CBOT® U.S. Treasury Futures and Options

Reference Guide

Chicago Board of Trade

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Introduction

For almost 130 years, the Chicago Board of Trade was strictly a commodity exchange, listing futures on agricultural products and precious metals. Then, in 1975 the Exchange introduced GNMA-CDR futures to track mortgage related interest rates, the first futures contract designed to manage interest rate risk associated with a debt instrument. The Exchange expanded its product offerings in 1977 with the 30-year U.S. Treasury bond futures contract, later adding futures on 10-year Treasury notes (1982), 5-year Treasury notes (1988), and 2-year Treasury notes (1990).

Currently, CBOT® financial futures and options represent the majority of trading activity at the Exchange. Just as annual volume in CBOT agricultural contracts exploded from a few hundred in 1848 to more than 85 million in 2004, volume in financial futures and options soared to more than 490 million in 2004 from a mere 20,125 in 1975. Such enormous growth is a testament to the value provided to the financial community by the Chicago Board of Trade markets.

This booklet provides a broad overview of the CBOT Treasury futures contracts, including concepts, fundamentals and applications.

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THE NEED FOR CBOT TREASURY FUTURES

Participants in the Treasury Futures Markets

The Chicago Board of Trade provides a marketplace for those who wish to hedge specific interest rate exposures, and speculators who wish to take advantage of price volatility.

CBOT Treasury futures and options play an important role in the risk management strategies of a number of foreign and domestic market participants, including:

- bankers
- cash managers
- governments
- insurance companies
- mortgage bankers
- pension fund managers
- thrifts
- underwriters
- bond dealers
- corporate treasurers
- hedge fund managers
- investment bankers
- mutual fund managers
- portfolio managers
- trust fund managers

Benefits of Treasury Futures and Options

Treasury futures provide numerous benefits to the marketplace, including:

Liquidity

Current prices are transmitted instantaneously around the globe to create a worldwide marketplace. This produces a diversified pool of buyers and sellers generating transaction volume and stable open interest, and providing participants with market breadth, depth and immediacy.

Price Discovery

The CBOT provides a centralized market where buyers can meet sellers and liquidity can be pooled. This centralization of trade facilitates price discovery and transparency. Prices are readily available to all market participants, providing data that reflects the futures contract's fair value.

Standardization

Standard contract specifications define upfront the traded commodity, its features, and the obligations of the futures contract. This means that negotiations to buy or sell futures contracts are focused on price alone. Standardization allows traders to respond instantly to even slight changes in market conditions.

Safety

The CBOT's clearing services provider minimizes credit risk by acting as both the buyer to every seller and the seller to every buyer. The credit risk that is inherent with over-the-counter trades is mitigated in futures transactions by the clearing services provider.

How Do Treasury Futures Work?

Generally speaking, futures contracts can act as a substitute for the cash market with one major distinction: where a cash transaction demands immediate payment and delivery, a futures contract provides for the delivery of the cash security at some later date. For example, in the cash market a buyer pays the seller for a cash security and the seller delivers the cash security to the buyer in return. Futures allow the buyer and seller to agree upon the price today but defer delivery of the instrument and its payment until a future date. Both buyer and seller must abide by the futures contract's specifications.

Of course, by delivery date the buyer may have sold his futures contract to another party and the seller may have ended his obligation to deliver by buying a futures contract. The standardization of financial futures allows market participants to offset their obligations to make or take delivery by simply executing an offsetting trade to cover the existing position.

Standardization attracts market participants and helps reinforce the liquidity of the futures market. Unlike the cash market where the parties specify the terms of each transaction, the terms of a futures contract are not negotiable. Each futures contract defines the instrument traded, its notional value, price quotation, settlement method and expiration date, so that the price of the futures contract becomes the single point of negotiation.

The futures contract will track the price of its underlying cash security. Also, since CBOT Treasury futures are not coupon bearing instruments and therefore do not have yields, they also reference the yield of that underlying cash security.

Trading activity is conducted in a competitive public auction resulting in a tight liquid market. Price negotiation creates a market where the bids and offers are publicly disseminated and transparent.

Chapter Three

CBOT TREASURY FUTURES: KEY CONCEPTS

The underlying instrument for CBOT T-bond, 10-year T-note and 5-year T-note futures contracts is a $100,000 face value U.S. Treasury security. Since the U.S. government issues significantly more debt in the 2-year maturity sector than any other, there are more 2-year Treasury securities traded in the underlying cash market. To accommodate the resulting need for trades of greater size, the CBOT designed its 2-year T-note futures contract to have a face value of $200,000 to provide economies of scale for market participants.

The chart below compares the key contract specifications for CBOT Treasury futures contracts.

