High Real Interest Rates: Can They Be Explained?

By Stephen G. Cecchetti

There is a common perception that real interest rates have been high in the 1980s because nominal interest rates have been high, while inflation has been low. Examination of the data for the post-World War II period certainly gives that impression. Nominal interest rates less actual inflation have averaged over 3 percent in the 1980s, consistently higher than any time since 1950. Since real interest rates are crucial to investment and saving decisions and to overall business activity, it is important to determine whether they actually have been high and, if so, what has been the cause.

This article provides evidence on real interest rates in the 1980s and develops a simple framework for analyzing possible causes of the high interest rates. Various causes are examined, including restrictive monetary policy, changes in total savings brought about by a reduced saving rate and high budget deficits, and increases in the profitability of investment possibly due to changes in the tax law. The impacts of these factors are distinguished by looking at their effects on the term structure of real interest rates and on stock prices. Evidence presented in the article suggests that the rise in real interest rates in the 1980s has not been the result of a single cause. At different times, monetary policy actions, changes in investment incentives, and changes in savings decisions appear to have contributed to the rise in real rates.

The article is divided into four parts. The first section defines real interest rates, discusses appropriate measures of real interest rates, and compares estimates of real interest rates in the 1980s with earlier years. The second section discusses the term structure of real interest rates and the real yield curve. The third section describes a simple framework for distinguishing possible explanations for the rise in real interest rates by looking at the behavior of the real yield curve and stock prices. The final section examines whether proposed explanations for the rise in real rates

Stephen G. Cecchetti is an assistant professor of economics at the Graduate School of Business, New York University, and a visiting scholar at the Federal Reserve Bank of Kansas City. Thomas Dean, a research associate at the bank, assisted in the preparation of this article. The views expressed in this article are those of the author and do not necessarily reflect the views of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

during the 1980s are consistent with the empirical evidence.[1]

Real interest rates in the 1980s

The importance of the real rate of interest

Real interest rates must be distinguished from the more familiar nominal interest rates quoted by banks and reported in the financial press. Because nominal interest rates include the effects of inflation, they are poor measures of the true costs of borrowing or returns to lending. For example, a lender receiving a 10 percent nominal return on his investment will find the purchasing power of this return reduced by increases in inflation. By contrast, real interest rates remove the effects of inflation from nominal rates and provide a more accurate measure of borrowing costs and returns to lending.

Unlike nominal interest rates, real interest rates are not directly observable and so must be calculated. Real interest rates can be obtained using the "Fisher equation,"

$$(1)\quad r^e = i - p^e$$

where r^e is the expected or ex ante real interest rate, i is the nominal interest rate, and p^e is expected inflation. The expected real interest rate can be calculated by subtracting a measure of expected inflation from the observed nominal interest rate.

In the same way that relative prices provide information for the flow of resources to the production of different goods at a point in time, real interest rates influence saving and investment decisions and determine the allocation of resources over time. Changes in the expected real rate of interest lead to changes in the levels of investment and saving and translate into changes in aggregate expenditure and the level of economic activity. In general, high real interest rates depress investment, by making new capital purchases less profitable, and encourage private saving, by making current consumption more costly.[2] Both lower investment and higher savings reduce aggregate expenditure and lower the equilibrium level of output in the economy below what it otherwise would be.

The behavior of real interest rates

In examining the behavior of real interest rates in the 1980s, it is important to distinguish between the expected or ex ante concept of the real rate and a realized or ex post concept. Ex post real rates of interest are nominal interest rates less actual inflation. For a three-month security, for example, the ex post real rate of interest can be computed by taking the current nominal rate of interest and subtracting actual inflation over the three-month maturity of the security. In contrast, calculating the ex ante real rate of interest requires an estimate of expected inflation. Since inflation is not perfectly anticipated, the ex post and ex ante real rates of interest differ by the amount of unexpected inflation.

It is the ex ante real rate of interest rather than the ex post real rate that is important for economic decisions. When a firm is making an investment decision or an individual is making a saving decision, they must consider the expected real return. People do not have the benefit of knowing future

[1] For a more technical discussion of the issues raised in this article, see Stephen G. Cecchetti and Robert E. Cumby, "The Real Yield Curve," New York University, Graduate School of Business, mimeo, 1986.

