

## Ben S Bernanke: Reflections on the yield curve and monetary policy

Remarks by Ben S Bernanke, Chairman of the Board of Governors of the US Federal Reserve System, before the Economic Club of New York, New York, 20 March 2006.

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I would like to thank the Economic Club of New York for inviting me to speak here this evening. I intend to take the opportunity afforded by an audience of experts on global financial markets to address an intriguing financial phenomenon: the fact that, over the past seven quarters or so, tightening monetary policy has been accompanied by long-term yields that have moved only a little on net. Why have long-term interest rates not risen more, as they have done over previous policy tightening cycles? And what implications does this pattern of long-term interest rates have for monetary policy and the economic outlook? As you will see, in my remarks I will do a better job of raising questions than of answering them. In particular, I will conclude that the implications for monetary policy of the recent behavior of long-term yields are not at all clear-cut. I hope you will agree that these questions are nevertheless worthwhile posing, as they are intertwined with a number of important economic and financial issues. I should say at the outset that the views I will express are my own and are not necessarily shared by my colleagues on the Federal Open Market Committee (FOMC).

### The Federal Reserve's tightening cycle

The tightening cycle that began at the end of June 2004 is notable in at least four respects. First, its onset was delayed for longer than many observers expected. The FOMC kept policy unusually accommodative for an extended, or should I say for a considerable, period. The goal, as you know, was to help ensure that the economic expansion would be self-sustaining and to protect against a remote risk that the fall in inflation observed during 2003 might culminate in outright deflation--an outcome that could have had potentially serious consequences for the economy and for the efficacy of monetary policy. Indeed, with those concerns in mind, in 2003 the Federal Reserve made explicit for the first time that price stability is a symmetric objective: It is important to avoid inflation that is too low as well as inflation that is too high.

A second way in which the most recent experience has been unusual is the extent to which policy actions have been signaled in advance. Both in the months leading up to the initiation of the tightening cycle and during the cycle itself, the statements issued after each meeting of the FOMC provided qualitative guidance about the likely future path of policy and its dependence on economic events. Providing information about the expected path of policy helped to ensure that long-term interest rates and other asset prices did not build in a projected pace of tightening that was more rapid than the Committee itself anticipated, and the statement's focus on the conditionality of future policy actions emphasized the ongoing need for both policymakers and financial market participants to respond to economic news. In retrospect, the clear communication of policy provided notable benefits, in my view, by increasing the effectiveness of monetary policy while minimizing unnecessary volatility in financial markets.

Third, policy moved gradually, tightening in one-quarter point increments over fourteen successive meetings. Together with expanded communication, this gradual approach served to stabilize policy expectations and damp market volatility. In addition, the measured pace of rate increases gave the Committee time to observe the progress of the economy and to adjust its plans and communications strategy accordingly.<sup>1</sup> To be sure, gradualism was possible only because inflation expectations remained contained--testimony to the importance of a central bank's retaining credibility in financial markets and among businesses and households.

A fourth interesting aspect of the latest tightening cycle, which is my principal focus this evening, is the behavior of long-term interest rates. Since June 30, 2004, the overnight interest rate has moved up 3-1/2 percentage points, but the ten-year nominal Treasury yield has only edged higher. At less than 4-

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<sup>1</sup> I spoke about this in more detail in "[Gradualism](#)," a speech delivered at an economics luncheon co-sponsored by the Federal Reserve Bank of San Francisco (Seattle Branch) and the University of Washington, Seattle, May 20, 2004.

3/4 percent, that yield is not much above the target federal funds rate of 4-1/2 percent and, indeed, is about even with yields for maturities of one to three years. In the remainder of my remarks I will speculate on the reasons for and consequences of this historically unusual behavior of long-term rates.

### **The recent behavior of longer-term yields**

Some discussion of the arithmetic of longer-term yields provides a useful perspective on recent developments in bond markets. The ten-year Treasury yield, for example, can be viewed as a weighted average of the current one-year rate and nine one-year forward rates, with the weights depending on the coupon yield of the security. As I will discuss, each of these forward rates can be split further into (1) a portion equal to the one-year spot rate that market participants currently expect to prevail at the corresponding date in the future, and (2) a portion that reflects additional compensation to the bondholder for the risk of holding longer-dated instruments.

