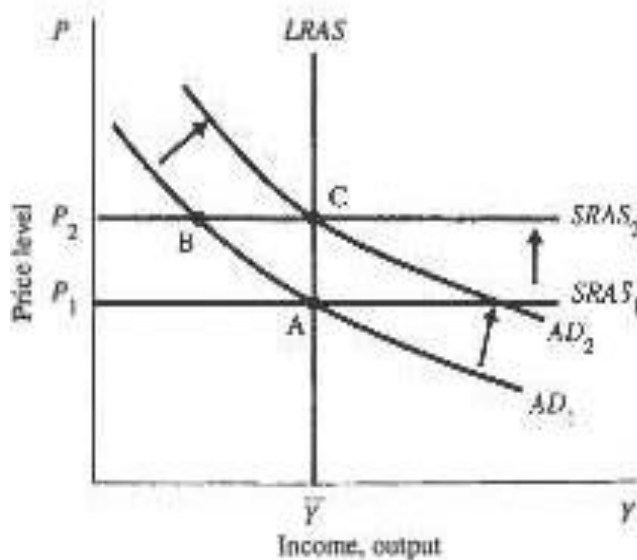


Figure 10-12

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 10-12. 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.

5) Why is it easier for the Fed to deal with demand shocks than with supply shocks?

It is easier for the Fed to deal with demand shocks than with supply shocks because the Fed can reduce or even eliminate the impact of demand shocks on output by controlling the money supply. In the case of a supply shock, however, there is no way for the Fed to adjust aggregate demand to maintain both full employment and a stable price level.

To understand why this is true, consider the policy options available to the Fed in each case. Suppose that a demand shock (such as the introduction of automatic teller machines, which reduces money demand by decreasing the parameter k and therefore increasing velocity V) shifts the aggregate demand curve outward, as in Figure 10-3. Output increases in the short run to Y_2 . In the long run output returns to the natural rate level, but at a higher price level P_2 . The Fed can offset this increase in velocity, however, by reducing the money supply; this returns the aggregate demand curve to its initial position, AD_1 . To the extent that the Fed can control the money supply, it can reduce or even eliminate the impact of demand shocks on output.

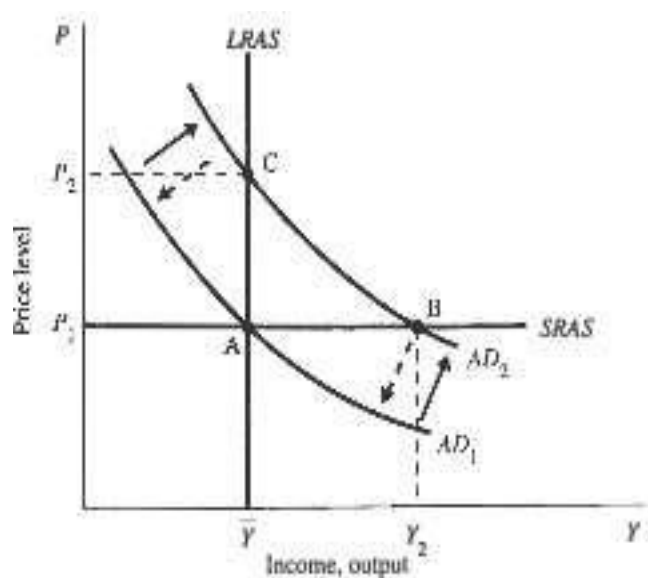


Figure 10-3

Now consider how an adverse supply shock (such as a crop failure or an increase in union aggressiveness) affects the economy. As shown in Figure 10-4, the short-run aggregate supply curve shifts up, and the economy moves from point A to point B.

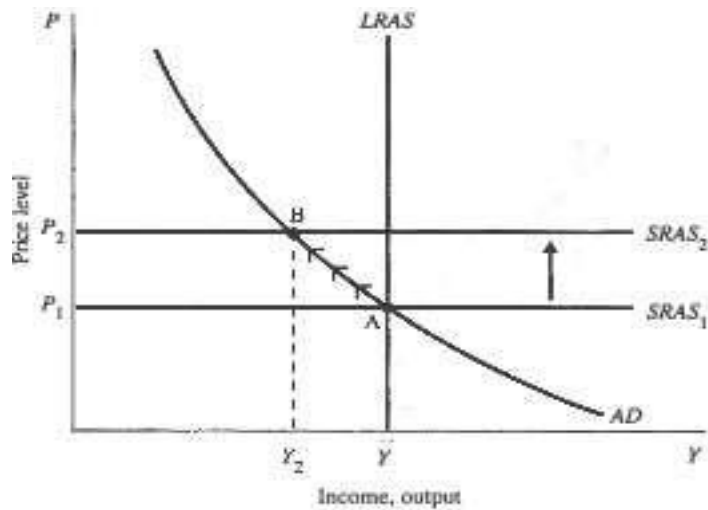


Figure 10-4

Output falls below the natural rate and prices rise. The Fed has two options. Its first option is to hold aggregate demand constant, in which case output falls below its natural rate. Eventually prices fall and restore full employment, but the cost is a painful 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 10-5.

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.

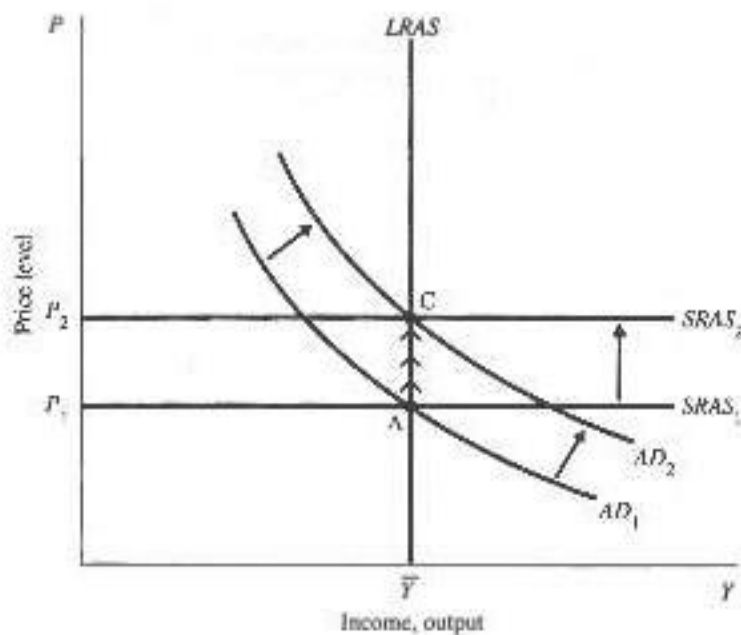


Figure 10-5