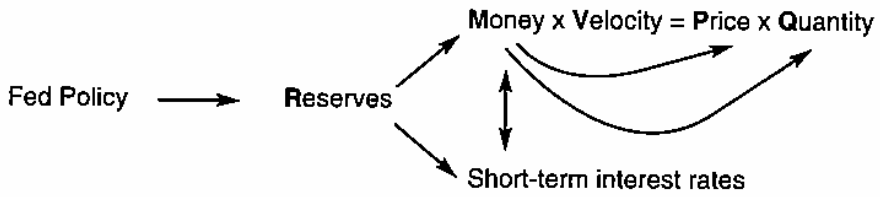
The Federal Reserve: Monetary Policy and Macroeconomics

The Basics

- **Purpose of monetary policy:** "To promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates" (*The Federal Reserve System: Purpose and Functions*, Washington D.C.: Federal Reserve Board of Governors, page 17.)
- **Primary goal since 1979:** To stabilize prices, which is arguably the strongest contribution the Fed can make toward maximizing long-term real output and moderating long-term interest rates
- **Reason for this goal:** Over time, it has become evident that monetary policy's long-term influence over prices is strong and predictable, but its influence over real output and real interest rates is mostly short-term and not highly predictable.

Linkages That Motivate Monetary Policy

The following diagram illustrates how monetary policy operates and how it affects prices and quantities (real output).



The Fed Influences the Money Supply by Managing Reserves

A greater volume of reserves leads banks to expand credit, expanding the money supply through the *money multiplier.*

- **Tools of policy:** Open market operations are the most frequently used tool. Changes in the discount rate are used primarily to signal the Fed's policy. Reserve requirements are seldom adjusted.
- **Choice of policy targets:** The Fed can set money supply targets, knowing that such actions will affect short-term interest rates as a by-product. Or the Fed can target short-term interest rates directly. Because of changes in financial institutions and other economic relationships, the optimal operating procedures change over time.
- **Limitation on policy:** The Fed cannot target the money supply and short-term interest rates simultaneously. *Ceteris paribus*, or all other factors held constant, increasing (decreasing) the money supply decreases (increases) short-term interest rates.
- **Importance of velocity:** Changes in the money supply have little short-term effect on velocity, so changes in the money supply *must* affect prices or real output, or both. This linkage provides the underlying motive for the long-term conduct of monetary policy.

Activity written by Robert Graboyes, University of Richmond, Richmond, Va.

Economists Can Disagree Sharply Over the Effects of a Given Monetary Policy

This disagreement can occur because

- the relationship between reserves and the money supply can change.
- the relationship between the money supply and short-term interest rates can change.
- velocity is not entirely stable.
- it is difficult to determine which money supply measure is most appropriate to policy.
- though today's monetary economists do not generally fall neatly into categories such as "Keynesian" and "monetarist," debates persist over the relative impact of monetary policy on prices and output. These relative impacts can change over time.
- data are imperfect, and many data series are produced and transmitted with lags.
- economic relationships are dynamic. Action the Fed takes today affects the economy well into the future.

1. What is monetary policy?

2. From 1998 to 2002, what was the dominant focus of monetary policy and why?

3. Explain why the money supply and short-term interest rates are inversely related.

4. What are some reasons for lags and imperfections in data used by central banks?

5. Why do many economists believe that central banks have more control over the price level than over real output?

6. What might cause velocity to change?

7. If velocity were extremely volatile, why would this complicate the job of making monetary policy?

8. What role does the money multiplier play in enabling the Fed to conduct monetary policy?

9. What is the fed funds rate?

10. What happens to the fed funds rate if the Fed follows a contractionary (tight money) policy?

11. What happens to the fed funds rate if the Fed follows an expansionary (easy money) policy?

12. Why do observers pay close attention to the federal funds rate?

Real Interest Rates and Nominal Interest Rates

If you bought a one-year bond for $1,000 and the bond paid an interest rate of 10 percent, at the end of the year would you be 10 percent wealthier? You will certainly have 10 percent more money than you did a year earlier, but can you buy 10 percent more? If the price level has risen, the answer is that you cannot buy 10 percent more: If the inflation rate were 8 percent, then you could buy only 2 percent more; if the inflation rate were 12 percent, you would be able to buy 2 percent less! The *nominal interest rate* is the rate the bank pays you on your savings or the rate that appears on your bond or car loan. The *actual real interest rate* represents the change in your purchasing power. The *expected real interest rate* represents the amount you need to receive in real terms to forgo consumption now for consumption in the future.

