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CRS Report for Congress

The Pattern of Interest Rates: Does It Signal an Impending Recession?

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Summary

The cyclical behavior of the economy is of great interest to Congress, yet the onset of an economic downturn is seldom recognized promptly. Recognition can take more than a year after the fact and is based on the accumulation of considerable supportive data. Therefore, policymakers frequently search for reliable recession predictors. The behavior of interest rates may provide advanced warning of an impending downturn. Following six of the past seven episodes in which the federal funds rate — the interest rate used to conduct monetary policy — rose above the level of interest rates on all maturities of Treasury securities, the United States experienced an economic downturn. The exception was in 1998. Following a period of monetary tightening by the Federal Reserve, a similar inversion pattern prevailed from mid-2006 to late 2007. The easing of monetary policy in evidence since September 2007 is consistent with efforts to forestall or minimize an economic downturn. Economic growth has been low since the last quarter of 2007, and some forecasters are now predicting a recession in 2008.

Recessions and the Pattern of Interest Rates

The dating of an economic downturn occurs after the event has happened. The National Bureau of Economic Research (NBER), the nonpartisan, nonprofit think tank that dates the business cycle for the United States, often waits a considerable period of time before it declares that a cyclical peak or trough occurred in a particular month of a particular year.[1] Furthermore, gross domestic product (GDP) data are issued with a lag, and from time to time do not show evidence of a downturn until the data have been revised. Yet, the cyclical behavior of the economy is of great interest to Congress: it not only affects the position of the federal budget, but could potentially be remediated by well-timed policy changes. For example, Congress is currently contemplating a fiscal

[1] For example, the NBER announced in July 1983 that the United States had reached a cyclical trough in November 1982; it announced in April 1991 that a cyclical peak had been reached in July 1990; it did not announce the March 1991 trough until December 1992; and it announced in late November 2001 that the longest economic expansion in American history peaked in March 2001.

stimulus package in an effort to forestall a recession. Clearly there are circumstances under which the early identification of an *impending* downturn may be advantageous.

The structure of interest rates may provide an advanced warning of an impending downturn. Typically, interest rates are higher on securities with a longer time to maturity. A "yield curve" refers to a graph plotting the yield on securities by maturity. Prior to each of the last six NBER-designated downturns (12/69, 11/73, 01/80, 07/81, 07/90, and 03/01), the yield on all maturities of U.S. Treasury securities fell below the federal funds rate (the rate that the Federal Reserve uses to conduct monetary policy).[2] In the discussion to follow, this will be referred to as an inversion of the yield curve. (Why this is likely to be associated with a downturn is explained below.) This means that the federal funds rate, which is a very short term rate as described in the box below, was higher than the yield on all Treasury securities (both short term and those whose maturity is some 10 to 30 years in the future).[3] It should be noted that the time that elapses between the month the inversion occurs and the subsequent NBER-designated peak in economic activity is not a constant. The number of months prior to the peak (and the peak) have been: 20 months/December 1969; 8 months/November 1973; 15 months/January 1980; 9 months/July 1981; 16 months/July 1990; and 9 months/March 2001.

What Is the Federal Funds Market?

For financial institutions to create money and credit, they must have reserves. These reserves, while supplied in the aggregate by the Federal Reserve, can also be bought and sold by individual financial institutions whose actual reserve positions are different from their required positions. Where this buying and selling occurs is called the federal funds market, and the rate prevailing on these transactions is the federal funds rate. Most transactions in this market are on a one-day basis, so the federal funds rate is very short term. This market came into existence late in 1954 at the initiative of private banks, so episodes considered in this report can only go back to that time. The Federal Reserve announces a rate for federal funds and intervenes in the market as needed to keep the rate close to its announced target level. However, this does not mean that the federal funds rate is constant. Through Fed intervention, the rate *tends* toward its announced target level.

