Interest-Rate Futures

by Judy Z. Menich

The rapid growth of the interest-rate futures market has attracted widespread attention in the financial industry. Increasingly, banks, thrift institutions, government securities dealers, and other institutional money managers are utilizing interest-rate futures to hedge against interest-rate risk.

Futures trading in interest rates was introduced in 1975 by the Chicago Board of Trade. Trading was initiated in a contract calling for future delivery of $100,000 principal balance Government National Mortgage Association (GNMA) pass-through certificates (that is, mortgage-backed certificates guaranteed by GNMA on which monthly payments of principal and interest are guaranteed to certificate holders). Since 1975, futures contracts have been added for 90-day and 1-year Treasury bills, 15-year and 20-year Treasury bonds, 4-year and 4-year to 6-year Treasury notes, and 30-day and 90-day commercial paper. Currently pending are proposals to establish futures contracts on additional intermediate-term Treasury notes and on private financial instruments.

The proliferation of interest-rate futures contracts has aroused concern among various financial regulators. In particular, the Federal Reserve System and U.S. Department of the Treasury have expressed concern about the impact of futures trading on the government's ability to market its debt.[1] Regulators also are concerned about possible misuses of the futures markets by financial institutions, which could threaten the soundness of individual banks.

Given the greater volatility of today's interest rates, the use of interest-rate futures contracts probably will continue to expand rapidly (see chart 1). There are both pitfalls and benefits in the use of these markets. This *Economic Commentary* examines some of the ways in which financial institutions can use futures markets to minimize interest-rate risk and focuses on some of the problems confronting potential hedgers.

Hedging and Speculating

Participants in futures markets generally can be classified as either hedgers or speculators—at least in theory. Each futures transaction has two sides—one party to the transaction seeks to avoid the risk of future price fluctuation (hedger), while the other party is willing, for a price, to assume the risk (speculator).[2] Although this dichotomy obviously fails to capture all of the distinctions among market participants and their activities, it does provide a useful framework with which to explain the risk-shifting function of the market.

The primary economic justification of a futures market is its role as a mechanism for transferring the risk of price fluctuations to persons more tolerant of such risk. Hedging is the assumption of a futures-market position (equal and opposite to an existing or contemplated cash-market position) as a temporary substitute for the intended future sale or purchase of the actual commodity. Hedgers are willing to forego the potential profits of a favorable price move in return for protection against the potential losses that would result from an unfavorable price move. By assuming offsetting positions in the cash and futures markets (that is, long the cash, short the futures, and vice versa), the hedger expects to gain in one market what he loses in the other.[3] In essence, hedging eliminates the effects of a major change in the price of a commodity and substitutes the more manageable risk of a change in the relationship between cash (or spot) and futures prices.

The effectiveness of the futures market as a hedging vehicle can be attributed to the fact that cash and futures prices tend to move in tandem. Not only do the supply and demand factors that affect prices operate in both markets, but cash and futures prices also are linked by the ability to store the commodity and deliver it in settlement of the futures contract. In practice, however, less than 3 percent of all transactions initiated in the futures market culminates in delivery of the actual commodity, the rest having been liquidated by offsetting trades.[4] This is because futures markets are primarily risk-transfer markets. The existence of a futures market presumes the existence of a viable cash market. Nevertheless, the ability to deliver the cash commodity against a futures contract ensures a close economic relationship between cash and futures prices.

Cash and futures prices tend to converge as the futures contract approaches its delivery date, both because risk decreases and carrying costs—insurance, storage, financing costs—decline. Actually, the price of the cash commodity may be higher than the futures contract during the delivery month, reflecting a premium for the uncertainty as to the actual delivery date. Cash and futures are not perfect substitutes for each other until the last day of the month, which occurs after trading in a particular futures contract has ceased. At that time, the economic factors determining price behavior in the cash commodity and futures contract are virtually identical. If satisfied by delivery, the futures contract becomes a cash transaction.

