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The Pattern of Interest Rates in 2006: Could It Signal an Impending Recession?

Marc Labonte and Gail Makinen
Government and Finance Division

Summary

The cyclical behavior of the economy is of great interest to Congress, yet the onset of an economic downturn is seldom recognized immediately. Recognition can take more than a year and is based on the accumulation of considerable supportive data. 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 by the Federal Reserve to conduct monetary policy — rose above the level of interest rates on all maturities of U.S. Treasury securities, the U.S. experienced an economic downturn. The exception occurred in 1998. A similar pattern might now be emerging as the Federal Reserve raises the target rate for federal funds. Should historic patterns continue and an actual inversion occur, it might signal an impending economic contraction. This report will be updated as events warrant.

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 often do not show evidence of a downturn until the data have been later 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 mitigated by well-timed policy changes. 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.

[1] For example, the NBER announced in July 1983 that the U.S. had reached a cyclical trough in Nov. 1982; it announced in Apr. 1991 that a cyclical peak had been reached in July 1990; it did not announce the Mar. 1991 trough until Dec. 1992; and it announced in late Nov. 2001 that the longest economic expansion in American history peaked in Mar. 2001.

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, 06/81, 12/90, and 02/01), 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. For example, it occurred 20 months prior to the December 1969 peak, 8 months prior to the November 1973 peak, 15 months prior to the January 1980 peak, 9 months prior to the July 1981 peak, 16 months prior to the peak of July 1990, and 9 months prior to the peak of 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. This market allows banks with a reserve deficiency to make it up without having to borrow from the Federal Reserve, and permits banks with excess reserves to earn an income from them. 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 comparisons made 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 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.

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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. U.S. Treasury securities have virtually zero default risk. This is not true for private sector debt securities.

[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.

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 nearly three-year period, from December 19, 1995, to September 29, 1998, the target rate had been held in the 5-1/4% to 5-1/2% range. While the yield on shorter term Treasury securities tended to track the federal funds rate during this period, longer term yields began to decline in early 1997. The yield on 30-year Treasuries declined during this period from 6.5% to 5.0%.

It is now widely accepted that the decline in longer term Treasury 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% in late September 1998. The unrest abroad also led to some nervousness in 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 unsettled conditions in domestic and foreign financial markets, the Federal Reserve reduced the federal funds rate by 1/4 percentage points on September 29, October 15, and November 17, bringing it down from 5-1/2% to 4-3/4%.

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.[4] 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

The most recent episode of inversion occurred in June 2000. Between 1998 and mid-2000, the Federal Reserve began a gradual policy of monetary tightening. Several of the increases in the target rate (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 6-1/2% from 5-1/2%. At that point, the target was then above the yields on all marketable Treasury securities. By July 2000, the yield curve on Treasury securities was quite

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[4] It is hard to make a case using the conventional macroeconomic model that an increased inflow of foreign capital can lead to an economic downturn. It can potentially slow the growth rate of demand because it is associated with a larger trade deficit, but some of the effect of the trade deficit on domestic spending is offset by the lower interest rates and higher interest sensitive spending (on business and household capital goods) made possible by the capital inflow.

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. During the next three years, the Fed reduced the federal funds rate from 6-1/2% to 1%, and the yield curve regained its more normal slope. Since that time, GDP has recovered the ground lost during the contraction and the subsequent expansion has lately been steady and stable. By the calculations of some economists, the economy is now close to, if not at, full employment.

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

Events in 2006

As recovery gave way to expansion and the unemployment rate began to fall in the current decade, the Federal Reserve, between June 2004 and February 2006, executed 14 equal hikes of 1/4 percentage point in the target rate. In February, it stood at 4-1/2%, up from 1% in mid-2004. The yield on short maturity Treasury securities has risen in harmony with the federal funds target; the yields on longer term Treasuries have not. This has resulted in a flattening of the yield curve. By mid-January 2006, there was virtually no difference in the yield on 3-month and 10-year Treasury securities. Both yields remain, however, slightly above the prevailing 4-1/2% target on federal funds.

Thus, although an inversion has yet to occur, the United States now stands as close to one as it has since mid-2000. However, if the Fed continues its recent pattern of rate hikes at its next scheduled meeting and other rates remain constant, an inversion will occur. Should an inversion occur, it would be due primarily to a systematic policy of monetary tightening by the Federal Reserve — a similar situation, some might argue, to the policies that set in motion five previous economic contractions. If a recession were to follow, it would be a surprise to forecasters, who are currently predicting steady growth in the year ahead. Economic growth has been consistently strong, core inflation is low (though headline inflation is higher), and the federal funds rate is still low when adjusted for inflation. Furthermore, this expansion, to date, has been much shorter than the previous two.

Another reason an inverted yield curve night not be a good predictor of recession at present is that foreign capital inflows (which equal the current account deficit) are at record levels. Economic theory predicts that upward pressure on interest rates will be relieved by capital inflows. Thus, in the absence of capital inflows, long 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, this 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 increases in their holdings. However, the spread between Treasury bonds and AAA bonds or mortgages was not unusually wide in 2005.

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.[6]

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 the next year four consecutive times. 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 notes for the next five years for the Treasury to be indifferent between the two financing methods. If one option was 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. 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 the result is 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, ultimately, a reduced rate of national spending. If this reduction is large enough, it can cause an economic contraction.[7] (An additional incentive for banks to contract credit

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[5] Mishkin and 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*, National Bureau of Economic Research, Working Paper 5379, Dec. 1995.

[6] 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 Stephen Gerlach, *Does the Term Structure Predict Recessions? The International Evidence*, Bank for International Settlements, Working Paper 37, Sep. 1996.

[7] A rising federal funds rate is also consistent with an increased demand for those funds, the sign of a vigorous economic expansion. By letting the rate rise, the Fed may also be tightening money and credit growth relative to what would be the case if it had held the rate constant. However,

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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 expected short-term rates 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 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.[8]

Summary

Being able to predict the future direction of the economy can be beneficial if it enables the monetary and fiscal authorities to undertake action today that might mitigate otherwise unfortunate developments. For that reason, economists search for good business cycle predictors. The yield curve 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 that the target rate for federal funds was pushed up 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 the face of a very uncertain financial outlook following the East Asian and Russian financial crises in 1997-1998. At the beginning of 2006, the yield curve is extremely flat, and could become inverted. If so, this would be a significant sign for the current expansion, based on past experience.

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[7] (...continued)
this tightening will be less than would be the case if it actually reduced the supply of those funds.

[8] Of interest is the argument that the economic downturns following the business cycle peaks of Nov. 1973, Jan. 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 Oct. 1973, Jan. 1979, and Aug. 1990 whereas the inversions first occurred in Mar. 1973, Oct. 1978, and Mar. 1989). Also, the NBER dates the peak of the 1990 expansion as occurring in July, a month before oil prices began to rise. In the current episode and before the 2001 recession, however, the oil price rise came before an inversion occurred.