

Does the Yield Curve Signal Recession?

by Joseph G. Haubrich

Predicting the future has always fascinated humans, and economic forecasting doubles the interest by adding a chance to turn a profit. One popular forecasting tool—the yield curve—has made headlines lately because it may be predicting a recession. Though traditionally among the most accurate of economic forecasting instruments, the yield curve is at odds with many other current predictions. So what is this yield curve, in what sense is it predicting a recession, and why are others skeptical of this prediction?

■ Bonds, Yields, and Maturity

The U.S. Treasury issues many types of debt, from short-term to long-term. You can buy Treasury bonds that mature in three months or in thirty years, and quite a few in between. You can buy them straight from the Treasury or from others who are selling ones they bought from the Treasury. The interest rate on the bonds that is relevant to the yield curve is the “yield to maturity” or just “yield,” which accounts for both the coupon payments from the bonds and the price you paid for the bond. The yield curve simply plots the yield on the bond against its time to maturity. Usually, the yield curve slopes up: longer-term bonds have higher yields than do short-term bonds, as people feel those longer-term bonds have more risk, requiring a higher return. Put differently, the spread (difference) between any given long rate and a short rate is usually positive. When short rates rise above long rates, the yield curve is said to be inverted (and the spread is negative).

As figure 1 shows, since 1960, the yield curve has inverted seven times, and in six of those times a recession has

followed in short order. The yield curve has inverted recently, sending both the 10-year minus the 2-year and the 10-year minus the 3-month spreads negative, and generating disagreement about whether the inversion signals a recession or not. In the past several months, a variety of Federal Reserve officials, market gurus, and general prognosticators have weighed in on the issue, a good many of them concluding it unlikely that the current inversion signals an incipient recession. So how concerned should we be about the inversion? To answer this, it is best to examine what the yield curve is predicting at this point in time and to consider the reasons we may have for doubting its prediction.

■ What Does the Yield Curve Predict?

Yield curve predictions about future growth come in two general flavors. One tries to predict the rate of growth that can be expected at some point in the future, the other tries to predict the probability of a recession occurring.

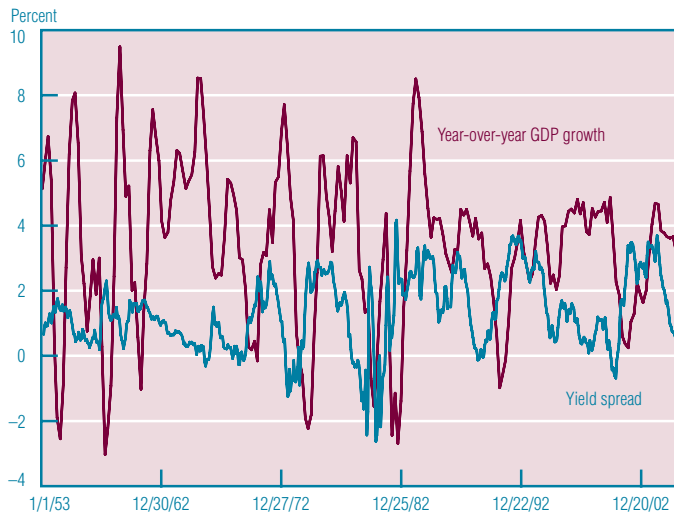
The first uses a term spread to predict future output, usually at a horizon of two, four, or six quarters. This approach has an advantage in that it reveals more of the information that is in the yield curve. Inversions are not the curve’s only signal: While negative spreads precede negative growth, positive spreads precede positive growth. In general, the steeper the curve, the higher the expected growth. This observation holds true both over time and across countries, and while most investigations have concentrated on the post–World War II period, some evidence has shown the yield curve predicts output since 1875 in the United States and since 1870 in Germany.

Experience has taught economic forecasters to expect a recession when the yield on short-term Treasury securities rises above the yield on longer-term securities—a situation known as a yield-curve inversion. But some economists suspect the yield curve might not be as reliable a predictor of output growth as it used to be.