The key to hedging is understanding the *basis*—the arithmetic difference between the immediate cash price of a security (or any other commodity) and the price of a specific futures contract. Hedgers focus on the relationship between cash and futures prices rather than on the absolute level of commodity prices. Because changes may occur in the cash-futures basis, some element of risk is interjected into hedging. Changes in the basis occur because futures prices often behave independently of cash prices. The independent behavior of futures prices (prior to the delivery month) is largely due to speculative activity, although differences in delivery time and delivery grade also impart an element of variability. A change in the basis between the time a futures contract is initiated and the time it is lifted would yield a profit or a loss. If the basis remains constant over the life of a hedge, the hedge is referred to as a "perfect hedge." In reality, the basis rarely remains constant, so that most hedges result in either a profit or a loss. The risk involved in basis change is much smaller, however, than the risk of price change in the entire cost of a commodity. Thus, the major benefit of hedging in a futures market is that a commercial user can replace the risk of commodity price change with the much smaller risk of basis change.

In addition to providing a hedging mechanism, the futures market offers a vehicle for speculation. Speculators assess the probable direction of future price movements and risk their capital to profit from an accurate forecast. Speculators are assumed to be taking the opposite side of a hedger's futures contract by accepting the risk of price fluctuation. In addition, they provide the market with the liquidity necessary for hedgers to buy and sell large quantities of a commodity contract with ease. The liquidity provided by speculators tends to reduce overall price volatility. Futures markets require an abundance of speculators to perform their economic function of providing a risk-transfer mechanism.

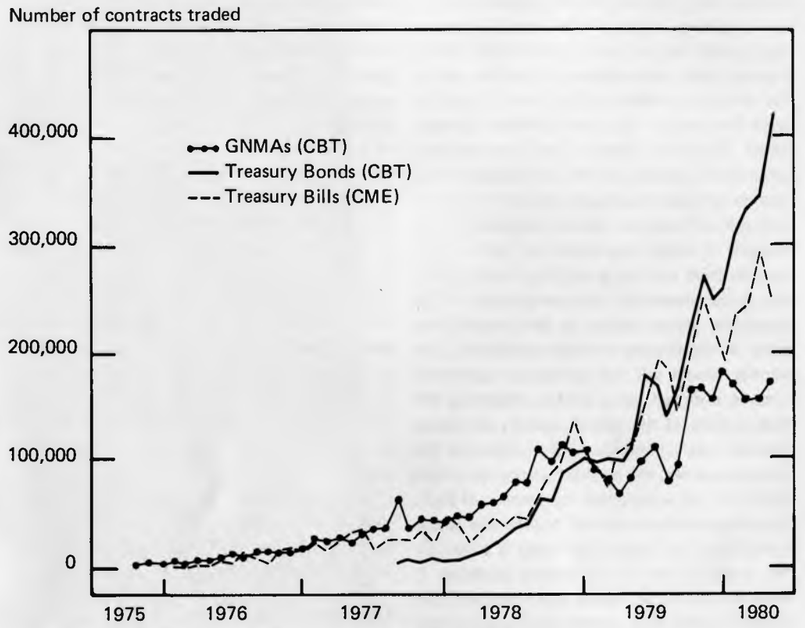
How Futures Markets Operate

The interest-rate futures market operates essentially the same as the long-established futures markets for agricultural goods and other commodities. Market participants enter into contracts calling for the delivery of a standardized quantity of a commodity at a specified time in the future at a price determined at the time the contract is made.

Futures contracts evolved from forward contracts—cash market transactions in which two parties agree to the purchase and sale of a commodity at a specified date in the future. Although similar in principle, there are significant differences between the two contractual instruments. In particular, the terms of each forward contract are tailored to the needs of the parties to the transaction, while futures contracts are standardized with respect to contract terms. Commodities exchanges specify the terms of a futures contract, such as quantity, deliverable grade, method of delivery, and maximum allowable daily price fluctuation. The exchanges limit the delivery date of futures contracts to designated months. Because each futures contract is identical and interchangeable with all other contracts of the same delivery month, a seller (or buyer) can easily offset his contractual obligation to deliver (or take delivery of) a commodity at any time simply by buying (or selling) an identical contract.