[2] This is true only when all other relevant economic variables are held fixed. If the real rate of interest rises because of an unexpected increase in the profitability of new investment, investment would be observed to rise. If the real interest rate were then to fall for some other reason, investment would go up even further.

inflation with certainty. While examination of the ex post real rate of interest is interesting, it is incorrect to claim that high realized real rates of interest influence aggregate expenditure.

The ex ante real interest rate can be estimated by using a statistical procedure that accounts for the fact that expected inflation at any point in time is based only on information available at that time.[3] The implication of this procedure is that when a nominal interest rate is determined in financial markets, the real interest rate embodied in it can depend only on currently observable economic variables, such as past inflation or economic growth. An estimate of the expected real interest rate can be obtained from a regression of the realized real interest rate on these variables.

This procedure was used in obtaining monthly estimates of the ex ante real rate of interest on U.S. government securities of three-month, two-year, and five-year maturities.[4] The results for the 1950-85 period are plotted in Chart 1.

The estimates reported in Chart 1 establish conclusively that real interest rates have been very high since late 1979. Moreover, all maturities examined have been high, including the three-month rate and the two-year and five-year rates. In prior years, real interest rates rarely exceeded 3 percent. In the past seven years, levels above 5 percent have not been unusual.

[3] The procedure described is due to Frederic S. Mishkin, "The Real Interest Rate: An Empirical Investigation," *The Costs and Consequences of Inflation*, K. Brunner and A. Meltzer, eds., Carnegie-Rochester Conference Series on Public Policy, vol. 15, 1981, pp. 151-200.

[4] These estimates were obtained from a regression of the ex post real rates of interest on a set of variables consisting of the nominal interest rate, lagged inflation, lagged growth in industrial production, and lagged growth in M2. The fitted values from this regression are estimates of the ex ante real rate. While it would be interesting to look at securities with maturities beyond five years, the estimation technique used produces estimates that are too unreliable.

The term structure of interest rates

A casual glance at the financial page of any newspaper shows that there are many interest rates. Restricting the discussion to securities issued by the U.S. government, there are still many types that differ by the date on which they are redeemed—their maturity date. There are Treasury bills, usually maturing in either three or six months, and Treasury bonds, which may not come due for up to 30 years. Together, these short-term and long-term securities form the term structure of interest rates, or yield curve.

Examining the yield curve helps in understanding how policy changes and other spending decisions affect economic activity. Since investment and saving decisions are normally made with a fairly long time horizon in mind, the relevant interest rate is a long-term rate. Purchasers of capital equipment, for example, are concerned with returns over the next three, five, or ten years. At the same time, macroeconomic policy actions and private spending changes have their immediate effects on short-term real interest rates. The connection between short-term and long-term real interest rates is important in understanding how these decisions affect the economy.

A plot of the yields to maturity of securities against their time to maturity can take on many different shapes. Possible yield curves are drawn in Chart 2. In the first panel, the yield curve slopes upward, indicating that long-term interest rates exceed short-term rates. The yield curve can also be hump-shaped, as shown in the second panel of the chart, or downward sloping, as shown in the third panel.

The causes of the different shapes of the yield curve can be explained by the "expectations theory" of the term structure of interest rates. According to this theory, the yield to maturity of a long-term security is the sum of expected future short-term interest rates. If short-term interest rates are expected to rise, then the long-