Treasury Futures: Comparing Contract Specifications

	Bond Futures	10-yr Note Futures	5-yr Note Futures	2-yr Note Futures
Face Amount	$100,000	$100,000	$100,000	$200,000
Maturity	15 years +	6 1/2 to 10 years	4 1/2 to 5 years	1 1/2 to 2 years
Notional Coupon	6% coupon	6% coupon	6% coupon	6% coupon
Minimum Tick	1/32	1/64	1/64	1/128
Minimum Tick Value	$31.25	$15.625	$15.625	$15.625

Price Increments and Their Values

The Treasury futures market follows the conventions of the underlying cash market in quoting futures prices in points and increments of a point. A point equals 1% of the total face value of a security. Since futures on Treasury bonds and 10- and 5-year notes are all contracts with a $100,000 face value, the value of a full point is $1,000 for each of these contracts. A one-point move on a $200,000 face value 2-year T-note futures contract has a value of $2,000.

Price movements for Treasury futures are denominated in fractions of a full percentage point. These minimum price increments are called ticks. T-bond futures trade in minimum increments of one thirty-second of a point equal to $31.25. The 10-year and 5-year T-note futures trade in minimum price increments of one half of one thirty-second with a tick value of $15.625. The minimum tick size of the 2-year T-note contract is one quarter of one thirty-second, and since its face value is double the size of the others, its tick value is $15.625.

Conversion Factors

A Treasury futures contract is a proxy for a variety of issues within a specified range of maturities. To allow the futures price to reflect the full range of issues eligible for delivery, the CBOT developed a conversion factor system. This system was created to facilitate the T-bond and T-note delivery mechanism and adjust for the coupons eligible for delivery into the futures contract.

Conversion factors link the different prices of the many eligible cash instruments and the single price of the corresponding standardized futures contract. A specific conversion factor is assigned to each cash instrument that meets the maturity specifications of a Treasury futures contract. This is used to adjust the price of a deliverable bond or note, given its specific maturity and yield characteristics, to the equivalent price for a 6% coupon. This renders each of these securities comparable for the purpose of delivery into a single generic futures contract.

A conversion factor represents the price, in percentage terms, at which $1 par of a security would trade if it had a 6% yield to maturity. Issues with coupons less than 6% will have conversion factors less than 1 to reflect that the issue is priced at a discount and issues with coupons greater that 6% will have conversion factors greater than 1 to reflect that the coupon is priced at a premium.

The table below is an example of conversion factors for the CBOT 10-year T-note futures contract and illustrates that:

• multiple securities are eligible for delivery

• each security has its own conversion factor

• the number of eligible securities varies from one delivery month to the next

Conversion Factors for CBOT 10-year Treasury Note Futures

Coupon	Date	Date	Number	(Billions)	Sep. 2005	Dec. 2005	Mar. 2006	Jun. 2006
3 5/8	05/15/03	05/15/13	912828BA7	$18.0	0.8582	0.8620	0.8659	0.8697
3 7/8	02/18/03	02/15/13	912828AU4	$18.0	0.8765	0.8800	0.8834	0.8870
4	11/15/02	11/15/12	912828AP5	$18.0	0.8870	0.8902	0.8937	-----
4	02/17/04	02/15/14	912828CA6	$27.0	0.8713	0.8744	0.8774	0.8806
4	02/15/05	02/15/15	912828DM9	$23.0	0.8595	0.8625	0.8653	0.8683
4 1/8	05/16/05	05/15/15	912828DV9	$22.0	0.8657	0.8683	0.8711	0.8737
4 1/4	08/15/03	08/15/13	912828BH2	$31.0	0.8927	0.8955	0.8983	0.9012
4 1/4	11/17/03	11/15/13	912828BR0	$29.0	0.8901	0.8927	0.8955	0.8983
4 1/4	08/16/04	08/15/14	912828CT5	$23.0	0.8821	0.8848	0.8873	0.8901
4 1/4	11/15/04	11/15/14	912828DC1	$23.0	0.8797	0.8821	0.8848	0.8873
4 3/8	08/15/02	08/15/12	912828AJ9	$18.0	0.9108	0.9136	-----	-----
4 3/4	05/17/04	05/15/14	912828CJ7	$25.0	0.9177	0.9195	0.9215	0.9233
	Number of Eligible Issues:			12	12	12	11	10
	Dollar Amount Eligible for Delivery:			$275.0	$275.0	$275.0	$257.0	$239.0

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To adjust a futures price to an equivalent cash price for a particular issue:

Adjusted Futures Price (or Cash Equivalent Price) = Futures Price x Conversion Factor

To adjust the cash price of a particular issue to an equivalent futures price:

Adjusted Cash Price (or Equivalent Futures Price) = Cash Price / Conversion Factor

The easiest way to understand conversion factors is to compare the coupon and maturity of a 10-year Treasury note to the 6% coupon standard of the 10-year Treasury note futures contract. For example, the .9215 conversion factor for the 4 3/4% 10-year of May 2014 deliverable in March 2006, means that cash 10-year note is approximately 92% as valuable as a comparable 6% 10-year Treasury note of the same maturity. The 3 5/8% 10-year Treasury note of May 2013, also deliverable in March 2006, is only 87% as valuable (conversion factor .8659) as a comparable 6% 10-year Treasury note.