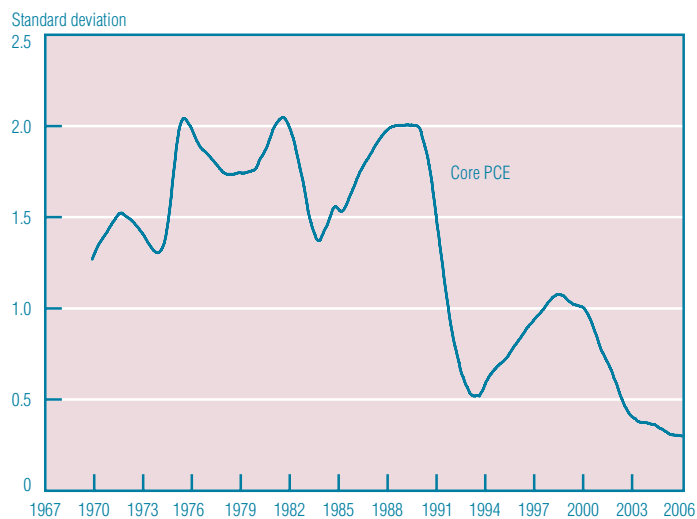
So the most straightforward, and, arguably, robust way to use the yield curve is to use the statistical relationship between its slope and future economic growth, and then look where the current yield curve is pointing. This approach requires choosing first a specific spread to use as a measure of the yield curve’s slope, and then choosing a measure of output. One of the most reliable and most often watched spreads is the one between 10-year U.S. Treasury bonds and 3-month T-bills. The natural and probably the most popular choice for growth is real GDP growth, taken at a quarterly or on a year-over-year basis, and predicting out one year (four quarters).

For the week of March 10, 2006, the spread stood at –13 basis points, so this approach predicts real GDP growth over the next four quarters of 2.12 percent. Using a different spread (such as the 10-year minus the 2-year spread) or a different measure of output would give similar results.

This yield-spread prediction can be seen as pessimistic, as it is well below the Blue Chip Economic Forecasters’

FIGURE 1 YIELD CURVE AND REAL GROWTH

NOTE: The yield spread is the 10-year Treasury note minus the 3-month Treasury bill.
 SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and Board of Governors of the Federal Reserve System, "Selected Interest Rates," *Federal Reserve Statistical Releases*, H:15.

FIGURE 2 INFLATION VARIABILITY

SOURCE: Department of Commerce, Bureau of Economic Analysis; and author's calculations.

consensus forecast of 3.0 percent, but it still indicates positive growth, not a recession. Actually, while this approach is quite good at telling you whether growth will be above or below average, it is not so good at predicting the exact number. It might tell you to expect below-average growth, but it seldom tells you that the economy will actually shrink. That is, it rarely predicts the negative growth characteristic of recessions and, conversely, rarely predicts the strong growth usually seen at the start of expansions.

For that reason, forecasters who want to be more certain about detecting an upcoming recession prefer a more direct approach. Rather than trying to predict actual GDP numbers, they prefer to focus on predicting the discrete event of whether the economy will be in a recession or not.

Using a different statistical procedure, one economists call a probit, we can use the 10-year minus the 3-month spread to find the current probability of a recession. Given the yield curve as of March 9, 2006, this approach puts the

probability of recession at 38 percent. Since 1960, the economy has been in a recession 14 percent of the time. So while not predicting a recession for sure, the yield curve indicates that the odds are substantially greater than average.

■ Do We Have Reason to Doubt the Yield Curve's Predictions?

Despite the evidence linking the yield curve to economic growth, and even though yield-curve inversions preceded the two most recent recessions, many have suggested that the yield curve no longer reliably predicts economic growth. Noting that the economy is continually evolving, particularly the financial sector, they discount past successes. They point to two recent "near misses" in 1995 and 1998, when a flat yield curve did not presage slow growth. And indeed, evidence since the early 1990s suggests that the relationship between the yield curve and growth has shifted, if not disappeared.

Thus, some people argue that it is inappropriate to use data before 1990 to measure the connection between the yield curve and economic growth. Even using this more modern sample, though, the yield curve's predictions have not fallen in line with the consensus. Using the shorter sample, the analysis predicts growth of 2.45 percent, higher than before, but still below the consensus estimate. Using data since 1990 to predict the probability of recession results in a recession probability of 55 percent, even higher than the previous estimate of 38 percent.

Recent data, then, although perhaps indicating a different relationship between the yield curve and growth, still points to slower growth and a nontrivial chance of recession, and so by itself does little to impugn the yield curve's record. However, those expressing doubts about predictions from the yield curve have some more specific reasons for their skepticism.

When describing why he thought the yield curve should be interpreted carefully, Alan Greenspan noted the flat curve in 1992–94, but also stressed another factor. Greenspan argued that "the key component from which the yield curve slope derives much of its predictive power for future GDP growth" is "the gap between the current and long-run levels of the real federal

funds rate.” That is, when the real federal funds rate—the target rate set by the FOMC, adjusted for inflation—is high relative to its long-run level, the chance of a recession increases. While Greenspan does not cite the statistical analysis he refers to, there is some evidence that movements in short-term rates account for much of the yield curve’s predictive ability.

The relationship Greenspan refers to can be applied to give another approach to using the yield curve to predict recessions. It provides a more optimistic assessment of GDP growth. Using data since 1960 on the gap between the real fed funds rate and its long-term average results in a prediction of 3.6 percent growth over the next four quarters; using data since 1989 gives a prediction of 3.0 percent growth.

