The Federal Reserve's Control over Nominal and Real Interest Rates

Investment and aggregate demand are affected by the real interest rate, not the nominal interest rate. So when the Federal Reserve wishes to alter monetary policy, its ultimate goal is to change the real interest rate and thereby affect the amount of investment and aggregate demand in the economy.

It is the case, though, that the Federal Reserve cannot target the real interest rate directly. That's because each of the interest rates that the Fed targets is nominal. That is true for the Federal Funds rate, the discount rate, and the interest rate paid on reserves. Each is a nominal interest rate. In addition, the various government and GSE bonds that the Fed purchases when engaging in quantitative easing also has its own nominal interest rate. So while the Fed's ultimate goal is to change the real interest rate, it has to do so by manipulating nominal interest rates.

The Fisher Equation

The Fed is able to affect the real interest rate via the various nominal interest rates because there is a simple equation that relates nominal and real interest rates. As we first explained in Chapter 27:

Nominal interest rate = real interest rate
+ inflation premium
(the expected rate of inflation)

This equation is sometimes referred to as the Fisher equation in honor of Irving Fisher, the Yale economics professor who first described it in the early 20th century. The equation posits that in the various markets where demand and supply set a nominal interest rate, market participants will set it so that it is equal to the real interest rate plus an inflation premium that reflects what market participants believe the future inflation rate will be. The real interest rate compensates lenders for giving up the use of their money for the length of the loan. The inflation premium compensates lenders for the anticipated erosion in the purchasing power of money that will occur over the length of the loan if there is inflation and a rising price level.

Two Possibilities for Adjusting Real Interest Rates

Because the nominal interest rate is the sum of the real interest rate and the inflation premium, the Fed can use the Fisher equation to target the real interest rate in two ways. To see them, rearrange the Fisher equation so that it is solved for the real interest rate:

Real interest rate = nominal interest rate
− inflation premium
(the expected rate of inflation)

This version of the Fisher equation tells us that if the Fed wants to achieve a particular value for the real interest rate, it has to change either the nominal interest rate or the inflation premium or both. One or the other or both have to be manipulated until their difference equals the desired real interest rate.

Targeting the Inflation Premium It is the case, however, that the Fed and other central banks have not found any sure-fire methods for influencing the inflation premium. Expected inflation is in large measure beyond the control of policy makers. It is for all intents and purposes a number that they cannot manipulate and which they must take as a given.

Targeting the Nominal Interest Rate With expected inflation beyond the reach of policy makers, the only remaining way for the Fed to adjust the real interest rate is by manipulating the nominal interest rate. To do that, the Fed will utilize the Fisher equation to determine the nominal interest rate that it should target.

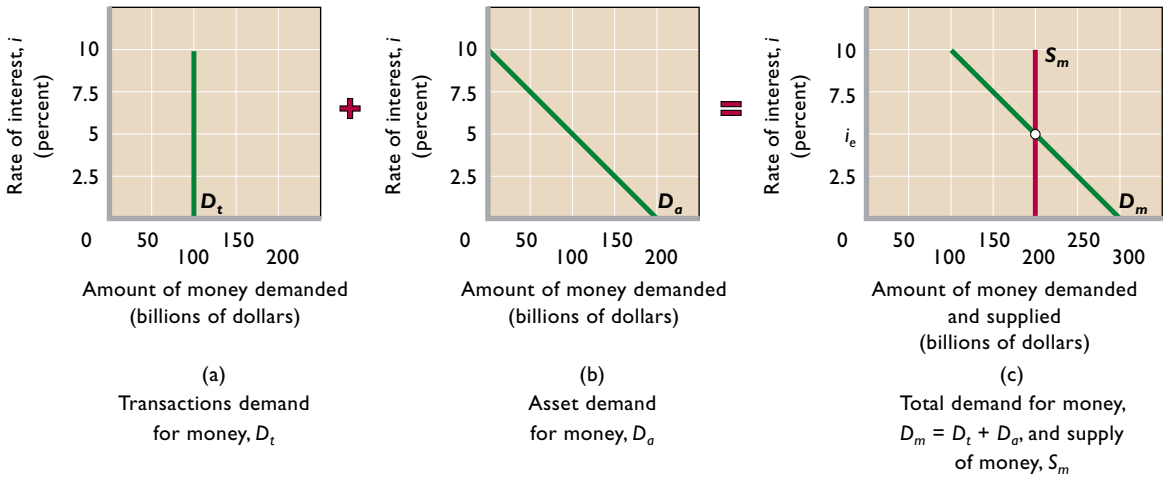
Determining the Nominal Interest Rate Target To see what the Fed has to do in a specific case, look back at the first version of the Fisher equation, the one that has the nominal interest rate on the left-hand side. If the Fed wants to achieve a 1 percent real interest rate when expected inflation is running at 2 percent, that first version of the Fisher equation tells us that the Fed must take whatever policy actions are necessary to get the nominal interest rate to be 3 percent (= 1 percent real interest rate + 2 percent expected rate of inflation).