Current and near-term forward rates are particularly sensitive to monetary policy actions, which directly affect spot short-term interest rates and strongly influence market expectations of where spot rates are likely to stand in the next year or two. Indeed, as we would expect, the recent tightening of policy has been accompanied by increases in both the current one-year rate and next few years' forward rates. For example, since June 2004, the one-year forward rate for the period two to three years in the future has risen almost 1-1/2 percentage points. As the ten-year yield is about unchanged even as its near-term components have risen appreciably, it follows as a matter of arithmetic that its components representing returns that are more distant in time must have fallen. In fact, the one-year forward rate nine years ahead has declined 1-1/2 percentage points over this tightening cycle. Incidentally, by comparing forward rates implied by yields on nominal Treasuries with those implied by Treasury securities that are indexed for inflation, we can infer that about two-thirds of the overall decline in far-distant nominal forward rates over this tightening cycle has been associated with a drop in real yields, with the remainder reflecting a drop in inflation compensation.

It is important to note that the marked decline in far-forward interest rates has not been confined to U.S. Treasury securities. The spread in yields between Treasuries and longer-term private securities such as corporate bonds is little changed or is down on net since June 2004, implying that essentially all of the fall in forward rates seen in the Treasury market has occurred in private yields as well. These patterns have also appeared in securities not denominated in dollars. For example, over the same period, longer-term government and swap yields in the United Kingdom and the euro area have moved appreciably lower. Indeed, long-term nominal yields have dropped in a number of countries, often by more than in the United States, and the yield curves in many of these countries are also rather flat or even slightly inverted.

### **Some reasons for the decline in far-forward rates**

Why have the far-forward rates implied by the term structure of interest rates declined in recent years? Observers have offered two broad (and not mutually exclusive) classes of explanations. One set of explanations holds that bond yields are reacting to current or prospective macroeconomic conditions. Another set focuses on special factors that may have influenced market demands for long-term securities per se, independent of the economic outlook. I will first consider explanations that emphasize possible changes in the net demand for long-term securities and later return to explanations that focus on the link between bond yields and the economic outlook.

As I have noted, each of the forward interest rates implicit in the term structure can be usefully decomposed into two parts: (1) the spot interest rate that market participants currently expect to prevail at the corresponding date in the future and (2) the additional compensation that investors require for the risk of holding longer-term instruments, known as the term premium. With the economic outlook held constant, changes in the net demand for long-term securities have their largest effect on the term premium. In particular, if the demand for long-dated securities rises relative to the supply, then investors will generally accept less compensation to hold longer-term instruments--that is, the term premium will decline.

To quantify the importance of the shift in the balance of demand and supply and of the consequent change in the term premium, we can appeal to the research literature on the term structure of interest rates. In modern models of the term structure, yields at each horizon are explained by a small number

of factors. In some models, these factors can be explicitly tied to observable economic variables, such as inflation; in other models, the factors represent statistical summaries of the data and have no explicit economic interpretations. These factors, in turn, can be used to estimate term premiums at each point in time, although one should clearly acknowledge that the results can be sensitive to various statistical and modeling assumptions.

According to several of the most popular models, a substantial portion of the decline in distant-horizon forward rates over recent quarters can be attributed to a drop in term premiums.<sup>2</sup> Using some of these models, we can further divide the term premium into two parts--a premium for bearing real interest rate risk and a premium for bearing inflation risk. Both of these components have trended lower over time as well, according to the standard models, but the decline in the premium since last June 2004 appears to have been associated mainly with a drop in the compensation for bearing real interest rate risk.

At least four possible explanations have been put forth for why the net demand for long-term issues may have increased, lowering the term premium. First, longer-maturity obligations may be more attractive because of more stable inflation, better-anchored inflation expectations, and a reduction in economic volatility more generally. With the benefit of hindsight, we now recognize that an important change occurred in the U.S. economy (and, indeed, in other major industrial economies as well) sometime in the mid-1980s. Since that time, the volatilities of both real GDP growth and inflation have declined significantly, a phenomenon that economists have dubbed the "Great Moderation." I have argued elsewhere that improved monetary policies, which stabilized inflation and better anchored inflation expectations, are an important reason for this positive development; no doubt, structural changes in the economy such as deregulation, improved inventory control methods, and better risk-sharing in financial markets also contributed.<sup>3</sup> Whatever the reason for the fall in macroeconomic volatility, if investors have come to expect this past performance to continue, they might believe that less compensation for risk--and thus a lower term premium--is required to justify holding longer-term bonds. In that regard, it is interesting to observe that long-term forward rates were also low in the 1950s and 1960s. With long-term inflation expectations apparently anchored at low levels and with the prospect of continued economic stability, market participants may believe that it is appropriate to price bonds for an environment like that which prevailed four or five decades ago.