If a Treasury futures contract position remains open following the last day of trading in a given delivery month, the dollar value of the securities that would have to be delivered against the open position is reflected by the "invoice price," which is the price the buyer, or "long," will pay the seller. The invoice price is calculated by multiplying the conversion factor by the futures settlement price of a specified contract month, then adding accrued interest.

Invoice Amount = Contract Size x Futures Settlement Price x Conversion Factor + Accrued Interest

Accrued Interest = (Coupon / 2) x (# Days since Last Coupon Payment / # Days in a Coupon Period)

To determine the invoice price of the 4 3/4% 10-year note deliverable against the 10-year note futures contract, assume a settlement price of 110-08 for March 2006 futures.

Invoice Amount = ($100,000 x 1.1025 x .9215) + Accrued Interest = $101,595.375 + Accrued Interest

The Significance of the Cheapest to Deliver

When delivery occurs it is the choice of the seller, or "short," to determine which issue to deliver. The cash instrument chosen is the most economical for the short to deliver, i.e., the security that maximizes the return of buying the cash security, holding it until delivery and then delivering it into the futures. Since they will have to go into the cash market and purchase the security for delivery, the short seeks the particular cash instrument that maximizes the difference between what he pays for it and the invoice amount he receives from the long. That security which maximizes this difference (i.e., has the lowest purchase price for the short) is called the "cheapest-to-deliver" security (CTD), and it is this instrument that the futures price tracks most closely.

There are three ways to characterize the cheapest-to-deliver security:

1. **It has the cheapest forward invoice price.** Of all the securities eligible for delivery, the CTD has the cheapest forward invoice price.

2. **It has the highest implied repo rate.** The implied repo rate (IRR) is the theoretical rate of return the short could earn by purchasing the cash security and delivering it into the futures contract.

3. **It has the lowest net basis.** The basis is the difference between the cash price and the adjusted futures price.

   Gross Basis =
   Cash Security Price
   – (Futures Price x Conversion Factor)

The net basis is the gross basis net of carry. The net cost of buying the cash security and delivering it into the futures contract is lowest for the CTD.

While all three serve as good measures of the CTD, the most precise indicator is the implied repo rate.

Through the conversion factor system, a common point is established between the cash price and its equivalent futures price. This is critical in determining the CTD instrument. Remember that a futures contract will most closely track the price movements of its underlying CTD security, which means that identifying the CTD is key to understanding how futures prices may be expected to move.

Basis and Carry

To understand the basis, it is important to understand the concept of "carry." The "cheapness" of the CTD relative to the other securities eligible for delivery depends in part on carry.

Carry is the relationship between the coupon income enjoyed by the owner of the security and the costs incurred to finance the purchase of that security until some future date when it is delivered into the futures market. Standard calculations in the cash and futures bond markets assume that financing is accomplished at the short-term repo rate. The repo (short for repurchase) market may be thought of as a market for short-term loans collateralized by U.S. Treasury securities.

A simplified example might help to clarify the concept of carry. Suppose an investor wishes to purchase a Treasury bond or note with a 10% coupon. He finances the purchase by going to the repo market, where the security is used as collateral to borrow against its current market value. If the general level of the overnight repo rates is 6% and remains unchanged, he will earn 4% each day that he owns that 10% security.

In this example, the investor earned more interest income on his cash bond than he paid to finance it. That is, he enjoyed a net interest income, or positive carry. Positive carry is characteristic of an upwardly sloping yield curve, where long-term rates are higher than short-term rates. If there were an inverted yield curve, where short-term rates exceeded long-term rates, negative carry would result and the investor would spend more

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to finance the purchase of the cash instrument than he earned in interest income.

In the positive carry example the buyer of the security will hold it until the time comes to deliver it into the futures market. But the buyer of a corresponding futures contract will not earn interest income, because a futures contract is not an interest-bearing instrument. If the price of a CTD cash market security were always equal to the price of its corresponding futures contract, then there would be an enormous advantage to buying cash market securities rather than futures contracts. To maintain a balance in the relationship between cash and futures prices, therefore, the price of a futures contract must be discounted by the dollar value of the carry on the underlying CTD security.