The relationship between the nominal interest rate, the real interest rate and the inflation rate can be written as

$$r = i - \pi$$

where r is the real interest rate, i is the nominal interest rate and π is the inflation rate. This relationship is called the *Fisher Equation.* In the example above with the 10 percent bond, if the inflation rate were 6 percent, then your real interest rate (the increase in your purchasing power) would be 4 percent.

Obviously banks and customers do not know what inflation is going to be, so the interest rates on loans, bonds, etc. are set based on expected inflation. The expected real interest rate is

$$r^e = i - \pi^e$$

where π^e is the expected inflation rate. The equation can be rewritten as

$$i = r^e + \pi^e$$

A bank sets the nominal interest rate equal to its expected real interest rate plus the expected inflation rate. However, the real interest rate it actually receives may be different if inflation is not equal to the bank's expected inflation rate.

The equation of exchange is MV = PQ. If we assume that velocity (V) is constant, then changes in the money supply (M) result in changes in the nominal output (PQ). The equation of exchange can be rewritten in terms of percentage change to be

percentage change in money supply + percentage change in velocity = percentage change in price level + percentage change in real output

Activity written by Rae Jean B. Goodman, U.S. Naval Academy, Annapolis, Md.

The first term, *percentage change in the money supply,* is controlled by the monetary authority (Federal Reserve). Assuming that velocity is constant, the second term is zero. The third term is the inflation rate and the fourth term is the growth in real output. Output (Q) is determined by the factors of production, technology and the production function. Output can be taken as given. Therefore, the percentage change in the money supply results in an equal percentage change in the price level.

Increases in the money supply by the Federal Reserve will result in increases in the price level, or inflation. Using the Fisher Equation, the increase in inflation would result in an increase in the nominal interest rate or a decrease in the real interest rate or in some combination. This is known as the *Fisher Effect,* or *Fisher Hypothesis.* Evidence indicates that increases in the inflation rate result in increases in the nominal interest rate in the long run. Increases in the money supply are translated into increases in the price level and increases in the nominal interest rate *in the long run.*

We know that

- in the short run, increases in the money supply decrease the nominal interest rate and real interest rate;
- in the long run, increases in the money supply will result in an increase in the price level and the nominal interest rate.

Figure 41.1
Real and Nominal Interest Rates

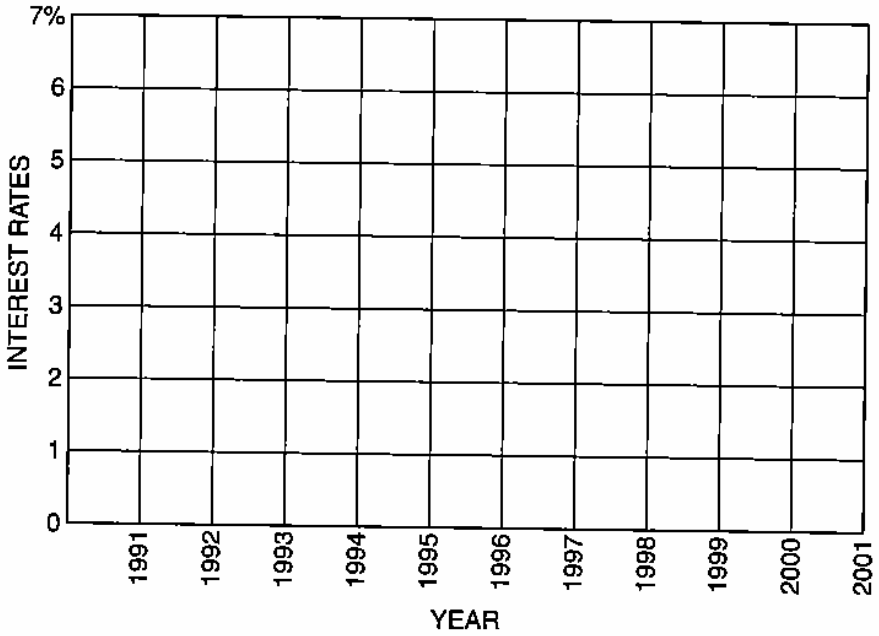
Year	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1991	5.41%	3.12%	
1992	3.46	2.30	
1993	3.02	2.42	
1994	4.27	2.05	
1995	5.51	2.12	
1996	5.02	1.87	
1997	5.07	1.85	
1998	4.78	1.14	
1999	4.64	1.56	
2000	5.82	2.29	
2001	3.39	1.96	