A second possible explanation of the evident decline in the term premium is linked to the increased intervention in currency markets by a number of governments, particularly in Asia. According to this explanation, foreign official institutions, primarily central banks, have invested the bulk of their greatly expanded dollar holdings in U.S. Treasuries and closely substitutable securities, and these demands by the official sector have put downward pressure on yields. This interpretation has some support, including research that I did with two coauthors that found that longer-term yields came under significant downward pressure during episodes of heavy official purchases of dollars in 2004.<sup>4</sup> And financial-market participants appear to be especially sensitive to any suggestion that foreign official entities may alter their portfolio preferences.

However, these observations speak more to the existence of a short-term impact of large purchases and sales--the result of limits to liquidity in the very short run--than to the perhaps more important question of whether those transactions have a lasting effect on yields. On this latter issue, clear evidence is harder to come by. Several pieces of indirect evidence suggest that the long-term effect of foreign purchases on yields may be moderate. Notably, the global market for dollar-denominated bonds is enormous--perhaps around \$25 trillion, including dollar-denominated debt issued by other countries as well as debt issued abroad by U.S. residents. In the long run, therefore, the market should be able to absorb purchases and sales of large absolute magnitude with relatively modest changes in yields. Indeed, long-term yields continued to fall over recent quarters even as foreign official holdings of Treasury securities increased at a slower pace than previously.

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<sup>2</sup> Don H. Kim and Jonathan H. Wright (2005), "[An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates](#)," Finance and Economics Discussion Series 2005-33 (Washington: Board of Governors of the Federal Reserve System, August).

<sup>3</sup> Ben S. Bernanke (2004), "[The Great Moderation](#)," speech delivered at the meetings of the Eastern Economic Association, Washington, D.C., February 20.

<sup>4</sup> Ben S. Bernanke, Brian P. Sack, and Vincent R. Reinhart (2004), "Monetary Policy Alternatives at the Zero Bound: An Empirical Assessment," *Brookings Papers on Economic Analysis* (2), pp. 1-100.

The performance of Treasuries relative to that of other fixed-income instruments also argues against a dominant influence of foreign official portfolio decisions on long-term rates. If foreign official holdings of Treasuries were the source of the decline in their yields, then we would expect to observe increased spreads between yields on Treasury securities and the returns to other types of debt less favored by foreign official holders. But we have not seen a significant widening of private yield spreads relative to Treasuries--quite the contrary--and, as I noted earlier, yields in other industrial economies have fallen as well, in many cases by more than U.S. yields. A reasonable conclusion is that the accumulation of dollar reserves abroad has influenced U.S. yields, but reserve accumulation abroad is not the only, or even the dominant, explanation for their recent behavior.

Changes in the management of and accounting for pension funds are a third possible source of a declining term premium. Reforms proposed in the United States, Europe, and elsewhere are widely expected to encourage pension funds to be more fully funded and to take steps to better match the duration of their assets and liabilities. Together with the increased need of aging populations in the industrial countries to prepare for retirement, these changes may have increased the demand for longer-maturity securities. We have seen little direct evidence to date of sizable pension-fund portfolio shifts toward long-duration bonds, at least in the United States. But judging from anecdotal reports, bond investors might be attaching significant odds to scenarios in which pension funds tilt the composition of their portfolios toward such assets substantially over time.

Fourth and finally, as investors' demands for long-duration securities may have increased over the past few years, the supply of such securities seems not to have kept pace. The average maturity of outstanding Treasury debt, for example, has dropped by 1-1/2 years since its peak in 2001, a trend just now beginning to turn with the Treasury's reissuance of the thirty-year bond. Corporations and households, however, have taken advantage of low long-term rates to lengthen the duration of their debt in recent years, which has compensated to some extent for the reduced duration of available Treasury debt.

### **Long-term yields and monetary policy**

What does the historically unusual behavior of long-term yields imply for the conduct of monetary policy? The answer, it turns out, depends critically on the source of that behavior. To the extent that the decline in forward rates can be traced to a decline in the term premium, perhaps for one or more of the reasons I have just suggested, the effect is financially stimulative and argues for greater monetary policy restraint, all else being equal. Specifically, if spending depends on long-term interest rates, special factors that lower the spread between short-term and long-term rates will stimulate aggregate demand. Thus, when the term premium declines, a higher short-term rate is required to obtain the long-term rate and the overall mix of financial conditions consistent with maximum sustainable employment and stable prices.

However, if the behavior of long-term yields reflects current or prospective economic conditions, the implications for policy may be quite different--indeed, quite the opposite. The simplest case in point is when low or falling long-term yields reflect investor expectations of future economic weakness. Suppose, for example, that investors expect economic activity to slow at some point in the future. If investors expect that weakness to require policy easing in the medium term, they will mark down their projected path of future spot interest rates, lowering far-forward rates and causing the yield curve to flatten or even to invert. Indeed, historically, the slope of the yield curve has tended to decline significantly in advance of recessions.