Logically, in a positive carry environment, the futures price should equal the adjusted price of the CTD cash instrument less the positive carry. In this case, the carry benefits (interest income) for Treasury securities exceed carrying charges (financing costs). As a result, futures contracts should price below adjusted cash market prices. Conversely, in a negative carry, or inverted yield curve environment, the futures price should equal the adjusted cash price plus carrying charges.

As a result of these carry implications, the more deferred the expiration of a Treasury futures contract, the lower its price relative to the price of its underlying CTD security in a positive yield curve environment. This price differential— the basis—should shrink as time elapses and the contract approaches expiration. This principle is known as *convergence*, and implies that cash

and adjusted futures prices will be approximately equal on the expiration date of a futures contract.

Price Sensitivity, Hedging and the Dollar Value of a Basis Point

In order to understand the price-yield relationship of fixed income securities, a brief explanation of duration and convexity is beneficial. *Duration* is a measure of the sensitivity of a security or portfolio of securities to changes in interest rates. It essentially incorporates factors such as maturity, yield, coupon, and payment frequency into a single number which allows portfolio managers to measure and manage the interest rate risk they face. *Convexity* indicates the rate of change in duration as interest rates change.

The price – yield relationship of fixed income securities varies from point to point due to convexity. Because of this, the interest rate risk varies as yields change. The best way to measure the interest rate risk of a security is to quantify how much the security's value changes when the yield moves by a single basis point (bp), which equals 1/100 of one percent, or .01. This is referred to as the dollar value of a basis point, or the "Dollar Value of an 01" (DV01). Using the price of the security and its modified duration, one can derive a close estimate of the DV01 of a cash security.

DV01 = .01 X ((.01 X modified duration) X price)

For instance, let's take a look at the 4 1/8s of May 2015 10-year Treasury note. For the sake of this example we'll assume that it is the CTD and the security tracked by the March 2006 10-year Treasury note futures contract. The modified

duration for this security is 7.940 and the traded price on this day is 99-15, a dollar amount of $99,468.75. The dollar value of a yield change of one basis point would be:

DV01 = .01 X ((.01 X 7.940) X $99,468.75 = $78.98

The owner of a single 10-year note (the 4 1/8s of May 2015) with a notional value of $100,000 that is trading at 99-15 and a modified duration of 7.94, would have a DV01 of $78.98. The note would gain/lose $78.98 as the yield moves a single basis point.

Technically speaking, Treasury futures do not inherently have a DV01 since they are not coupon-bearing securities. Instead, they derive their DV01 from the instrument they track, which is usually the CTD or the on-the-run (most recently issued) Treasury security. Many mistake the 6% notional coupon in the Treasury futures contract specifications as a coupon rate for the futures. The futures contract prices the basket of deliverable securities with the assumption that they have a coupon of 6%. It does not reflect a coupon rate or interest revenue stream. Having said this, you can get an approximation of a DV01 for a Treasury future by using the underlying cash instrument it tracks.

To move from the cash DV01 to the future's DV01 is simple. Simply take the cash DV01 and divide it by the conversion factor for the security. Suppose we are trying to calculate the DV01 for the March 2006 10-year note futures.

The conversion factor for the 4 1/8s for the March 2006 future is .8711.

Future DV01 = Cash DV01/Conversion Factor

Future DV01 = $78.98/.8711 = $90.67

Whether a manager has underlying cash securities or futures, they need to understand the price sensitivity of the instrument. If the underlying security is to be hedged then its price sensitivity (DV01) needs to be matched with the price sensitivity of the hedging instrument. A portfolio of 10 of the 4 1/8s of May 2015 would have a DV01 of $789.80 (10 X $78.98). In order to hedge this portfolio with the March 2006 10-year Treasury note futures one must determine exactly how many futures would be needed to match the DV01 of the portfolio. This can be found by dividing the DV01 of the portfolio by the DV01 of the March futures contract.

Number of March Futures needed = $789.80/$90.67 = 8.71 March Futures

In this case one would need to sell nine March 2006 10-year Treasury note futures to hedge the long portfolio of ten 4 1/8s of May 2015.

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Chapter Four

TREASURY FUTURES HEDGING APPLICATIONS

CBOT Treasury futures lend themselves to a variety of strategies designed to allow market participants to hedge their risk. This section will highlight some of the more common hedging applications.

Long Hedge (or Anticipatory Hedge}
Generally speaking, since Treasury futures are a proxy for the cash market, they can be used by investors to gain interest rate exposure.

Quite often portfolio managers may be seeking to add a security to their portfolio that trades infrequently, and in the days or weeks they spend looking for the security they are missing out on the interest rate exposure. They can use Treasury futures to gain that exposure while they seek the security, and then liquidate their futures position once the security is purchased.