CHART 1

Ex ante real interest rates on Treasury securities

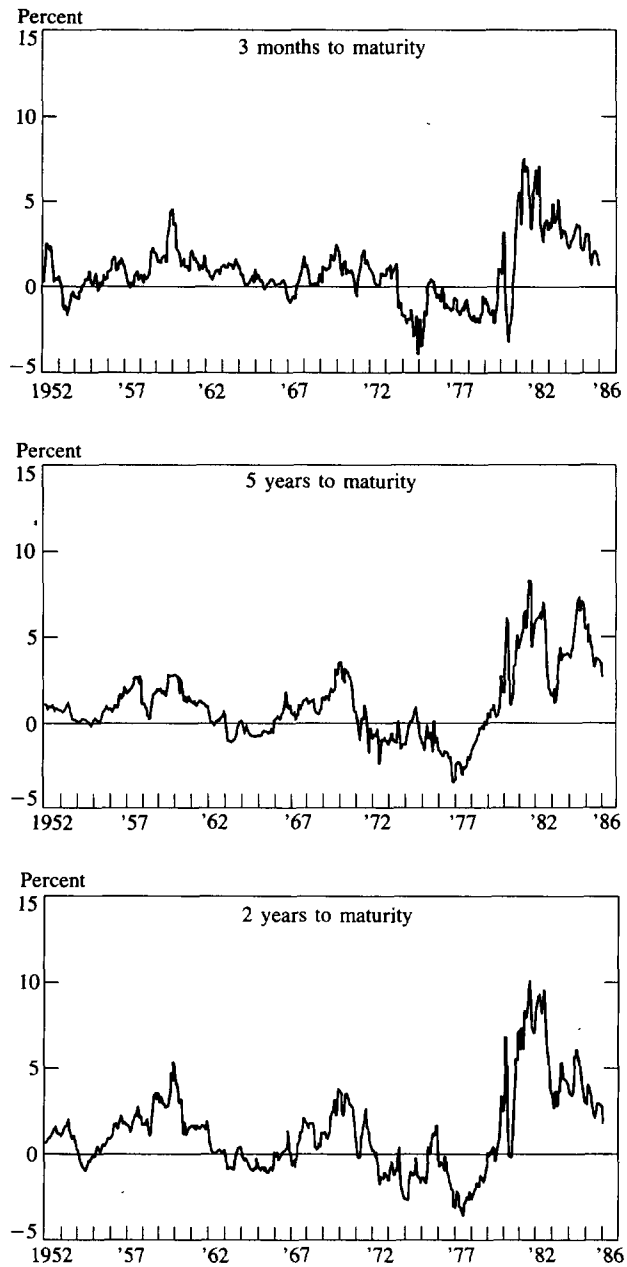
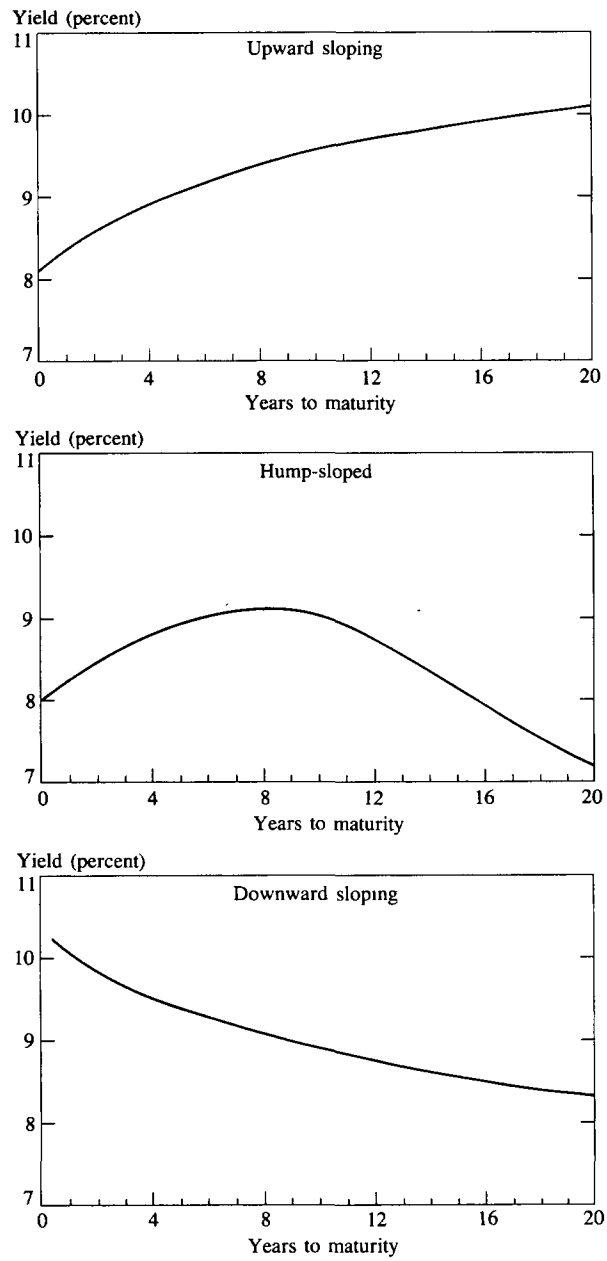


CHART 2
Nominal yield curve



term interest rate would be higher than the short-term rate, causing the yield curve to slope upward. If short-term interest rates are expected to fall, the yield curve will slope downward. Similarly, if short-term rates are expected to first rise and then fall, the yield curve will be hump-shaped.