What is the relevance of this scenario for today? Although macroeconomic forecasting is fraught with hazards, I would not interpret the currently very flat yield curve as indicating a significant economic slowdown to come, for several reasons. First, in previous episodes when an inverted yield curve was followed by recession, the level of interest rates was quite high, consistent with considerable financial restraint. This time, both short- and long-term interest rates--in nominal and real terms--are relatively low by historical standards.<sup>5</sup> Second, as I have already discussed, to the extent that the flattening or inversion of the yield curve is the result of a smaller term premium, the implications for future

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<sup>5</sup> This is consistent with empirical work in Ben S. Bernanke and Alan S. Blinder 1992), "The Federal Funds Rate and the Channels of Monetary Transmission," *American Economic Review*, vol. 82 (September), pp. 901-21. In that paper, we found that the level of the federal funds rate was extremely informative about future movements of real macroeconomic variables.

economic activity are positive rather than negative.<sup>6</sup> Finally, the yield curve is only one of the financial indicators that researchers have found useful in predicting swings in economic activity. Other indicators that have had empirical success in the past, including corporate risk spreads, would seem to be consistent with continuing solid economic growth. In that regard, the fact that actual and implied volatilities of most financial prices remain subdued suggests that market participants do not harbor significant reservations about the economic outlook.

An alternative perspective holds that the recent behavior of interest rates does not presage an economic slowdown but suggests instead that the level of real interest rates consistent with full employment in the long run--the natural interest rate, if you will--has declined. For example, some observers have pointed to factors that may create a longer-term drag on the growth in household spending, including high energy costs, the likelihood of slower growth in house prices, and a possible reversal of recent declines in saving rates. If these drags on the growth of spending do materialize, then a lower real interest rate will be needed to sustain aggregate demand and keep the economy near full employment. To be consistent with a lower long-term real rate, the short-term policy rate might have to be lower than it would otherwise be as well.

Given the global nature of the decline in yields, an explanation less centered on the United States might be required. About a year ago, I offered the thesis that a "global saving glut"--an excess, at historically normal real interest rates, of desired global saving over desired global investment--was contributing to the decline in interest rates.<sup>7</sup> In brief, I argued that this shift reflects the confluence of several forces. On the saving side, the factors include rapid growth in high-saving countries on the Pacific Rim, export-focused economic development strategies that directly or indirectly hold back the growth of domestic demand, and the surge in revenues enjoyed by oil producers. On the investment side, notable factors restraining the global demand for capital include the legacy of the Asian financial crisis of the late 1990s, which led to continuing sluggishness in investment in some of those economies, and the slower growth of the workforce in many industrial countries. So long as these factors persist, global equilibrium interest rates (and, consequently, the neutral policy rate) will be lower than they otherwise would be.

## Conclusion

What conclusion should we draw? Clearly, bond prices, like other asset prices, incorporate a great deal of information that is potentially very relevant to policymakers. However, the information is not always easy to extract and--as in the current situation--the bottom line for policy appears ambiguous. In particular, to the extent that the recent behavior of long-term rates reflects a declining term premium, the policy rate associated with a given degree of financial stimulus will be higher than usual. But to the extent that long-term rates have been influenced by macroeconomic conditions, including such factors as trends in global saving and investment, the required policy rate will be lower. Given this reality, policymakers are well advised to follow two principles familiar to navigators throughout the ages: First, determine your position frequently. Second, use as many guides or landmarks as are available.

In the context of monetary policy, these principles suggest that policymakers should monitor bond yields carefully in judging the current state of the economy--but only in tandem with the signals from other important financial variables; direct readings on spending, production, and prices; and a goodly helping of qualitative information. Ultimately, a robust approach to policymaking requires the use of multiple sources of information and multiple methods of analysis, combined with frequent reality checks. By not tying policy to a small set of forecast indicators, we may sacrifice some degree of simplicity, but we are less likely to be misled when a favored variable behaves in an unusual manner.

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<sup>6</sup> See the discussion in Jonathan H. Wright (2006), "[The Yield Curve and Predicting Recessions](#)," Finance and Economics Discussion Series 2006-7 (Washington, D.C.: Board of Governors of the Federal Reserve System, March).

<sup>7</sup> Ben S. Bernanke, "[The Global Saving Glut and the U.S. Current Account Deficit](#)," Homer Jones Lecture, April 14, 2005.