



# DECODING MESSAGES

## From The Yield Curve

What does the recent inversion imply  
for banks in the Fifth District and beyond?

BY ELIANA BALLA, ROBERT CARPENTER, AND MARK VAUGHAN

**B**ank supervisors get paid to worry — even when there may be little to worry about. Historically, when the yield curve inverts — that is, when short-term interest rates rise higher than long-term interest rates — banks have gotten into trouble. Short rates have exceeded long rates consistently since July 2006, so supervisors are naturally growing restless. Are banks in the Fifth District and across the country potentially headed for problems?

The yield curve plots the return on a given type of debt instrument — if held to maturity — across a range of maturities. The curve is typically drawn using Treasury bills, notes, and bonds because U.S. government debt is fairly homogenous, enjoying virtually no default risk and active secondary markets.

The slope of the yield curve, also called the term spread, is often measured by the difference between the rate on 10-year Treasury notes and three-month Treasury bills. The term spread reflects the premium demanded by investors for bearing greater interest-rate risk on long-term Treasuries, as well as expectations about the future path of interest rates on short-term Treasuries.

The yield curve almost always slopes upward — put another way, long-term interest rates are generally higher than short-term rates. But the curve can take other shapes. It can be flat, for example, indicating that short- and long-term Treasuries offer the same rates. It can also slope downward or “invert,” indicating that short rates exceed long rates.

An inverted yield curve is worrisome to bank supervisors because it has typically put pressure on the margin between interest earnings and funding costs. Such pressure can, in

turn, tempt bankers to take more risk. Both effects have the potential to weaken bank conditions.

An inverted yield curve worries supervisors for an additional reason. Inversion has typically signaled a coming recession, and recessions undermine the ability of bank customers to repay their loans.

The chain from inversion to recession to loan losses shows up clearly in recent data. In July 2000, the yield curve inverted, and a recession followed, starting in March 2001. Between year-end 2000 and year-end 2002 the median charge-off rate for U.S. banks — net loan losses divided by total loans — grew by 50 percent before peaking at 0.16 percent in December 2002.

The yield curve was relatively flat throughout most of 2006 before inverting last summer. Only twice in the last 20 years has the Treasury yield curve departed from its usual shape for so long. More ominously, the curve has inverted prior to every recession since 1960, and only once in the past 70 years has a recession not followed a period of inversion lasting more than a month.

### Term Spreads and NIMs

The term spread is a key driver of net interest margin (NIM), which, in turn, is an important source of bank profits. Formally, NIM is measured as the difference between the interest income from loans and securities and the interest expense on deposits, divided by interest-earning assets. Loans tend to have longer maturities than deposits, so bankers make money when the long-term rates they charge loan customers exceed the short-term rates they pay depositors. As the yield curve begins to invert, however, margins narrow and profitability suffers. The positive rela-

tionship can be seen in Figure 1, which traces the term spread and median NIM for U.S. and Fifth District banks from 1984 through March 2007.

A persistently flat or inverted yield curve can also lure bankers into assuming more risk, in the hope of, potentially higher returns will offset declining NIM. This phenomenon, called “chasing yield,” can take a number of forms. A bank could, for example, grow its asset portfolio for a given level of equity capital (a so-called leveraged-growth strategy) or purchase securities with greater levels of interest-rate risk. Traditionally, banks have opted to take more credit risk — by weakening lending standards, offering new lending products, or lending in unfamiliar territory. On average, chasing yield has resulted in greater loan losses, with negative consequences for bank conditions.

### Whither NIMs?

The current inversion has yet to produce a marked decline in net interest margins because the traditional relationship has weakened since 2001. A close look at Figure 1 shows this weakening. Between 2001 and 2004, the term spread widened to a 13-year high while margins for U.S. and Fifth District banks drifted downward. Then, in early 2004, median NIM began to climb while the spread narrowed dramatically.

Analysis of bank-level data for Maryland, Washington, D.C., West

Virginia, Virginia, North Carolina, and South Carolina suggests the factors behind nationwide trends are also at work in the Fifth District. Across the country, banks have insulated margins through more careful asset-liability management and greater reliance on