In the same vein, if funds are expected to come in throughout the month, as is sometimes the experience of insurance companies, the manager can purchase Treasury futures to gain exposure while waiting for the funds to become available. Once the funds are booked and the desired cash securities bought, the futures can be sold. In this way, the manager realizes any interest rate moves that occur during the period he is waiting for funding. The liquidity of the Treasury futures market makes it inexpensive to implement this strategy when compared to the cash market.

Let's take a look at a possible scenario. Suppose you want to purchase ten of the 2-year Treasury notes that won't be auctioned until the following month (the "When Issued" or WI 2-year note). Even though the notes are not yet available, you still want to lock in the interest rate exposure. While you're waiting for the cash 2-year notes to be auctioned, you could use CBOT 2-year T-note futures to get the interest rate exposure.

In order to implement this strategy, you first need to determine the DV01 of the WI 2-year notes and the March 2006 2-year T-note futures contract. The current price of the on-the-run (OTR) 2-year note deliverable into the March 2006 2-year T-note futures contract is 97-24/32 (97.75) with a modified duration of 2.411. The DV01 of that security would be:

OTR DV01 = .01 X ((.01 X 2.411) X 97,750) = $23.57

While the OTR and the WI 2-year are different securities, they are close enough to give us an estimate of the DV01 of a portfolio of ten WI 2-year notes:

$10 x CTD DV01 = 10 x \$23.57 = \$235.70$

The DV01 of the March 2006 2-year T-note futures would be:

$\$23.57 / Conversion\ Factor = \$23.57 / .9464 = \$24.90$

Therefore, the number of March 2006 futures needed to cover ten of the WI 2-year Treasury notes would be:

$Cash\ DV01 / Futures\ DV01 = Number\ of\ March\ 2006\ 2\text{-}year\ T\text{-}note\ Futures$

$\$235.70 / \$24.90 = 9.4658\ March\ 2\text{-}year\ T\text{-}note\ futures.$

Since fractional futures positions cannot be established you need to buy either nine or ten futures contracts, which means your position will be either slightly under-hedged (nine) or slightly over-hedged (ten). Let's assume you decided to purchase nine 2-year T-note futures contracts.

Suppose that during the month before the auction, interest rates drop 20 basis points. By not being in the market, you would miss out on a \$4714 profit on the WI 2-year note:

$DV01 x Position x Yield\ Change = \$23.57 x 10 x 20 = \$4714\ missed\ revenue$

Your futures position, however, will compensate for nearly all of that missed revenue:

$DV01 x Position x Yield\ Change = \$24.90 x 9 x 20 = \$4482$

By using futures you avoided the opportunity cost of not having the interest rate exposure and being able to take advantage of the 20bp decrease in interest rates. The liquidity of the futures market facilitates the participation that allows this strategy to take place.

Short Hedge
Once again, the liquidity of the financial futures market makes managing interest rate risk easy and inexpensive.

Suppose instead of anticipating a purchase of cash 2-year Treasury notes, you are already holding these securities in your portfolio and are concerned about declining value should interest rates rise. Potential losses can be mitigated by selling futures against the securities. Any loss incurred by the long cash position can be neutralized by the short futures position.

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Suppose you owned ten of the on-the-run 2-year notes and wanted to hedge the position against a possible rise in rates. The calculations would be the same as above, however, since you are long the cash security you would sell 2-year T-note futures to hedge rather than buy them. In the event of a 20 bp rise in interest rates, the loss from your long cash position (-$4714) would be mitigated by the gain in your short position in 2-year T-note futures (+$4482).

Duration Adjustment

Since the 1970s, portfolio managers have used duration to express the price sensitivity of a bond, note or portfolio to yield changes. In the face of a changing interest rate environment, portfolio managers need to adjust the duration of their portfolio. In a rising rate environment securities will lose their value so portfolio managers will want less interest rate sensitivity, i.e. lower duration. As rates drop, they'll seek higher duration to increase interest rate sensitivity and capture the impact of the rate change. Of course, they could adjust their duration by buying and selling the cash securities in their portfolio, but using Treasury futures is much simpler, efficient and cost effective.

Consider a portfolio of $100 million par value cash securities of varying tenors, maturities, and yields. The table below breaks down each security to show the DV01 per security and per position.