Although the structure of Treasury interest rates has had a good predictive record, it is not perfect. There have been two economic contractions since the federal funds market was developed in 1954, which were not preceded by an inversion (those beginning in August 1957 and April 1960). And an inversion occurred both in June 1966 and August 1998 with no subsequent economic contraction. The 1957, 1960, and 1966

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[2] For analytical purposes, only the yields on U.S. Treasury securities are used in order to hold the risk factor constant. The yield on private sector securities can vary across time because investors change their evaluation of their riskiness. Unlike private sector securities, Treasury securities have virtually zero default risk.

[3] In this report, inversion does not necessarily mean that the yield on all shorter term Treasury securities was above those on longer term debt. It only means that the federal funds rate was above the yield on all marketable Treasury securities.

anomalies may be due to the early and limited nature of the federal funds markets and the fact that this rate was not then the main vehicle for carrying out monetary policy.

The 1998 Episode

The August 1998 episode is both interesting and different in a major way from the five episodes that preceded it. During these five episodes, both the target rate for federal funds and the yields on Treasury securities were rising, but the target was rising more rapidly. During 1998, the federal funds rate was essentially held constant at about 5.5% whereas the yields on Treasury securities were *falling*. (During the anomalous 1966 inversion, the federal funds rate was rising whereas the yields on Treasury securities tended to fall.) During the period, from December 19, 1995, to September 29, 1998, the target rate had been held in the 5¼% to 5½% range. While the yield on shorter term securities tended to track the target rate during this period, longer term yields began to decline early in1997 (the yield on 30-year Treasuries declined from 6.5% to 5.0%).

It is now accepted that this decline in longer term yields was associated with an international "flight to quality" following the financial crisis in East Asia in the last half of 1997 and the debt default by Russia in the summer of 1998. The U.S. international trade deficit, a measure of the inflow of capital from abroad, rose from 1.1% of GDP in 1996 to 1.4% in 1997 and to 2.6% in 1998. As further evidence on the flight to quality, the yield on American corporate bonds rated AAA fell from about 7% in late September 1997 to about 6.4% a year later. The unrest abroad also unsettled domestic financial markets, as the "flight to quality" led to financial problems at a large U.S. hedge fund, Long-Term Capital Management. In response to conditions in domestic and foreign financial markets, the Federal Reserve reduced the target by ¼ percentage points on September 29, October 15, and November 17, bringing it down from 5½% to 4¾%.

Thus, because special international circumstances — rather than a tightening of monetary policy — played an important role in causing a yield curve inversion, it is not surprising that an economic downturn did not ensue. In fact, quite the opposite occurred — the rates of growth of GDP during 1998, 1999, and the first half of 2000 were among the highest of that long expansion. But had the Fed not intervened to add liquidity to the financial system, a recession might have occurred.

The 2000 Episode

Between 1998 and mid-2000, the Federal Reserve began a gradual policy of monetary tightening. Several of the federal funds rate increases (June 30, August 23, and November 16, 1999) merely reversed the easing that had taken place during 1998 to deal with the financial unrest. However, on February 2, March 21, and May 16, 2000, the target was increased to 6½% from 5½%. At that point, the target was above the yields on all marketable Treasury securities. Moreover, by July 2000, the yield curve on Treasury securities was quite inverted, with shorter term yields generally above successive longer term yields. The stock market, as measured by the S&P 500, began to fall soon thereafter, in October 2000.

As noted above, the longest economic expansion in American history (128 months) came to an end in March 2001. The subsequent contraction was both short and mild, and

the NBER designated the trough as November 2001. At that point, a new economic expansion begun. During the next three years, the Fed reduced the federal funds rate target from 6½% to 1%, and the yield curve regained its more normal slope.

The 2000 episode is thus similar to the other five episodes in which an economic contraction followed an inversion caused by the systematic upward movement in the target rate for federal funds.

