FRBSF Weekly Letter

November 30, 1984

Inflation-Proof Long-Term Bonds

The long-term real, or inflation-adjusted, interest rate is one of the economy's most important variables. It measures the return earned on savings; it represents the cost of borrowing to business to finance capital spending; and its movements serve as a guide to the impact of actual and prospective changes in fiscal and monetary policies on the economy. Unfortunately, the long-term real interest rate has not been observable in a major industrial country until the recent development of long-term bonds indexed to the inflation rate, so-called "real" bonds, in the United Kingdom. The parallel operation of markets in nominal and real bonds in the U.K. allows us to observe the expected real long-term interest rate directly and to estimate expected inflation as well.

Interest rate components

The market interest rate on government bonds in this country is readily available in the daily financial pages. But this rate is the *nominal* interest rate. To calculate a real interest rate, we must adjust the nominal rate for expected inflation since bonds represent obligations to pay or rights to receive fixed dollar interest payments and principal repayment in the future. More specifically, market participants, be they prospective homebuyers, savers, or corporate borrowers, must subtract the inflation rate expected over the life of their bonds to obtain their expected long-term real rate of interest. Although nominal interest rates embody these market expectations, it is difficult to determine how much of the nominal rate is due to expectations of inflation and how much to real rates of interest.

Furthermore, yields on nominal bonds, relative to real bonds of the same maturity, may also contain a premium for the uncertainty about inflation. This premium may be positive, negative, or zero depending on the risk-aversion of borrowers and lenders, but it is often assumed to be positive. Furthermore, this inflation-risk premium is sometimes assumed to be volatile. The size of this premium would vary with the degree of uncertainty borrowers and lenders have regarding their expectations of the inflation rate.

Inflation-proof bonds

To the extent that actual inflation rates over the life of a bond turn out to be different from expected rates, real returns on savings and borrowing costs will differ from expected real returns. This uncertainty presumably is unattractive to borrowers and to lenders. Bonds that promise to pay a certain *real* return therefore should be attractive because they allow lenders to lock in real returns and borrowers to lock in real costs if the bonds are held to maturity.

In spite of the sophistication of financial markets and their recent waves of innovation, such "inflation-proof" bonds have not emerged in the United States. In labor markets, by contrast, wage contracts that are at least partially indexed to inflation have existed for decades. The contrast is even more striking when we consider that most labor contracts last a very few years, while mortgages and corporate and government bonds may have maturities as long as thirty years.

This situation is not the same in other countries. Since 1981, the central government of the United Kingdom has been issuing both traditional, fixed nominal interest rate and "real" long-term bonds whose principal and coupon payments are indexed to the price level. Because of this indexing, the yield on the latter is a certain real rate of interest. The co-existence of nominal and real rate securities allows us to estimate the financial market's expectation of long-term inflation by subtracting the real rate from the nominal rate for bonds of similar maturity.

To the extent that there is a positive inflation-risk premium in nominal bonds, borrowers such as the corporate sector and the federal government could reduce their borrowing costs by issuing indexed debt. Since inflation-indexed debt removes the uncertainty about real yields due to uncertainty about inflation, the interest rate on real bonds will contain no premium for inflation uncertainty. The fact that such bonds have not been issued in the United States may suggest that this premium is negligible.

We do observe, of course, that many longer term financial instruments have nominal yields that move with the overall level of short-term nominal

interest rates. The adjustable rate mortgage is a well-known example. However, these instruments remove inflation risk only to the extent that short-term interest rates move one-for-one with inflation. In fact, we have seen several episodes in recent years when nominal rates on short-term instruments did not move in step with inflation.

Recent behavior

The history of long-term (fifteen-year) nominal and real interest rates in the United Kingdom is plotted in Chart 1. We take the difference between these rates to represent long-term price inflation. During 1981, the U.K.'s actual inflation rate was about twelve percent, as was the expected long-term inflation rate. More recently, the actual inflation rate has been about 7½ percent.

Two features of this measure of expected long-term inflation are noteworthy. It dropped four percentage points between the second half of 1981 and the second half of 1982, and it has changed little in the two years since. This suggests that expectations about relatively long-run (here, about 14 years) inflation may change rather quickly. Whether the change during 1982 resulted from anticipations of future government policies, the slowing of actual inflation (from around 20 percent in 1979 to 5 percent in 1982), or other forces cannot be determined here.

Nominal rates have followed the same general pattern as expected inflation—falling off sharply and then stabilizing. Chart 1 suggests that nearly all of the movement in nominal rates since 1981 has been associated with expected inflation, both on a monthly basis and over longer time periods. Also note that nominal rates would have been a misleading guide to real interest rate movements for two reasons. First, fluctuations in real interest rates were much smaller. Second, when nominal rates were falling, real rates were rising, and when nominal rates were flat (for the past two years), real rates were still rising. Real rates moved up a full percentage point from July 1981 to October 1984, and have risen most noticeably since early 1983.

Real term structure

The availability of real interest rates for different maturities allows us to examine the real rate expected over various time horizons—the "real term structure," in other words. The availability of both nominal and real yields also allows us to construct the term structure of expected inflation.

The term structure of real interest rates as of early November (plotted in Chart 2) shows a downward sloping yield curve, with shorter term (five-year) instruments yielding four to four-and-a-half percent and very long-term (thirty-five-year) securities yielding about three percent.