Tenor	Security	Price (Million $ Par)	Yield	Duration	Number of Securities	Dollar Amount	DV01 per Security	DV01 per position	Weight (Duration X $ Amount)
2-Year	3s of 2/08	97-24 (97.75)	3.92%	2.411	18	$17.595 M	$235.68	$4,242.24	$42.42 M
5-Year	3 7/8s of 05/10	99-14 (99.44)	4%	4.323	52	$51.709 M	$429.88	$22,353.76	$223.54 M
10-Year	4s of 11/12	99-17 (99.53)	4.08%	6.244	24	$23.887 M	$621.47	$14,915.28	$149.15 M
30-Year	8 1/8s of 05/21	141-31 (141.969)	4.41%	9.958	6	$8.518 M	$1413.73	$8,482.38	$84.82 M
Portfolio				4.92	100	$101.71 M	$2,700.76	$49,993.64	$499.93 M

The dollar amount of each security is multiplied by its respective duration to derive a weighted amount for that security. The total dollar amounts and weighted amounts are added to determine values for the entire portfolio. By dividing the total weighted amount by the actual dollar amount of the portfolio ($499.93 M/ $101.71 M) you can determine the duration of the portfolio (4.92). The duration of the portfolio is somewhere between that of the 5-year Treasury note (4.323) and the 10-year Treasury note (6.244).

The chart below displays the March 2006 Treasury futures contracts with their DV01s and the number of contracts you would need to short in order to hedge your position 100%. By hedging yourself 100% you have effectively reduced the portfolio's duration to nearly zero.

March 2006 Futures Contract	Futures DV01	Number of Contracts (100% Hedge)
2-year	$49.80 ($24.90 X 2)	85
5-year	$46.60	480
10-year	$69.54	214
30-year	$116.99	73

By partially hedging the position, selling less than the number of contracts indicated, you can still reduce the interest rate sensitivity of the portfolio to the point where it is easier to manage.

If your outlook indicates that this is a temporary situation, then this synthetic portfolio constructed with CBOT futures will help you target your preferred duration. On the other hand, if you conclude that this will be a longer-term situation, you can begin to adjust your underlying portfolio in a cost-effective way as the market creates opportunities to do so. With the futures position in place, you can afford to wait for advantageous prices in the cash market. As you eliminate unwanted securities and replace them with securities that fit in with your new goals, you can gradually lift your futures position until the portfolio adjustment is complete.

Chapter Five

SPREAD TRADING IN TREASURY FUTURES

In addition to hedging applications, Treasury futures also provide opportunities for interest rate speculation.

Spreading

Spreading is one of the most popular speculative strategies for Treasury futures. It involves the simultaneous purchase of one futures contract and the sale of another with the expectation that their price relationship will change enough to produce a profit when both positions are closed. Spreads are attractive for two reasons: less risk and lower costs.

Because the spread trader holds both a long and a short position between related instruments, spreads usually offer a lower-risk alternative to an outright long or short position. Consequently, spreads act as a "cushion" in the event the market goes against the trader's expectations. Spreading is generally less risky than an outright long or short position and therefore requires lower exchange margins.

Treasury spread strategies are intended to take advantage of the differences in price sensitivity between similar instruments of differing maturities. With all else being equal, the greater the length of time to maturity, the greater the impact a change in yield will have on price. The price of a T-bond futures contract, therefore,

should move more dramatically in response to a given change in yield than the prices of 2-year, 5-year, or 10-year T-note futures contracts.

The Treasury futures contracts traded at the CBOT offer spread traders a full range of U.S. yield curve products. For many years the 10-year T-note over the 30-year T-bond (NOB) spread has been a popular trade. The launch of 5-year and 2-year T-note futures added to the range of spread possibilities using notes and bonds.

Some guidelines may be applied when spreading between futures contracts whose underlying instruments are Treasury issues of different maturities. Since the prices of long-term issues are more sensitive to a given parallel change in yield than prices of shorter-term notes, the trader who anticipates advancing interest rates would buy a spread such as the NOB (buy 10-year T-note futures and simultaneously sell T-bond futures). If the trader expects yields to decline in a parallel fashion, he would sell the spread because T-bond futures prices should rise more dramatically than medium- or intermediate-term T-note futures prices.

Futures spreading strategies are similar to hedging a cash position, therefore the proper

spread ratio must be determined. Once again, this is achieved by matching the DV01s of each security. Consider the following example:

Assume a trader feels there will be a flattening of the yield curve and would like to use Treasury futures to take advantage of this environment. Since rates will rise faster in the front end of the yield curve, he will sell the front-end of the curve and buy the back-end. He decides to sell March 2006 5-year T-note futures (FVH6) and buy March 2006 T-bond futures (USH6). In the duration example in the previous section, we saw the DV01 for the FVH6 was $46.60 and the DV01 for the USH6 was $116.99. By dividing the USH6 DV01 by the FVH6 DV01 we find a ratio of 2.51 FVH6 for every USH6, or five 5-year T-note futures contracts for every two T-bond futures. If the curve does flatten the 5-year T-note futures position will outperform the T-bond futures. Assume the spread is initiated on June 22, 2005 and closed out on July 15.

