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Is There a Message in the Yield Curve?

by E.J. Stevens

Short-term bond yields have moved above long-term bond yields over the past year. The resulting inverted yield curve indicates that monetary policy is tighter than it could be and may be tighter than it has been, but provides no basis for judging whether policy is tight (or easy) enough.

The yield curve, relating market yields to the maturity of debt instruments, began to invert at the end of 1988. As yields on shorter-term securities rose above those on longer-term securities, questions arose about the significance of a downward-sloped yield curve.

Does a negatively sloped yield curve prove that monetary policy is tight or that a recession is coming? Does a steeply positively sloped curve indicate that monetary policy is easy or that inflation will accelerate?

The Federal Reserve System could produce recessions and decelerating inflation, or booms and accelerating inflation, by allowing the monetary base to grow too slowly or too rapidly for sustained periods of time. Policy analysts employ a variety of indicators to try to distinguish between "too" slowly and rapidly, between tightness and ease, with fashions in indicators varying over the years and among analysts.

The growth rate of the M1 monetary aggregate was a popular indicator until its relationship to output and prices broke down during the 1980s under the weight of deposit-rate deregulation and a reversal of the postwar upward trend in interest rates. The Federal Reserve's policymaking arm, the Federal Open Market Committee, continues to set annual target ranges for growth rates of the broader monetary aggregates, M2 and M3, to communicate its policy intentions to Congress and the public. Policy analysts also use as indicators the gap between actual and capacity GNP and the gap between actual and full employment.

Each of these is an intermediate indicator between the ultimate results of policy, which are measured by actual trend rates of economic growth and inflation, and day-to-day policy actions, which are measured by changes in the monetary base and the federal funds rate. The yield curve can be considered as another intermediate indicator, blending short-term interest rates that reflect policy actions with longer-term interest rates that reflect investors' expectations of real returns to capital and future inflation rates.

This *Economic Commentary* examines the indicator value of the yield curve, with the conclusion that its message is no more distinct than those received from other intermediate indicators.

What Is the Yield Curve?

A yield curve plots term to maturity against market yields to maturity on an otherwise comparable set of debt instruments. A typical curve uses yields on U.S. Treasury securities, so that differences in credit quality will not distort the relationship between yield and maturity (see figure 1).

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Even Treasury debt is not completely uniform, so that differences in yields among 250 or so marketable issues are not due solely to maturity. "Flower bonds," for example, now yield about 5 percentage points less than other issues of comparable maturity because the Treasury must accept these old bonds at par in payment of estate taxes. Similarly, market yields may differ between high- and low-coupon bonds, and between unstripped and stripped bonds (those with coupons removed and sold separately), reflecting different valuations of coupon income and capital value at maturity.

These and other differentiating features illustrate that the yield curve is an abstraction that should be used with caution. Constant-maturity yields underlying the yield curve in figure 1 are not actual market yields, but rather estimates of what yields on actively traded issues would have been had comparable issues of such maturities been in existence. There is no basis for calculating a margin of error, but changes in constant-maturity yields and yield spreads of perhaps five to ten basis points and for only one or two weeks should be interpreted with skepticism.[1]

■ Expectations in the Yield Curve

Actual yields are set in markets. Ignoring questions of risk for the moment, traders and investors will hold a particular security when their expectation of total return before a future date (that is, coupon payment plus expected change in market price) is no better or worse than on any other available security.

A yield curve seems suggestive of investors' expectations about future levels of yields. For example, if two-year issues currently are priced to yield 9.2 percent while one-year issues yield 9.0 percent, the implication seems to be that the one-year yield one year from now is expected to be 9.4 percent.[2] If the future one-year rate in this example were expected to be lower than 9.4 percent, then some combination of a current two-year yield lower than 9.2 percent and a one-year yield higher than 9.0 percent would be required to forestall portfolio shifts from one-year to two-year securities.

While a yield curve may *suggest* expected future yields, precise future yields cannot be derived from a yield curve. One must first know the premiums that investors require to compensate them for the risk that realized short-term yields on long-maturity assets will differ from expectations. Only by assuming constant risk premiums can one reach the popular presumption that a change in the slope of the curve reflects a change in expectations. For example, a flattening of the curve means that current short-term interest rates have risen relative to future short-term interest rates only if risk premiums in long-term yields have not dropped.

A further ambiguity should be noted. An expectation of rising or falling nominal interest rates reflects beliefs both about future real interest rates and about future inflation. Thus, a steep positive slope in the yield curve might reflect perceptions of a very low real rate of interest at the shortest end of the curve because of weakness in the real economy that, once passed, would bring a resumption of stable growth at a stable inflation rate. Alternatively, the slope might reflect perceptions that the inflation rate would rise steadily into the future. Interpreting the slope of the yield curve would require additional information to be free of this ambiguity.