The formal structure of a futures market contrasts with the informal structure of

Chart 1 Growth of Interest-Rate Futures



NOTE: Data cover period from October 1975 through April 1980.

SOURCES: Chicago Board of Trade and Chicago Mercantile Exchange.

1. For further discussion of public-interest issues of financial futures, see *Treasury Futures Markets: A Study by the Staffs of the U.S. Treasury and Federal Reserve System,* May 1979.

2. The opposite side to a hedger's futures transaction also could be another hedger who is offsetting his risk or liquidating a hedge. Similarly, a futures transaction could involve two speculators.

3. In a *cash market,* transactions for purchase or sale of the physical commodity are made under terms agreeable to the parties to the transaction.

4. The percentage of contracts on which delivery is taken tends to be somewhat higher with respect to financial futures than nonfinancial futures. In the GNMA futures market, for example, the ratio of deliveries to maximum open interest (total number of futures contracts that have not been offset by opposite futures transactions or by delivery) has been roughly 15 percent. For further discussion, see *Treasury Futures Markets: A Study by the Staffs of the U.S. Treasury and Federal Reserve System.*

Judy Menich is an economic analyst at the Federal Reserve Bank of Cleveland.

a forward market. Whereas futures contracts are traded on federally designated contract markets, forward contracts are not. Each commodities exchange maintains a clearinghouse that reconciles all trades executed on the floor of the exchange. The clearinghouse interposes itself in the middle of each transaction, becoming the buyer to every seller, and the seller to every buyer. The contractual obligation of each market participant, therefore, is to the clearinghouse, eliminating the need for market participants to concern themselves with the identity or credit standing of the other party to the transaction. Members of the clearinghouse post margins on their contracts, similar to performance bonds, to ensure the financial integrity of the market. Each day the accounts of the clearing members are adjusted as to gain or loss. Losses posted to an account must be eliminated by the deposit of cash prior to the opening of trading the following day. In contrast, forward markets generally do not require margin deposits or daily settlement of accounts. Parties to a forward contract must, therefore, assess the credit worthiness of the other party to the transaction. For this reason, forward contracts may entail a greater risk of default.

Primary Uses of Interest-Rate Futures

The interest-rate futures market offers financial institutions and other institutional money managers the opportunity to manage interest-rate risk at relatively low cost. By hedging in the futures market, money managers can achieve any of three basic objectives:

(1) protect the value of a currently held portfolio of fixed-income securities that will be liquidated, or protect the value of a portfolio of fixed-income securities against a rise in interest rates; or
(2) lock in the interest cost of debt to be issued at a future time; or
(3) fix the return on an investment in a fixed-income security before funds are available, or lock in the yield on a reinvestment or rollover of a portfolio.

If a holder of a financial asset expects interest rates to rise before he can sell the instrument, he can lock in the current higher price by using a short hedge. A *short hedge* is the sale of a futures contract today as a temporary substitute for the sale of the actual instrument in the future. By using a short hedge, the loss on the actual instrument would be offset by a gain in the futures market when the holder buys back (offsets his short position) at an anticipated lower price. Financial institutions that own fixed-income securities or create them for sale to investors could use a short hedge to protect themselves against a rise in interest rates. For example, mortgage bankers holding a pool of mortgages for later resale to permanent investors would be vulnerable to losses on their holdings during periods of rising interest rates. By initiating a short hedge, a mortgage banker could protect himself against the price consequences of rising interest rates.