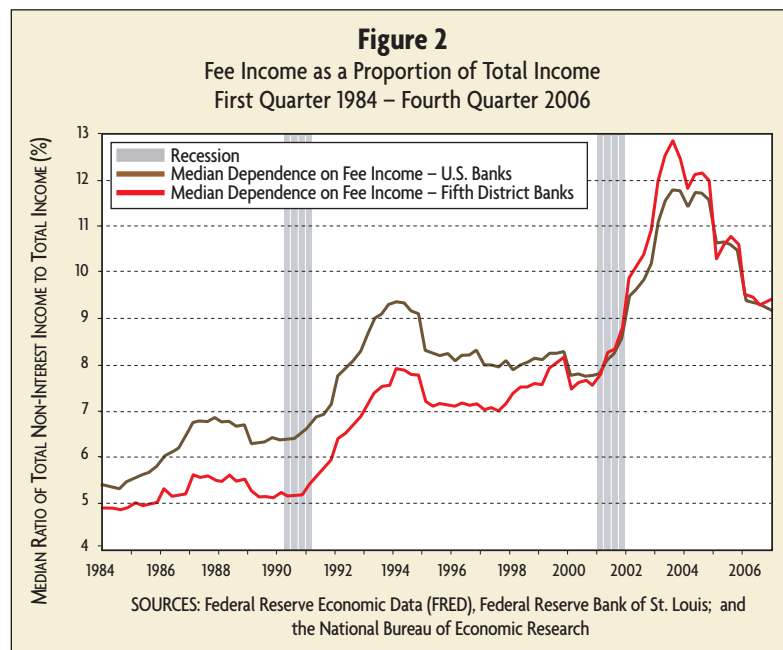
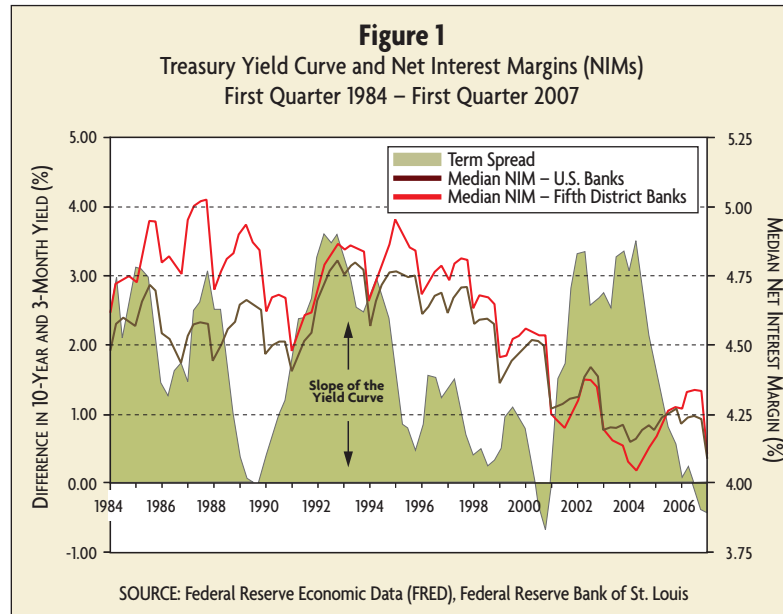
1986 and year-end 2006, median fee dependence (i.e., the portion of bank income derived from fees) rose from 6.45 percent to 9.32 percent in the nation and from 5.23 percent to 9.38 percent in the Fifth District.

Although flat-to-negative term spreads have yet to squeeze margins, they still could. Three times since 1984 — in 1989, 2000, and 2006 — the yield curve flattened or inverted and Fifth District NIMs declined sharply, but with a lag. This experience suggests bank margins and profits could still be at risk should the unusual slope of the yield curve persist.

### Recession Radar

Assessing the potential for loan losses implied by a flat or inverted yield curve requires a look at the role of monetary policy. The Federal Reserve stabilizes prices by targeting a key short-term interest rate — the federal funds rate. Suppose the Fed raises the federal funds rate to fight inflation. The increase will ripple across all interest rates in financial markets, but the rise in short rates will be larger than the rise in long rates. Long rates will not rise as much because they reflect the average of short rates expected to

prevail over time, and the Fed historically has cut the federal funds rate with the passing of the inflation threat. If the rise in the federal funds rate is large, then short rates could move above long rates. Such a hike is also likely to slow the economy.



long-term fixed-rate Federal Home Loan Bank advances. Profits also have been shielded from narrowing margins through greater reliance on fees from services, most prominently for larger banks. This trend can be seen in Figure 2. Between year-end