■ The Yield Curve as an Indicator

A policy indicator registers tightness and ease, but what do those words mean? Ultimately, the unique function of the central bank in the U.S. economy is to determine the trend rate of inflation. This function was once performed by gold, but since the United States abandoned any specific gold parity in 1973, the trend rate of inflation is primarily the result of central-bank money creation. Tightness or ease in this ultimate sense must mean management of the monetary base that will lower or raise the trend inflation rate.

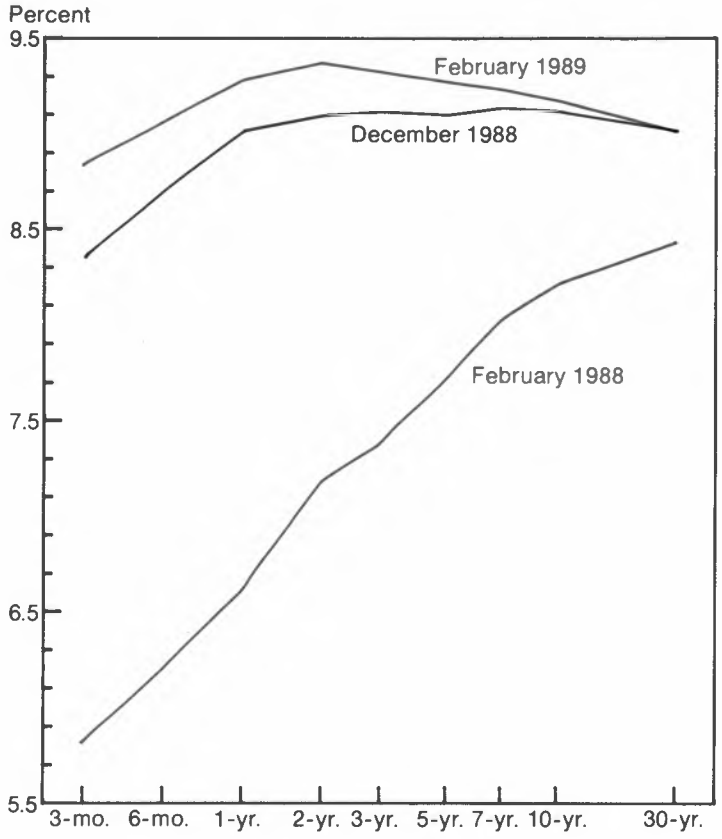
Reductions in the level of *long-term* interest rates would be an indicator of market perceptions of tighter policy if we could know that the expected real rate of return plus the risk premium in long-term rates were constant. *Increases* in the level of *short-term* rates might be an indicator of tighter policy in a different sense, reflecting a short-run stringency in the supply of base money. This would be expected to result in lower future short-term rates, as in the prior numerical example, if we could know that the trend inflation rate and the long-term yield were unchanging.

Lacking that knowledge, a *narrowing* positive yield *spread* between representative short- and long-term instruments would be a more reliable indicator of tightening than rising short-term rates, because increased expected inflation incorporated in both short- and long-term rates would not be mistaken for tighter policy. However, the yield spread still would be no more reliable an indicator than long-term yields if we could not know the values of the expected real rate of return and the risk premium.

Of course, we cannot know these things with any certainty. Figure 2 illustrates the difficulties of interpreting the yield spread. First, it is trivially true that at any point in time a narrower yield spread represents tighter policy than an alternative wider spread. This is not a powerful conclusion, however, because the same could be said about a higher level of short-term rates or about a lower level of base money. Second, it is not necessarily true that today's narrower spread is tighter than yesterday's wider spread, because we cannot know that the real return and risk premium in long-term yields is unchanged. Third, we do not know whether a given rate spread is too tight, or not tight enough, to stabilize trend inflation.

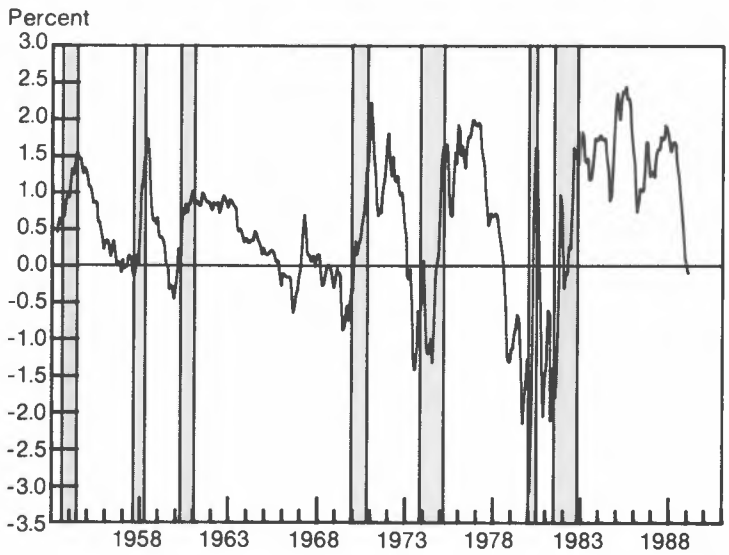
Consider the sequential episodes of rising interest rates during the postwar period. Despite successively greater cyclical swings of the yield spread in figure 2 from plus to minus, and despite successively wider negative spreads near business-cycle peaks in

FIGURE 1
YIELD CURVES[a]



a. Three-month, six-month, and one-year U.S. Treasury instruments are quoted from the secondary market on a yield basis; all other instruments are constant-maturity series.
SOURCE: Monthly averages from the Federal Reserve Statistical Release H.15.