1. Figure 41.1 provides the nominal interest rates and inflation rates for the years 1991 through 2001.

   (A) Compute the actual real interest rates for 1991 through 2001.

   (B) Graph the nominal interest rates and the actual real interest rates on Figure 41.2.

Figure 41.2
Real and Nominal Interest Rates



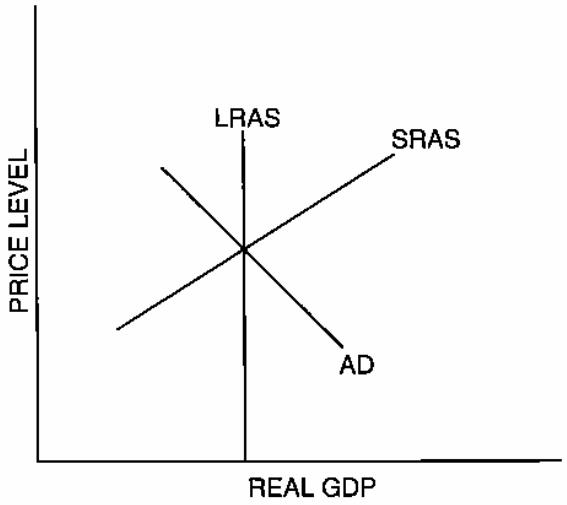
(C) Has the actual real interest rate stayed constant? _____

(D) If it has not, explain why you think the real rate has not been constant.

(E) For what years has the actual real interest rate remained nearly constant?

2. Frequently, economists argue that the monetary authorities should try to maintain a steady real interest rate. Explain why you think a steady real rate of interest is important to the economy.

Figure 41.3
Expansionary Monetary Policy



3. Suppose that initially the economy is at the intersection of AD and SRAS as shown in Figure 41.3. Now, the Fed decides to implement expansionary monetary policy to increase the level of employment.

(A) In the short run, what happens to real output? Explain why.

(B) In the short run, what happens to the price level? Explain why.

(C) In the short run, what happens to employment and nominal wages? Explain why.

(D) In the short run, what happens to nominal interest rates and real interest rates?

(E) In the long run, what happens to real output? Explain why.

(F) In the long run, what happens to the price level? Explain why.

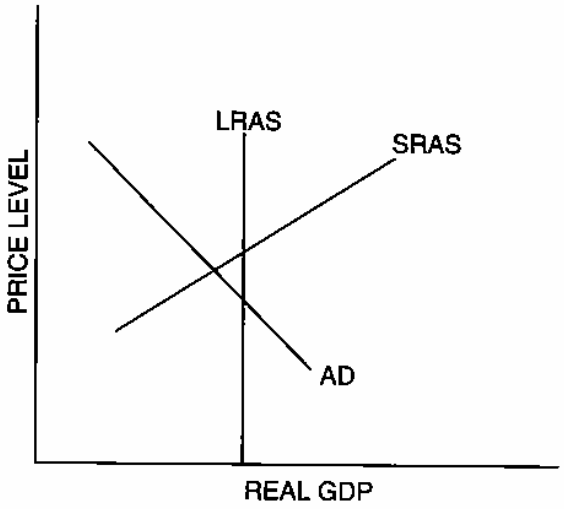
(G) In the long run, what happens to employment and nominal wages? Explain why.

(H) In the long run, what happens to the nominal interest rate and the real interest rate?

Monetary Policy

We now bring together all of the pieces of the process by which monetary policy is transmitted to the economy, and we examine both the short-run effects and the long-run effects of monetary policy.