According to this theory, when expectations of the level of future short-term interest rates change, for whatever reason, long-term interest rates adjust. Though a current policy that is expected to have a short-lived impact will affect the short-term interest rate, the long-term interest rate will change significantly only if the policy is expected to lead to further changes in the short-term interest rate at some time in the future.

Examination of the entire term structure of interest rates provides information on the way policy changes have both current and prospective influences on economic activity. Conversely, by developing a theory for how policies move the yield curve, it is possible to work backward and infer the policy from its influences and, thereby, determine why interest rates have changed.

Alternative explanations for high real interest rates

A number of competing explanations have been offered for the rise in real interest rates in the 1980s.[5] Some have argued that the Federal Reserve's anti-inflation policy in the early 1980s contributed to a rise in real rates. Others have focused on such possible causes as the effects of tax law changes on investment incentives, the impact of large federal budget deficits, and a declining savings rate.

This section shows that these explanations can be distinguished from one another by looking at the behavior of the real yield curve supplemented by information on stock prices. That is, if monetary factors contributed to the rise in real rates in a given period, a particular pattern should be observed in the behavior of the real yield curve and stock prices. In contrast, if a change in investment incentives or savings decisions was the principal cause of higher real rates, different patterns should be seen in the real yield curve and stock prices.

Monetary policy and the real yield curve

Monetary policy actions have only temporary effects on real interest rates. For example, in the short run, a restrictive monetary policy will tend to raise short-term real interest rates as the quantity of money supplied by the Federal Reserve falls short of the amount demanded by the public. Over the longer run, however, the principal effect of a reduced quantity of money is to lower the price level in the economy.[6] As prices fall, the level of the real money supply increases and the real interest rate falls back to its original level.

Because the effects of monetary policy on real interest rates are only temporary, these actions lead to a particular shape of the real yield curve. Specifically, a restrictive monetary policy causes the real yield curve to slope downward, with short-term interest rates exceeding long-term rates. This shape of the yield curve results from both the temporary nature of the monetary effect on interest rates and the expectations theory of the term structure. Following the reduction in the money stock, both current and expected future

[5] A more complete discussion of the issues presented here can be found in Olivier J. Blanchard and Lawrence H. Summers, "Perspectives on High World Real Interest Rates," *Brookings Papers on Economic Activity*, 1984:2, pp. 273-334.

[6] In the current environment, changes in the growth rate of the money stock translate after a few years into changes in the inflation rate.

short-term rates rise. Long-term rates also rise since long-term rates are the sum of the expected future short-term rates. However, long-term rates do not rise by as much as short-term rates because the temporary nature of the monetary policy action means that expected future short-term rates rise by less than current short-term interest rates. As a result, a restrictive monetary policy causes the real yield curve to slope downward.

It is important to realize that this downward slope may not be apparent over the entire maturity structure because monetary policy has lagged effects, taking a few years to reach its full force. Following a monetary contraction, it will take time before the rise in short-term interest rates reduces interest-sensitive areas of spending. Once future spending is reduced, however, short-term rates will begin to fall. As a result, the real yield curve will slope downward only for securities that mature beyond the time when monetary policy affects aggregate spending. In practice, then, a restrictive monetary policy can result in a real yield curve that is hump-shaped with a slight upward slope for shorter maturities and a downward slope as the maturity structure lengthens.

Investment spending and the real yield curve

In addition to monetary policy actions, changes in aggregate expenditure patterns may also affect real interest rates. Recently, considerable attention has been given to the strength of investment spending in the early stages of the current economic recovery, the contribution of tax law changes to investment spending, and the possible impact of this spending on real interest rates.

Investment spending changes affect real interest rates and the real yield curve in a manner similar to the effects of monetary policy. Like monetary policy, investment spending changes tend to have temporary effects on real interest rates. As a result, a stimulus to investment spending leads to a downward-sloping yield curve.