In a similar fashion, imagine that expected inflation is 0 percent and the Fed wants a real interest rate of 2 percent. In that case, the Fed would have to adjust the nominal interest rate to 2 percent (= 2 percent real interest rate + 0 percent expected rate of inflation).

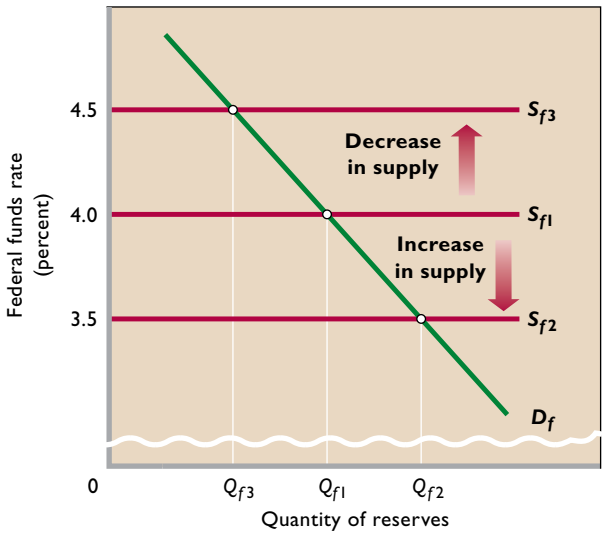
Try another scenario for yourself. Suppose that expected inflation is −2 percent (there is a deflation) and the Fed wants to set a real interest rate of 3 percent. What will the nominal rate have to be if the Fed wants to achieve that real interest rate?

Adjusting the Money Supply to Achieve the Nominal Interest Rate Target The Fed's manipulation of the nominal interest rate in order to achieve a particular real interest rate can be seen graphically in Figures 34.1c and 34.3. In Figure 34.1c, the Fed can adjust the equilibrium nominal interest rate by shifting the supply of money to the left or the right. In this way, the Fed can achieve whatever nominal interest rate is needed in order to get to whatever real interest rate the Fed wishes to set.

34.1



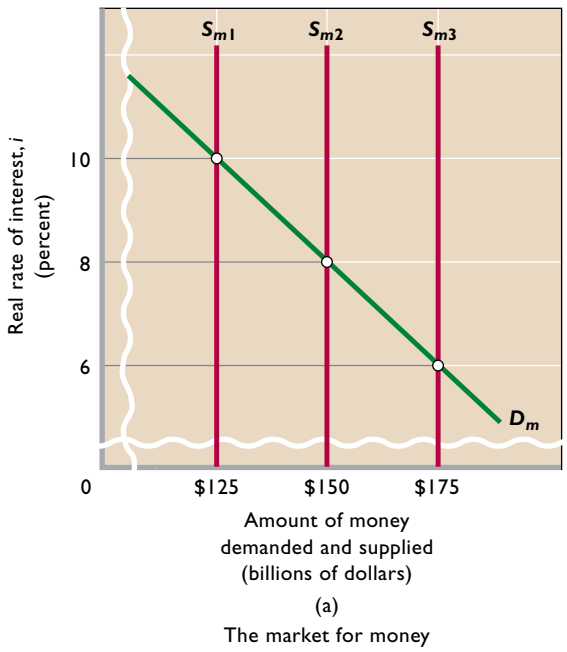
34.3



A specific instance of the Fed adjusting a nominal interest rate can be seen in Figure 34.3. There, the Fed uses open market operations to adjust the supply of bank reserves that are made available in the federal funds market. By doing so, the Fed can achieve its desired value for the (nominal) federal funds rate.