Date	FVH6	USH6
6/22/2005	Sell 5 @ 108-22+	Buy 2 @ 117-20
7/15/2005	Buy 5 @ 107-13	Sell 2 @ 115-20
Profit / Loss	$6,484.38 (41.5/32 X $31.25 X 5)	-$4,000 (64/32 X $31.25 X 2)

As the table above indicates, the trader's market forecast was accurate and the position netted $2,484.38. Had there been a parallel shift in the curve instead, the two legs of the spread would have offset each other.

There are two things that should be kept in mind when considering this example:

1. Markets are dynamic, and the underlying deliverable security that is cheapest-to-deliver into a futures contract can change with shifts in either the general level of yields or the pitch of the yield curve. Clearly, any change in the identity of a futures contract's CTD issue will exert a direct impact upon the appropriate spread ratios for yield curve trades that incorporate the futures contract. For this reason alone, anyone who trades futures should routinely monitor price action in the contract's underlying basket of deliverable securities.

2. Also, the example references market conditions during a specific time period (June-July 2005). Insofar as market conditions may have changed since then, the spread ratios computed above may have changed in value as well.

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OPTIONS ON TREASURY FUTURES: KEY CONCEPTS

Option contracts offer more flexibility because they convey a right, rather than an obligation, to buy or sell the underlying futures contract for a given period of time at a pre-selected price. Like futures contracts, each option contract has its own specifications which define the rights the particular option conveys and when the contract will expire. The rights are granted only to option buyers, who purchase them by paying a price, called a premium, to the seller. In giving up those rights, the seller is now obligated to do whatever the option contract specifies if and when the buyer chooses. Options appeal to investors because the risks and rewards are defined up front.

The premium paid by an option buyer (also known as the "holder") is the maximum possible amount that the buyer can lose in this trade, yet the buyer's potential for profit can be unlimited. Because there is no further risk for the option buyer, his option position is never subject to margin calls.

The seller, or "writer," on the other hand, knows that the premium he is paid up front is the maximum profit he will receive, and even that is not guaranteed: in many cases, his potential for loss may be unlimited. Therefore, the option seller must post margin to demonstrate his ability to meet any potential obligations to the buyer.

An option contract grants the buyer either the right to buy (a call option) or to sell (a put option) the underlying futures contract. A call option on March 2006 T-bonds, for example, gives the holder the right to assume a long position in March 2006 T-bond futures. The seller of that call option is obligated to take a short position in March 2006 T-bond futures if the buyer chooses to exercise it. A buyer of a put option on March 2006 T-bonds, on the other hand, would have the right to take a short position in the March 2006 T-bond futures contract, while the seller of that put option must assume a long position in the futures contract.

Option Trades

	Calls	Puts
Buy	The right to buy a futures contract at a specified price.	The right to sell a futures contract at a specified price.
Strategy	Bullish: Anticipating rising prices/falling rates.	Bearish: Anticipating falling prices/rising rates.
Sell	Obligation to sell a futures contract at a specified price.	Obligation to buy a futures contract at a specified price.
Strategy	Bearish: Anticipating falling prices/rising rates.	Bullish: Anticipating rising prices/falling rates.

If the seller holds an offsetting position in a futures contract or in the underlying commodity itself, an option position is "covered." For example, the seller of a T-bond call option would be covered if he actually owns cash market U.S. Treasury bonds or is long the T-bond futures contract.

The risk associated with selling a covered call is limited, because the seller already owns either a futures position he can use to satisfy his contractual obligation to the buyer, or a cash security whose value is tied to that of the underlying futures contract. If he did not hold either, he would have an uncovered, or "naked," position.

An uncovered short call position exposes the option seller to a higher degree of risk than a covered call and therefore, is rarely advised for investors who lack professional trading expertise.

Pricing Options

Except for the option premium, the terms of an option are standardized; the premium is determined competitively in the marketplace.

An option contract specifies not only the expiration month of the particular futures contract, but also the price at which the contract can be exercised. A wide range of options are available for each Treasury futures contract, and each option specifies a different price level for the corresponding futures position. This pre-selected price level is the option's "strike price," also known as the "exercise price." The premium the buyer pays for the option depends in part on the strike price he has chosen.

Suppose that March 2006 T-bond futures are trading at 115-00, and an investor is concerned that prices may drop some time prior to expiration. He could simply sell March 2006 T-bond futures. However, options provide a vehicle that can limit the investor's loss. A reasonable trade would be to buy the at-the-money puts (March 115 puts). In the event that the market trades lower, the investor can realize a profit. If, however, the market goes against the long put position, his loss is limited to the premium he paid for the option.