Events in 2006-2008

As the expansion took hold and the unemployment rate began to decline, the Federal Reserve, between June 2004 and June 2006, executed 17¼ percentage point increases in the target rate, raising it to 5¼% from 1%. The target was then held at 5¼% until August 2007. During this period, the yields on short maturity Treasury securities moved in harmony with the target whereas longer term yields did not. From July 2006 through September 2007, the yield curve was inverted. Since October 2007, most Treasury yields, except the 30-year Treasury yield, have remained below the federal funds rate.

The tightening of monetary policy that was completed in mid-2006 was associated with a substantial weakening in the national housing market in 2007, suggesting to some observers that the so-called housing market bubble was beginning to burst.[4] This development was coincident with the crisis in the sub-prime mortgage market that also emerged last summer. The Federal Reserve responded by easing monetary policy. The target was reduced by ½% on September 18, and by ¼% on October 31 and December 11, 2007. Both short- and long-term Treasury yields fell in sympathy. Part of the decline may have reflected the shift by financial institutions to the safety provided by Treasuries as the financial crisis in sub-prime lending spread. To date, financial markets remain in turmoil.

This yield curve inversion, like those that prefigured a number of past economic contractions, follows from a systematic policy of monetary restraint by the Federal Reserve. Since there has always been a lag between the inversion and the onset of a recession, it may be too soon to conclude that the latest inversion was a false positive. If a recession were to occur this time around, however, it would come as a surprise to the vast majority of forecasters, who are currently predicting moderate growth in the year ahead. And, based on the data available to date, current economic growth has been strong, core inflation is low (although headline inflation is higher), and the unemployment rate is still near rates that correspond with many measures of full employment.

Additionally, the record level of foreign capital inflows (which equal the current account deficit) might compromise the ability of an inverted yield curve to predict economic contractions. Economic theory suggests that upward pressure on interest rates can be relieved by capital inflows. Thus, were it not for large capital inflows, long-term rates might be higher and the yield curve steeper today. Since capital markets have become more integrated over time, the dampening effect of capital flows on domestic interest rate movements may be stronger now than in previous expansions. Furthermore,

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[4] See CRS Report RL33666, *Asset Bubbles: Economic Effects and Policy Options for the Federal Reserve*, by Marc Labonte.

this dampening effect may be stronger in the Treasury market than among private securities: foreign holdings of U.S. Treasuries have doubled since 2001, with some foreign central banks making large purchases.

Why Does This Empirical Relationship Occur?

This paper has reported an empirical regularity on the relationship between the yield on Treasury debt and the federal funds rate and the subsequent course taken by economic activity.[5] A case can be made that there is a behavioral basis for this regularity.

To understand why a yield curve inversion might precede a recession, it may first be useful to explain why the yield curve is usually upward sloping, and why Treasuries of different maturities usually move together. Consider the debt management choices facing the Treasury for the next, say, five years. It can either borrow the money it needs by issuing a five-year Treasury note today or by issuing a one-year Treasury bill today and "rolling over" that bill when it matures in each of the following four consecutive years. Since the Treasury would like to minimize its borrowing costs, the rate on a five-year note would have to be close to the average expected rate on one-year bills for the next five years for the Treasury to be indifferent between the two financing methods. If one option were less expensive than the other, the Treasury would choose the less expensive option until interest rates had leveled out. This explains why Treasuries of different maturities usually move together, but it does not explain why the yield curve is usually upward sloping. That is because investors are only willing to take on more risk if they receive a higher rate of return. In this case, the greater riskiness of longer term Treasuries comes not from default risk, but from interest-rate risk. The price of a bond fluctuates inversely with changes in interest rates, and bonds with a greater maturity length will change in value more than short-term bonds for a given change in interest rates. Thus, even if investors expected interest rates to be constant over the next five years, a five-year bond would have to offer a higher rate of return than a one-year bond to compensate for interest rate risk in order for investors to be indifferent between the two, and this results in an upward sloping yield curve.