To see the effects of investment spending on the real yield curve, consider the impact of a tax law change, such as an investment tax credit or more liberal depreciation allowances. These policy actions increase the profitability of new capital equipment and cause an increase in investment expenditures. Increased spending leads to increased income in the economy, resulting in a higher transactions demand for money and higher short-term real interest rates. The rise in short-term interest rates is only temporary, however, because additions to the capital stock result in diminished profitability. Under the new tax structure, businesses eventually find that further additions to the capital stock are unprofitable and new investment spending ceases.[7] The expected fall in investment spending causes a corresponding decline in expected future short-term interest rates. Although the investment stimulus tends to raise interest rates at all maturities, short-term rates rise by more than long-term rates and, hence, the yield curve is downward sloping.

Saving, budget deficits, and the real yield curve

A third explanation sometimes offered for the rise in real interest rates in the 1980s relies on changes in aggregate saving behavior. Some analysts have emphasized the effect of an apparent decline in the saving rate and the associated stimulus to consumer spending. Others have focused on the impact of public sector dissaving in the form of large government budget deficits.[8]

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[7] This result can be easily derived from an equilibrium growth model. An increase in the marginal product of capital increases the size of the steady state capital stock. Along the transition path to the new steady state growth path, the marginal product of investment is falling, implying a falling real rate of return.

[8] The term "budget deficits" refers to what is sometimes called the "public sector borrowing requirement," the sum of federal, state, and local deficits.

Changes in public or private saving behavior have a different effect on real interest rates than either monetary policy or investment spending changes. Reduced saving or increased consumption raises the level of aggregate expenditures in the economy and puts upward pressure on short-term interest rates. If people believe that this change is permanent—that the saving rate will be permanently lower or budget deficits will persist into the future—expected real interest rates will also be high in the future. This means that interest rates will rise over the entire maturity spectrum. However, long-term rates will rise by more than short-term rates because short-term rates are seen as increasing into the future. Thus, a reduction in saving that is believed to be permanent will result in an upward-sloping real yield curve.

Distinguishing the causes

It is now possible to see how evidence on the slope of the real yield curve can be used to determine the cause of high real interest rates. All the potential sources—restrictive monetary policy, increases in the profitability of investment, and reduced current and future saving—lead to high real interest rates in the short run. Monetary policy and investment incentives can be differentiated from savings changes, however, by looking at the real yield curve. The former explanations cause the real yield curve to slope downward, while the latter explanation leads the yield curve to slope upward. Thus, evidence of an upward-sloping real yield curve is consistent with a savings explanation of high real rates, while evidence of a downward-sloping real yield curve is consistent with a monetary or investment story.

Although the monetary policy and investment stories lead to the same behavior of real interest rates, they can be distinguished because they have opposite implications for the stock market value of the capital stock. Changes in tax laws that increase the profitability of existing capital or future additions to the capital stock will be reflected in higher stock prices. By contrast, a contraction in the money stock that lowers output and decreases profits will reduce the value of capital as measured by the stock market. If high short-term real interest rates are accompanied by a downward slope in the real yield curve, then it is possible to discriminate between the two possible causes by examining movements in a comprehensive measure of the value of the capital stock, such as a broad stock market index. When the index shows a fall, the real interest rate increase can be ascribed to stringent monetary policy. Alternatively, when the stock market index shows an increase, the real interest rate increase can be ascribed to higher investment spending.

The three potential sources of high real interest rates considered here can be differentiated, then, by reviewing three pieces of information. Examination of both the relationship of the short-run and long-run real interest rates as well as the movements in the value of the stock market will shed light on the reasons for the observed movements in ex ante real interest rates.

Causes of high real interest rates: the evidence

What were the causes of high real interest rates in the 1980s? The framework presented in the previous section suggests that information on the slope of the real yield curve supplemented with data on stock price movements can be used to discriminate monetary, investment, and saving explanations of the rise.

Estimates of the slope of the real yield curve are presented in Charts 3 and 4 using estimates of the ex ante real interest rate discussed earlier and presented in Chart 1. Chart 3 provides information about the real yield curve at a specific point in time, while Chart 4 provides a time series of the slope of the real yield curve over the 1979-85 period.