The other reason often cited for why the yield curve inversion may not mean a recession is the Fed’s credibility in the fight against inflation. In one version of this argument, long-term rates are low, not only because expectations of inflation are low, but because the risk of inflation (inflation variability) is also low. Not only is the market’s best guess that inflation will be low, but the market thinks it quite unlikely that its guess will be off by much.

As figure 2 makes clear, inflation variability has dropped quite dramatically since 1989–90. This fall in variability most likely results in a reduced inflation-risk premium for long bonds, which lowers long-term interest rates. Economists at both Goldman Sachs and Deutsche Bank suggest that this is the key to low long-term rates, and the key to understanding why the inversion does not signal a recession. Roughly speaking, in the old days, fears of inflation meant the yield curve was steep, and investors demanded high rates to protect themselves against inflation. A yield curve inversion, then, meant that short-term rates had moved up a lot. And those high short rates signaled, or even caused, a recession. Now, with a credible Fed and a low risk premium, an inversion only signals moderately high short rates, and thus less risk of recession.

A related reason also looks to the increase in Fed credibility, but emphasizes reductions in the persistence, rather than in the variability of inflation (though clearly the two can be related).

In this work, a more credible regime means less persistent inflation: The Fed stops inflation quickly once it starts, and so inflation is only temporarily high. In a less credible regime, once high inflation begins, it stays around, and the monetary authority does little or nothing to stop it.

In the case of the less credible regime, inflation shocks will tend to shift up both short- and long-term interest rates, as inflation feeds through to both. Thus, with persistent inflation, nominal shocks don’t shift the yield curve’s slope very much—both long and short rates move together. Now suppose that these inflationary expectations aren’t the part of the yield curve that predicts real activity. That is, the real part of the yield curve, interest rates adjusted for inflation, is what predicts real activity. Then, under a less credible regime, nominal shocks don’t distort the curvature of the yield spread, and inversions can signal recessions.

Under a credible regime, with low persistence of inflation, it is a different matter. In this case, an inflation shock will increase short rates, but not long rates, because long-term expectations of inflation don’t change. Thus a nominal shock twists the yield curve, distorting the message of the underlying real curve. This pattern seems to hold—at least for the United States; times of high inflation persistence are also times when the yield curve predicts well. In times of low persistence (like in the present, credible regime), the yield curve does less well.

■ Still Worth a Look

Economists do not currently have a well-accepted theory of why the yield curve predicts future economic growth. Given that, speculating on whether or not the yield curve is truly predicting a recession remains exactly that: speculation. Using the yield curve remains an exercise in judgment that requires balancing the long, successful history of the yield curve’s predictive power with some recent evidence of its fading foresight. It also requires judgment because predictions of real activity represent only one facet of the problem facing the FOMC: Inflation is the other. Still, as the Committee becomes more familiar with the risk-management approach to policymaking, it seems that the signal from the yield curve deserves some weight.

■ Recommended Reading

For a good overview of the basic issues see:

Arturo Estrella. 2005. “The Yield Curve as a Leading Indicator: Frequently Asked Questions.” Federal Reserve Bank of New York, Capital Markets Web page.

The source of the Greenspan quote is:

Alan Greenspan. 2005. Letter to the Honorable Jim Saxson (Nov. 28).

Some work supporting Greenspan’s claim about the importance of short rates can be found in:

Andrew Ang, Monika Piazzesi, and Min Wei. 2005. “What Does the Yield Curve Tell Us about GDP Growth?” *Journal of Econometrics*.

Variants of the low inflation premium story appear in:

William Dudley. 2006. “Low Bond Risk Premia: The Collapse of Inflation Volatility,” Goldman Sachs, U.S. *Economics Analyst* (January 6).

Torsten Slok, and Cristine Dobridge. 2006. “What Is the Yield Curve Telling Us: That Long Yields are Too Low,” *Deutsche Bank U.S. Economics Weekly*, (January 6).

The story emphasizing persistence first appeared in:

Michael Bordo, and Joseph G. Haubrich. 2004. “The Yield Curve, Recessions, and the Credibility of the Monetary Regime: Long-Run Evidence: 1875–1997.” NBER Working Paper, no. 10431.

And is developed in:

Joseph G. Haubrich. 2004. “Interest Rates, Yield Curves, and the Monetary Regime,” Federal Reserve Bank of Cleveland, *Economic Commentary* (June).

Some work presenting evidence that the yield curve’s predictive ability has changed recently can be found in:

Joseph G. Haubrich, and Ann M. Dombrusky. 1996. “Predicting Real Growth Using the Yield Curve,” Federal Reserve Bank of Cleveland, *Economic Review*, no. 32, pp. 26–34.

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Michael Dotsey. 1998. "The Predictive Content of the Interest Rate Term Spread for Future Economic Growth," Federal Reserve Bank of Richmond, *Economic Quarterly*, pp. 31–51.

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