We do not plot the difference between the nominal and real yields for different maturities because it is essentially flat at 7 percent for all maturities. On the face of it, this result could suggest that inflation rates expected to prevail over the next five years and over the next thirty-five are the same and that the risk premium rises little with maturity. However, part of this constancy may be deceptive. As noted earlier, nominal yields may also contain a premium for inflation uncertainty. If this uncertainty increases with the forecast horizon, which seems plausible, nominal yields will rise, everything else being equal, with the term to maturity. A constant difference between nominal and real yields therefore translates into *declining* expected inflation as the forecast horizon lengthens, after adjustment is made for the inflation uncertainty problem.

Conclusion

Offering inflation-indexed bonds increases the options available in financial markets to lenders and to borrowers in several ways. To begin with, individuals and businesses that want to avoid inflation risk would benefit from access to such an investment. To some extent, borrowers can already mitigate such risk, for example, by issuing bonds with

call provisions. The availability of indexed bonds in the United Kingdom makes it easy for lenders to secure a known real return over virtually any horizon. Pension funds have found this particularly attractive and, presumably, so would a large fraction of the total saving done for retirement.

Issuing indexed bonds also may reduce the government's borrowing costs. If inflation is reduced to a level below what the market expects, the *ex-post* real borrowing costs associated with issuing nominal interest bonds would be too high because the government would have paid an inflation premium that is too high. In that case, issuing real bonds would prove cheaper. Third, increasing the share of its bonds that are indexed might increase the credibility of a government's anti-inflation program. To the extent that private markets for labor, capital, and materials can be convinced of a government's anti-inflation resolve, a government would have to pursue less restrictive monetary and fiscal policies to reduce inflation further.

Finally, the parallel operation of real and nominal bond markets provides policymakers with information about the current state of the economy as well as information about how the economy might respond to actual and prospective government policies.

James A. Wilcox

Chart 1
Long-term Interest Rates and Inflation

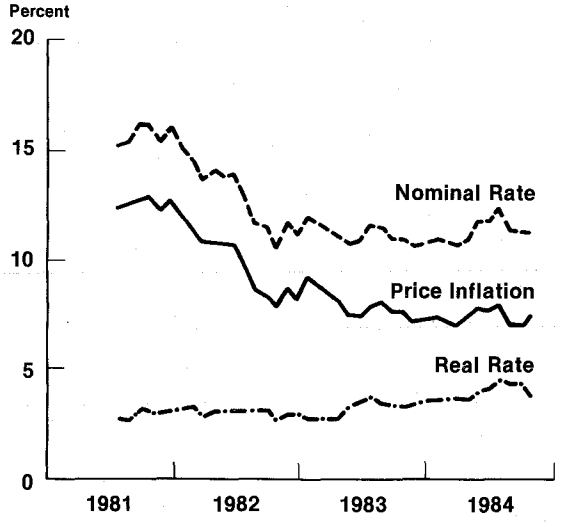
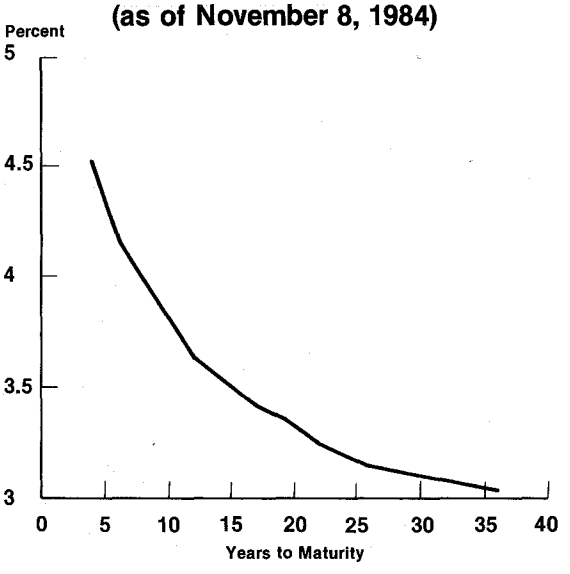


Chart 2
The Term Structure of Real Yields
(as of November 8, 1984)



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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT
(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 11/14/84	Change from 11/07/84	Change from 12/28/83 Dollar	Percent[7]
Loans, Leases and Investments[1 2]	187,015	410	10,990	7.0
Loans and Leases[1 6]	168,354	447	12,999	9.4
Commercial and Industrial	51,458	200	5,495	13.5
Real estate	61,377	103	2,478	4.7
Loans to Individuals	30,776	98	4,125	17.4
Leases	5,093	− 4	30	0.6
U.S. Treasury and Agency Securities[2]	11,557	− 38	− 950	− 8.5
Other Securities[2]	7,103	0	− 1,060	− 14.6
Total Deposits	192,175	136	1,178	0.6
Demand Deposits	45,662	443	− 3,575	− 8.2
Demand Deposits Adjusted[3]	30,020	− 119	− 1,311	− 4.7
Other Transaction Balances[4]	12,461	− 271	− 314	− 2.7
Total Non-Transaction Balances[6]	134,052	− 37	5,067	4.4
Money Market Deposit Accounts—Total	39,310	120	− 287	− 0.8
Time Deposits in Amounts of $100,000 or more	40,922	− 45	2,757	8.1
Other Liabilities for Borrowed Money[5]	22,846	431	− 592	− 2.9
Two Week Averages of Daily Figures	Period ended 11/05/84	Period ended 10/22/84		
Reserve Position, All Reporting Banks				
Excess Reserves (+)/Deficiency (−)	55	13		
Borrowings	133	102		
Net free reserves (+)/Net borrowed(−)	− 78	− 89		

1 Includes loss reserves, unearned income, excludes interbank loans
2 Excludes trading account securities
3 Excludes U.S. government and depository institution deposits and cash items
4 ATS, NOW, Super NOW and savings accounts with telephone transfers
5 Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources
6 Includes items not shown separately
7 Annualized percent change