CHART 3
Real yield curve

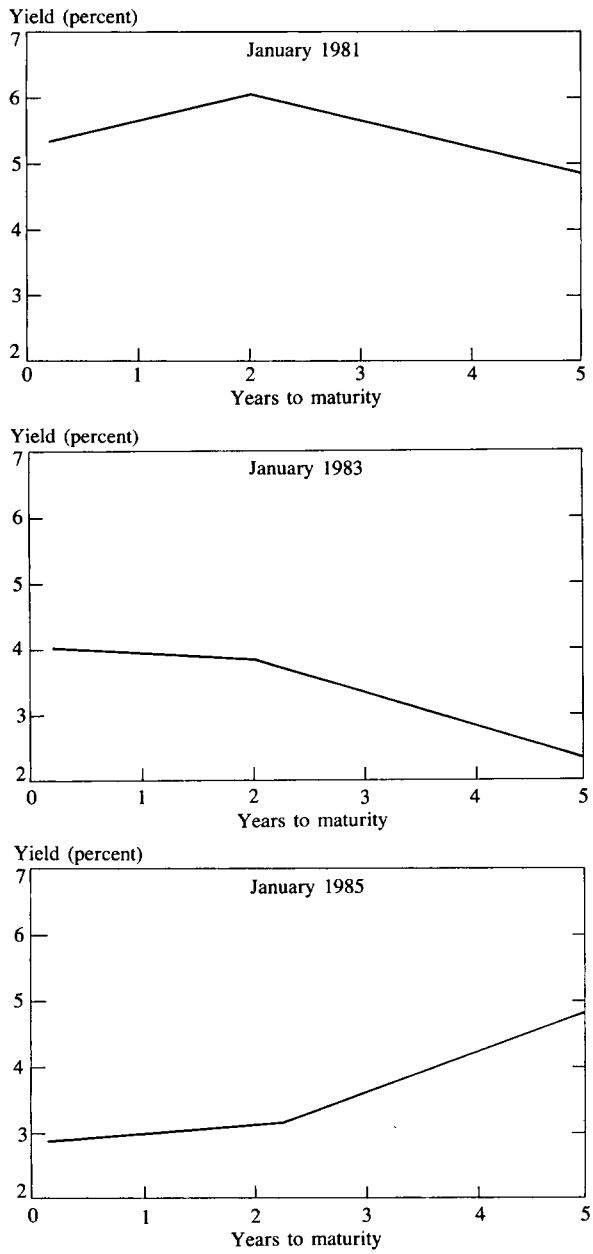
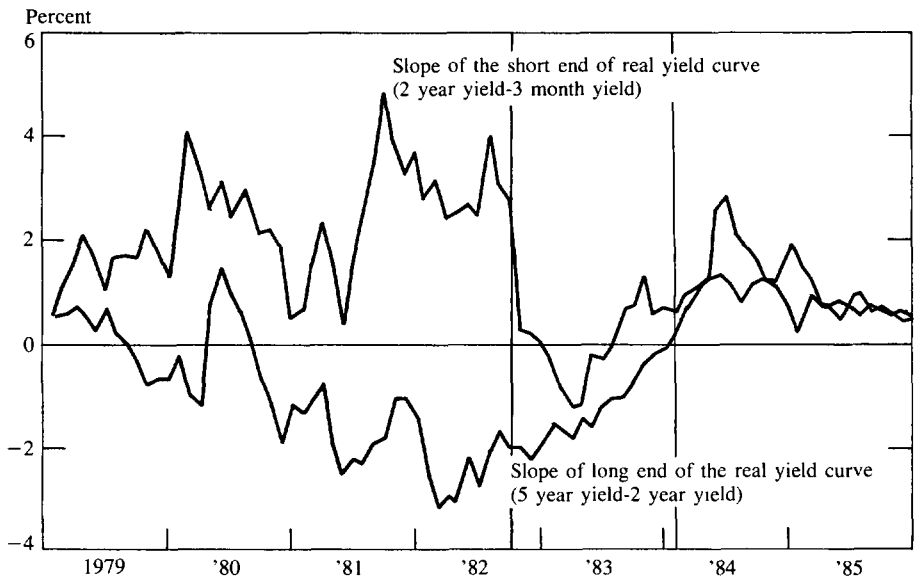