FIGURE 2
YIELD SPREAD CYCLES[a]



a. Spread is the difference between the Treasury 10-year and one-year constant-maturity yield. Shaded areas represent periods of recession. Last date plotted is February 1989.
SOURCE: Monthly averages from the Federal Reserve Statistical Release H.15.

1957, 1960, 1969, 1973, and 1980, we know, with hindsight, that monetary policy was not tight enough because the trend inflation rate was rising during much of the period.

■ Yield Curve Inversions

A widespread presumption in financial-market commentary seems to be that a negatively sloped yield curve is abnormal. Certainly, for the United States in this century, a negative slope is not typical: only 11 episodes have occurred since 1910. Excluding the period 1930 through 1951, when they were prevented by the Great Depression and then by Federal Reserve wartime rate-pegging, inversions have appeared every six years, on average.

The most common explanation for a normal *upward* slope is that, in a growing economy in stable equilibrium at a stable trend inflation rate, yields on longer-term debt instruments would be higher than those on shorter-term instruments, even though the series of future short-term rates was expected to be flat. This positive spread would reflect the risk premium required to compensate risk-averse investors for greater uncertainty about more distant events.[3]

With a longer historical perspective, a negative slope seems less unusual. Prior to the Great Depression, business cycles left their mark on short-term rates, but had relatively less impact on long-term rates—perhaps because the gold standard was a more credible anchor for the trend inflation rate than the central bank has been since the gold standard began to break down. Maintaining convertibility of the dollar into gold at a fixed price meant that the trend inflation rate incorporated in bond yields could not deviate far from zero for any length of time. The yield curve therefore might have been expected to pivot around a relatively stable long-term yield.

■ Recent Experience

The yield curve became quite flat in December 1988, with the 30-year yield to maturity 10 basis points lower than the 10-year yield. However, this hardly

qualified as an inversion. Occasional episodes of a monthly average 30-year yield as much as 23 basis points lower than the 10-year yield have appeared over the past five years without the inversion subsequently spreading across a broader range of the maturity spectrum.

Longest-term yields may be biased downward because the innovation of stripping has removed from the market almost half of the par value of all Treasury securities with maturities longer than 17 years. Yields in the longest maturity range may include a smaller risk premium than in the intermediate range, reflecting the liquidity assurance this additional source of demand provides for portfolio investors in those bonds.

By the end of February 1989, inversion undoubtedly had set in, with a peak yield at two years, which was 36 basis points above the 30-year bond, but still 53 basis points above the three-month bill. Actually, inversion has extended all the way back to the three-month yield on only two occasions in the postwar period (one month in 1974 and six months in 1980-81).

With the February inversion came speculation about recession. Inversion of some portion of the yield curve has been associated with all but four of the 17 business-cycle peaks since 1910 (1926, 1945, 1948, and 1953). Emergence of a negative spread between the one-year and 10-year maturities has preceded each business-cycle peak since 1953, by an average of 10 months and within a range of eight to 16 months. On the other hand, a yield-curve inversion has not always been associated with a business-cycle peak and recession. False signals were registered in 1965-67 (lasting 14 months), again in 1967 (one month), and in 1968 (five months).

■ Conclusion

Changes in yield spreads are an ambiguous indicator of monetary policy, at best, but so too are all intermediate indicators. The year-old narrowing and recent inversion of the yield curve does indicate that policy is tighter now than it would be if the spread were positive and wider, but that is not very useful information. Moreover, spreads can and do change rapidly without any overt policy actions, as swings in market sentiment change market yields.

The fundamental question is whether the current yield curve reflects a policy that is "too easy," so that the trend inflation rate will continue to rise. The yield curve fails to answer that question.

■ Footnotes

1. The yield curve shown in figure 1 and pictured in many publications is based on data in the Federal Reserve's weekly H.15 release. The three-month, six-month, and one-year maturity yields are composites of actual yields reported by five dealers for the most recent issues. Beyond the one-year maturity, however, the values are estimates of the yields that would have emerged in active trading had issues of the designated maturities actually existed. The values are taken from the Treasury's continuous yield curve "fitted by eye" for actively traded issues, which tend to be the most recent issues.

2. $(1.092)^2 / (1.090) = 1.094$.

3. Other explanations are postulated for a positive yield spread. One is that longer-term instruments must provide a premium to compensate investors for lesser liquidity. Another is that the normal slope would be either negative or positive, depending on whether predominant coupon rates tend to be high or low compared to the normal range within which yields are expected to vary.

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