The second objective—to lock in the interest cost of debt to be issued at a future time—also would entail the initiation of a short hedge in the futures market. A short hedge thus could be used by a bank in its asset/liability management. Banks especially are vulnerable to changes in the level of interest rates, as they often fund long-term assets (for example, mortgages and consumer loans) with short-term liabilities (for example, six-month money-market certificates and other short-term deposits). This "mismatch" of maturities exposes banks to potential loss if interest rates rise; rollover costs can increase, while the return on the portfolio remains constant. To mitigate the adverse effects of mismatched asset/liability maturities, a bank can hedge in the futures market. To ensure its profit margin against rising interest rates, a bank can sell Treasury-bill futures contracts roughly corresponding to the terms of its short-term deposits. If interest rates rise, a bank's increased rollover costs would be offset by a gain on its futures-market position, thereby locking in a specified level of profits on its lending activities. The cost of this profit margin "insurance" is the forfeited profit that would have resulted from a decline in interest rates.

The final objective—to fix the return on a fixed-income security to be purchased in the future—would entail the initiation of a long hedge. A *long hedge* is the purchase of a futures contract today as a temporary substitute for the purchase of the actual financial instrument in the future. The primary reason for executing a long hedge is to lock in a high yield on a future investment when interest rates are expected to decline. As in the previous example, a long hedge could be used by a bank in its asset/liability management. If a bank's assets (loans or investment securities) mature before its liabilities are due and interest rates are expected to decline (deposit inflows can thus be expected to increase), a bank may want to lock in the current high rate by going long, that is, buying, a corresponding futures contract. If, as expected, yields decline in the interim, the price of the futures contract would rise. The banker would sell the previously purchased futures contract at a profit, offsetting the higher price of the actual security (or lower interest rate on the loan). By hedging in the futures market, the banker has protected the return on his anticipated investment or loan, since his increased cost of buying the actual instrument (or lower loan rate) is offset by the profit made on his futures position. If rates had increased rather than declined, the banker would have experienced a loss on his futures-market position, but this would have been offset by the lower cost of purchasing the actual financial instrument (or higher loan rate). Thus, the banker would have forfeited the additional profit that would have resulted from an accurate interest-rate forecast in exchange for minimizing the potential increase in his purchase cost.

Although interest-rate futures can be used to minimize interest-rate risk, some caveats are in order. If there is no futures contract corresponding to an institution's cash-market instrument, hedging could increase risk. Cross-hedging—the buying or selling of an interest-rate futures contract to protect the value of a cash-market position of a similar, but not identical instrument—depends on the degree of price correlation between the two instruments. If a change in market conditions affects the instruments differently, the hedger could suffer losses on both his cash and futures position. Thus, an institution may not be able to hedge a cash-market position that has no comparable futures contract.

It is generally conceded that futures trading tends to encourage speculation because of the low transaction costs of being a market participant.[5] Similarly, futures markets enable commercial users to hedge more easily and cheaply. However, it is sometimes difficult to determine whether the activities of a financial institution in the futures market constitute hedging or speculating. Under a bona fide hedging strategy, a market participant should be indifferent to the course of interest rates; he would fare as well whether interest rates rose or fell. In practice, most financial institutions probably engage in speculation to some extent insofar as they seek to profit from a change in interest rates. In the strictest sense, a futures-market hedging position that is unequal to an institution's interest-rate exposure involves an element of speculation. In fact, most institutions do not assume futures-market positions exactly equal to their cash-market positions, thereby retaining some interest-rate risk. The magnitude of interest-rate risk is probably reduced significantly by a selective or partial hedge.

Conclusion

Interest-rate futures have the potential to modify substantially the way in which business is conducted in the capital markets. Although still in their infancy, interest-rate futures have proven to be a valuable tool for money managers seeking to avoid or minimize their exposure to interest-rate risk.

To date, much of the participation in these markets has been speculative in nature. As interest-rate futures contracts continue to proliferate, however, commercial interests can be expected to become more frequent users of these markets. Ultimately, the success of these markets will depend on the willingness of those who manage money—banks, securities dealers, savings and loans, mortgage bankers—to take advantage of the market's hedging opportunities.

5. *Transaction costs* are the costs of participation in the market and include commissions, search costs, and margin deposits.

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Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

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