CHART 4
Real yield curve slope



In Chart 3, the estimates from Chart 1 are used to plot yield curves for three specific months, January 1981, January 1983, and January 1985. Chart 4 presents a summary of information needed to infer the slope of the yield curve over the entire period from the beginning of 1979 to the end of 1985. Included in Chart 4 are plots of the difference between the real rates at two years and three months, the slope at the short end of the term structure, and the difference between the real rate at five years and that at two years, which measures the slope at the long end of the maturity structure. In Chart 4, a point above the horizontal line at zero signifies that the yield curve slopes upward and a point below zero indicates that the yield curve slopes downward.

To help in reading these two charts, consider January 1981 as an example. The top panel of Chart 3 shows that in January 1981 the real two-year interest rate exceeded both the three-month rate and the five-year rate. The yield curve was hump-shaped. In Chart 4, this shape is depicted as a point on the solid line above zero, indicating an upward slope at the short end of the yield curve, and a point on the dashed line below zero implying a downward slope at the long end.

A number of interesting observations can be made from this evidence. The past six years, 1979 to 1985, can be divided into three distinct periods delineated by the vertical lines in Chart 4. The first period covers the time of the first change in Federal Reserve operating policy, October 1979 to October 1982, when monetary policy moved from targeting interest rates to targeting nonborrowed reserves. This period began with very high inflation. Depending on the measure used, prices were increasing at annual rates of as much as 15 percent. The stated objective of the Federal Reserve was to lower inflation through lower money growth.

The 1979-82 period of tight money shows up clearly in the estimates. Chart 1 shows that real interest rates were then very high. Furthermore, the top panel of Chart 3, together with Chart 4, indicates that the expected real return to holding two-year securities exceeded the expected return on securities of either three months or five years. Thus, during this period the real yield curve was hump-shaped. The upward slope at shorter maturities is the consequence of lags in the effect of monetary policy. Meanwhile, the value of the in-place capital stock as measured by the New York Stock Exchange Composite Index first fell during the brief recession in the first half of 1980, rose during the second half of that year, and then fell gradually throughout 1981 and the first seven months of 1982. This pattern is inconsistent with high investment having caused high real interest rates and further bolsters the case for ascribing the high rates to tight money.

The second distinct period runs from the fall of 1982 through the end of 1983. Again, real interest rates were high at all maturities. But this time both the plot of January 1983 in Chart 3 and the series in Chart 4 indicate that the real interest rate at three months exceeded that at two years, which in turn was higher than the real return at five years. The real yield curve sloped downward throughout. Meanwhile, stock market indexes showed a sharp upward movement. It is likely that this was a period of an investment boom brought on by the tax policy changes included in the revisions of the federal tax code enacted in the summer of 1981. Increases in the investment tax credit and changes in capital depreciation schedules both spurred investment demand, which led to high real interest rates and a downward-sloping real yield curve.

Charts 3 and 4 indicate that the yield curve sloped upward over the entire range examined during the most recent period, running from January 1984 to December 1985. From the previous discussion, it is clear that an upward-sloped yield curve is the predicted pattern when there is a reduction in both current and anticipated future saving. This pattern is inconsistent with both tight money and increases in the profitability of investment. Decreases in saving signal an increase in consumption and higher levels of aggregate expenditure. The most recent high real interest rates could well be the consequence of the pattern of anticipated future government budget deficits. It is important to realize that current deficits are not sufficient to produce this pattern in the data. People must believe that there will be continued reductions in saving fairly far into the future.

Conclusion

This article has provided evidence supporting the contention that real interest rates have been high in the 1980s. Three possible causes of the height of ex ante real interest rates were examined and each was found to bear primary responsibility for the rise at some time over the past six years. From the fall of 1979 through the fall of 1982, the evidence points to tight money as the primary cause of high real interest rates. From late 1982 through the end of 1983, an increase in the profitability of investment, due possibly to changes in tax policy, bears primary responsibility for real interest rates of nearly 5 percent. Finally, for 1984 and 1985, changes in saving patterns, due perhaps to changes in fiscal policy, appear to be primarily responsible for high real interest rates.