Figure 42.1
Effects of Monetary Policy



1. Suppose that initially the economy is at the intersection of AD and SRAS in Figure 42.1.

   (A) What monetary policy should the Fed implement to move the economy to full-employment output? _____

   (B) If the Fed is going to use open market operations, it should *(buy / sell)* Treasury securities.

   (C) What is the effect on Treasury security (bond) prices?

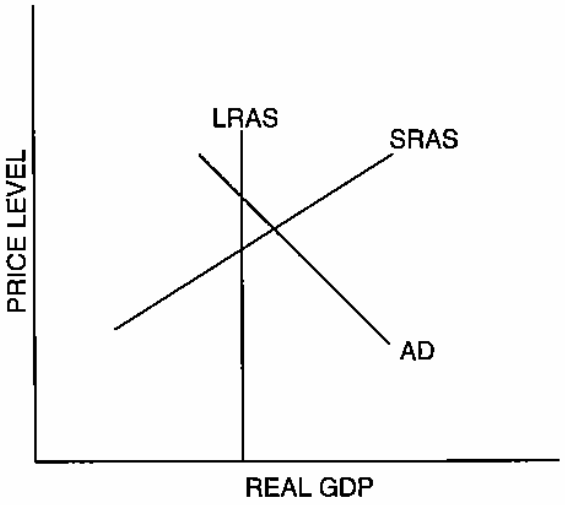
   (D) In the short run, what is the effect on nominal interest rates? Explain.

   (E) In the short run, what happens to real output? Explain how the Fed's action results in a change in real output.

Activity written by Rae Jean B. Goodman, U.S. Naval Academy, Annapolis, Md.

(F) In the short run, what happens to the price level? Explain how the Fed's action results in a change to the price level.

Figure 42.2
Moving to Full Employment



2. Suppose that initially the economy is at the intersection of AD and SRAS in Figure 42.2.

   (A) What monetary policy should the Fed implement to move the economy to full-employment output? _____

   (B) If the Fed is going to use open market operations, it should *(buy / sell)* Treasury securities.

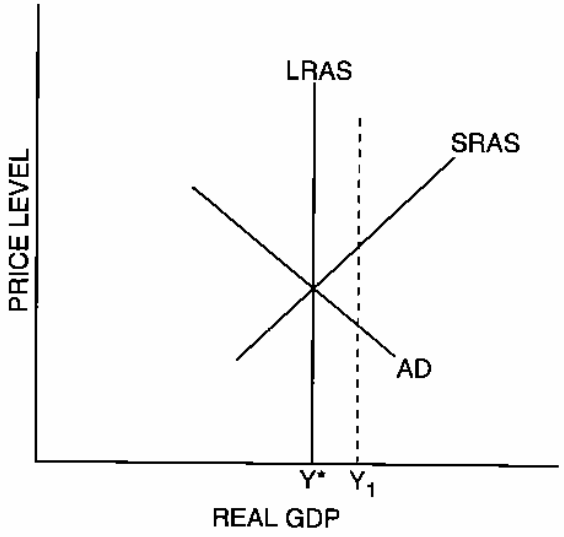
   (C) What is the effect on Treasury security (bond) prices?

   (D) In the short run, what is the effect on nominal interest rates? Explain.

   (E) In the short run, what happens to real output? Explain how the Fed's action results in a change in real output.

(F) In the short run, what happens to the price level? Explain how the Fed's action results in a change to the price level.

Figure 42.3
Expansionary Monetary Policy



3. Suppose that in the situation shown in Figure 42.3, the aggregate supply and demand curves are represented by LRAS, SRAS and AD. The monetary authorities decide to maintain the level of employment represented by the output level Y_1 by using expansionary monetary policy.

   (A) Explain the effect of the expansionary monetary policy on the price level and output in the short run.

   (B) Explain the effect on the price level and output in the long run.

(C) Explain what you think will happen to the nominal rate of interest and the real rate of interest in the short run as the Fed continues to increase the money supply. Explain why.

(D) Explain what you think will happen to the nominal rate of interest and the real rate of interest in the long run. Explain why.

4. Many economists think that moving from short-run equilibrium to long-run equilibrium may take several years. List three reasons why the economy might not immediately move to long-run equilibrium.

5. In a short paragraph, summarize the long-run impact of an expansionary monetary policy on the economy.