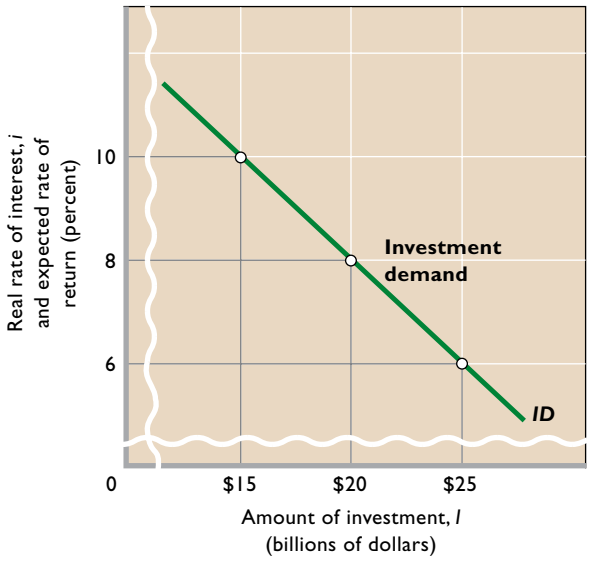
Next, consider Figure 34.5, which explains how Fed policy actions lead to changes in investment and AD. In Figure 34.5A, we are implicitly assuming (for simplicity) that expected inflation equals zero. With expected inflation equal to zero, we know from the Fisher equation that the real interest rate will always equal the nominal interest rate. Thus, in Figure 34.5A, any change in the money supply engineered by the Fed can be thought of as directly affecting the real interest rate. Those changes in the real interest rate then go on to affect the quantity of investment and AD in Figures 34.5B and 34.5C, respectively.

34.5A



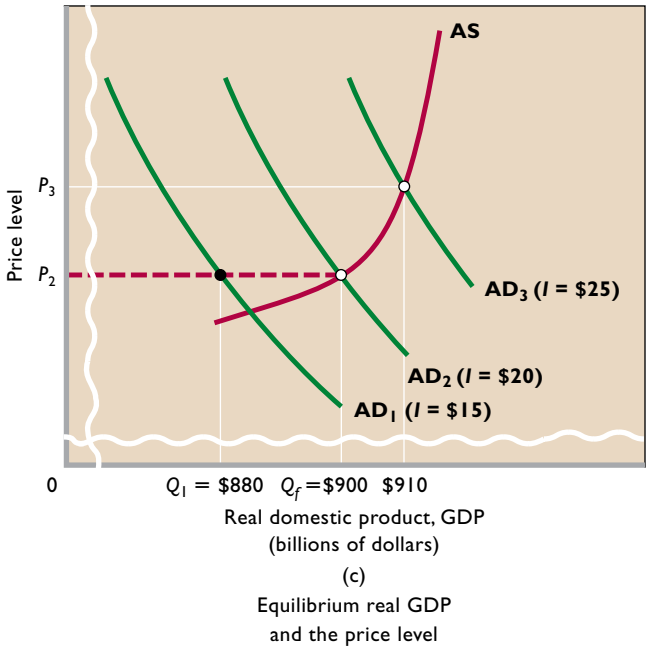
(a) The market for money

34.5B



(b) Investment demand

34.5C



In nearly all real-economy situations, however, expected inflation is not zero. As a result, the Fed can't think of its expansionary or contractionary policy actions as directly affecting the real interest rate. Whenever the expected rate of inflation deviates from zero, the Fed must use the Fisher equation to adjust the nominal interest rate as necessary until it equals the desired real interest rate plus the expected rate of inflation.

Difficulties Estimating Expected Inflation

There is one additional complication. It is not easy to know precisely what people expect future inflation to be. The Fed has to rely on estimates. To the extent that those estimates are incorrect, the nominal interest rate that the Fed sets will be either higher or lower than it should be in order to achieve the desired real interest rate.

In order to minimize this problem as much as possible, economists at the Federal Reserve spend a great deal of time attempting to come up with the best possible estimates of expected inflation: they monitor polling data on inflation expectations; they closely examine the prices of assets like gold whose values have historically reflected inflation expectations; and they also keep track of currency exchange rates because the currencies of countries with higher rates of inflation are believed to be likely to fall in value relative to the currencies of countries with lower rates of inflation.