Next, consider what could cause a yield curve inversion. An inversion usually occurs as a result of a rising federal funds rate, which is consistent with a tightening of monetary policy. The Federal Reserve reduces the supply of federal funds, pushing up the federal funds rate. With fewer reserves, banks are forced to reduce loans and sell other assets that shows up as a reduction in the growth of money and credit and,

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[5] Frederic Mishkin, now a member of the Board of Governors of the Federal Reserve, and Arturo Estrella have shown statistically that the yield curve inversion was a powerful predictor of recessions between 1960 and 1995. They estimate that a flat yield curve indicated a 30% chance of recession in the next four quarters, with a very steeply inverted yield curve indicating a 90% chance of recession. They find it to be one of the best single-measure recession predictors available. See Arturo Estrella and Frederic Mishkin, "Predicting U.S. Recessions," *Review of Economics and Statistics*, vol. 80, no. 1 (February 1998), pp. 45-61.

This pattern has also been found abroad. One study found that yield curve inversions were predictors of recession in all eight of the countries studied. Henri Bernard and Stefan Gerlach, "Does the Term Structure Predict Recessions? The International Evidence," *International Journal of Finance & Economics*, vol. 3, no. 3 (July 1998), pp. 195-215.

ultimately, a reduced rate of national spending. If this reduction is large enough, it can cause an economic contraction. (An additional incentive for banks to contract credit following an inversion is that the rate they must now pay to borrow reserves is above what they can earn using those reserves for the acquisition of very safe assets.) If long-term rates are partly determined by the average of present and future short-term rates, then the yield curve would become inverted if short-term rates today were higher than short-term rates expected in the future. This would occur when the federal funds rate was rising if investors expected it to fall in the future. For example, if they thought that the higher rate was going to reduce GDP growth, they might expect that the Fed would be forced to reduce the target rates in the future to increase GDP growth.

Why is there a time lag between the yield curve inversion and the recession? In this case, because of the lag between the change in Fed policy and the slowdown in economic activity that a tightening of credit conditions eventually causes. As economists are prone to argue, the time that elapses from a decrease in the growth of money and credit to a decrease in the growth of money spending is not uniform (mainly because economic conditions differ when monetary policy is tightened). It can be both long and of a variable length. This accounts for the variable lag reported above between the month the inversion occurs and the month in which the economy reaches a business cycle peak.[6]

Conclusion

An ability to predict the future direction of the economy can be beneficial if it enables monetary and fiscal policymakers to undertake action today that might remediate otherwise unfortunate developments. For that reason, economists search for good business cycle predictors. The yield on U.S. Treasury securities relative to the federal funds rate appears promising. In six of the past seven episodes in which the federal funds rate has been above the yields on all maturities of Treasuries, the American economy has experienced a recession. These six episodes all share in common an increase in the federal funds rate, reflecting a shift to a tighter monetary policy. The exception to this pattern was 1998. During the 1998 episode, the yields on longer term U.S. Treasuries were falling in the face of a fairly constant federal funds rate. This is now acknowledged to have been due to a flight to quality in response to a very uncertain financial outlook following the East Asian and Russian financial crises in 1997-1998. The shift to monetary tightness that began in June 2005 pushed the federal funds rate above the yields on all Treasury securities until the Fed began easing policy in late 2007. The past history of yield curve inversions and subsequent economic downturns suggests that a recession could be in the offing.

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[6] Of interest is the argument that the economic downturns following the business cycle peaks of November 1973, January 1980, and July 1990 were associated with negative oil price shocks. The empirical relationship reported in this paper casts doubt on this interpretation. It suggests that the contractions were set in motion some months before these oil price shocks by a tightening of monetary policy (for example, oil prices began to rise in October 1973, January 1979, and August 1990 whereas the inversions first occurred in March 1973, October 1978, and March 1989). Also, the NBER dates the peak of the 1990 expansion as occurring in July, a month before oil prices began to rise. The 2000 episode is more complicated. Oil price rises came during the tightening, but before the inversion and subsequent 2001 recession occurred.