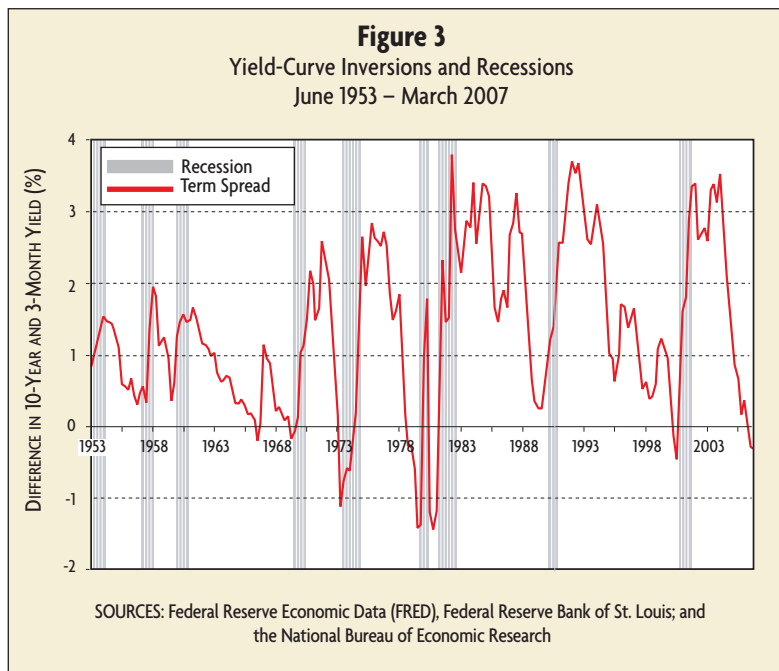
In formal statistical studies, economists Arturo Estrella of the New York Fed and Frederic Mishkin, now a Federal Reserve Board governor, and more recently, Estrella and Mary Trubin, also of the New York Fed, documented the link between the term spread and recession probability. Jonathan Wright, an economist at the Federal Reserve Board, has also found a connection, though his work suggests that the forecasting ability of the term spread improves dramatically when the federal funds rate is taken into account to capture information about current monetary policy.

On average, since 1990, the term spread has been 1.72 percent, and the federal funds rate has been 4.37 percent. Using Wright's model, these numbers imply an average probability of recession of 2.5 percent. Since the yield curve inverted in August 2006, the spread has averaged -0.21 percent, and the federal funds rate has averaged 5.25 percent, implying a recession probability of 42.8 percent, though most analysts' forecasts put the chances of recession lower than that.

### Banks Are Solid

The recent behavior of the term spread does not necessarily imply that bank supervisors should leap into action to

head off loan-quality problems. An inverted yield curve has preceded every recession since 1960, as seen in Figure 3, but a recession has not followed every inversion. In September 1966, for example, the term spread dipped below zero and remained negative into



January 1967, yet no recession occurred. In addition, the charge-off rate tends to lag the business cycle, so supervisors should have some time to prepare if economic conditions weaken. Finally, loan quality in the Fifth District and the nation is strong by historical standards. At the end of March 2007, the median charge-off rate was 0.02 percent for Fifth District banks and 0.01 percent for U.S. banks as a whole. These figures compare with the 20-year high of 0.77 percent for the entire banking sector in December 1986.

Supervisors have another factor on their side: the robust levels of equity capital in the banking sector. Equity capital represents the owner's stake in the bank — the more capital, the less temptation to chase yield.

As of March 31, 2007, the median leverage ratio — equity capital divided by assets — was 10.16 in the Fifth District and 10.00 percent across the nation. Viewed another way, no Fifth District banks and only seven banks nationwide (of more than 7,300) were weakly capitalized, where “weak” corresponds to a simple leverage ratio under 5 percent.

### Bottom Line

Taken together, the evidence suggests that the recent inversion of the yield curve may not pose a threat to bank safety and sound-

ness. Moreover, in early June the curve “righted” itself — that is, the term spread headed above zero — for the first time in nearly a year. Still, past experience combined with the lengthy duration of the yield-curve inversion suggests bank supervisors should remain vigilant.

**RF**

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### READINGS

Estrella, Arturo, and Frederic S. Mishkin. “The Yield Curve as a Predictor of U.S. Recessions.” Federal Reserve Bank of New York *Current Issues in Economics and Finance*, June 1996, vol. 2, no. 7.

Estrella, Arturo, and Mary R. Trubin. “The Yield Curve as a Leading Indicator: Some Practical Issues.” Federal Reserve Bank of New York *Current Issues in Economics and Finance*, July/August 2006, vol. 12, no. 5.

Federal Deposit Insurance Corporation. “What the Yield Curve Does (and Doesn't) Tell Us.” *FYI: An Update on Emerging Issues in Banking*, February 22, 2006.

Wright, Jonathan H. “The Yield Curve and Predicting Recessions.” Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series Working Paper 2006-07, February 2006.