The difference between the strike price of an option and the price at which its corresponding futures contract is trading is the "intrinsic value." A put option has intrinsic value when its strike price is greater than the current futures price, because the buyer will be able to sell futures higher than their current value. A call has intrinsic value when its strike price is lower than the current futures price, because the buyer will be able to purchase futures for less than their current value.

The investor who wants to save money up front by paying the least premium often chooses an option with no intrinsic value. If the investor in the above example buys a put option on March 2006 T-bond futures with a strike price of 113, he pays a smaller premium to ensure that

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	Call Option	Put Option
In-the-money	Futures> Strike	Futures < Strike
At-the-money	Futures = Strike	Futures = Strike
Out-of-the-money	Futures < Strike	Futures> Strike

113-00 is the minimum price at which he can go short the futures contract – regardless of how quickly or how far prices may fall before the option expires.

An option whose strike price is equal to the price of the underlying futures contract is referred to as "at the money." When the strike price suggests the possibility of an immediate profit, that option is "in-the-money." If exercising an option would result instead in an immediate loss, that option is "out-of-the-money." The more an option is in-the-money, the higher its premium; the further it is out-of-the-money, the lower the premium.

Intrinsic value is just one component of an option's premium. Another component is "time value." Options are considered "wasting assets." They have a limited life because each expires on a certain day, although it may be weeks, months, or years away. The expiration date is the last day the option can be exercised. When the option expires out-of-the-money, it expires worthless.

Time value reflects the probability the option will gain in intrinsic value or become profitable to exercise before it expires. The greater an option's time value, the higher its premium must

be. Time value decays as an option contract approaches expiration. As long as its intrinsic value remains relatively constant, its premium may be expected to fall over time.

In addition to intrinsic value and time value, volatility also affects option pricing. Volatility measures the uncertainty of future price moves. When volatility is low, price moves tend to be somewhat stable; when prices are volatile, uncertainty rises. As price volatility increases, the price of an option increases.

Exiting an Option Position

An option buyer may exit his option position in one of three ways. He may choose to exercise the option prior to expiration, whenever it seems most prudent to do so. Or, he may offset his option position by selling an option contract identical to the one he purchased. Finally, he may simply allow his option to expire.

The option seller may offset his position by buying back an identical contract or by keeping his option position until it expires. As long as the seller has an open position in an option contract, however, he is obliged to perform according to the terms of the contract, if the buyer chooses to exercise his rights.

Treasury Futures Positions after Option Exercise

	Call Option	Put Option
Buyer Assumes	Long Treasury futures position	Short Treasury futures position
Seller Assumes	Short Treasury futures position	Long Treasury futures position

Flexible Options on U.S. Treasury Futures
Flexible options are exchange-traded options that have non-standard features. The CBOT offers Flex Options on the 2-year, 5-year and 10-year T-note futures as well as the 30-year T-bond futures contracts.

Flex Options give market participants the ability to enhance the components of their position by customizing contract specifications that are typically standardized:

• Strike Price

• Exercise Style

• Expiration Date

• Expiration Month

The nonstandard features of Flex Options, coupled with the fact that they are exchange-traded, bring greater transparency to what otherwise would be an over-the-counter transaction.

Why Use Flex Options?
Among the reasons Flex options are an attractive alternative:

1. **Access to a Presently Unavailable Option:** Flex options allow you to establish a position in an option before it is listed.

2. **Options with Non-Standard Characteristics:** Flex options provide a vehicle for trading options that have non-standard components and therefore would not be listed.

3. **Cost Efficiencies:** Flex options provide a cost effective way of establishing a position by adjusting some of the factors that impact the option's price, e.g., the strike price, time to expiration and expiration style.

For further information please read *CBOT® Flexible Options on U.S. Treasury Futures*.

This brochure is designed to only introduce the subject of options trading; additional reading is strongly recommended. There are many books that thoroughly cover options and options trading.

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RECOMMENDED READING

The purpose of this brochure is to provide a general overview of CBOT U.S. Treasury futures and options, and some of the various aspects of trading; there is a limited amount of information a brochure of this nature can cover. To study these topics further and in greater detail the following books are recommended.

1. *Options, Futures, and Other Derivatives* by John C. Hull (Prentice Hall)
2. *Fixed Income Mathematics: Analytical & Statistical Techniques* by Frank J. Fabozzi (McGraw Hill)
3. *The Treasury Bond Basis* by Galen D. Burghardt (McGraw Hill).
4. *The Complete Guide to Spread Trading* by Keith Schap (McGraw Hill)

CONTRACT SPECIFICATIONS

30-Year U.S. Treasury Bond Futures

Contract Size
One U.S. Treasury bond having a face value at maturity of $100,000 or multiple thereof.

Deliverable Grades
U.S. Treasury bonds that, if callable, are not callable for at least 15 years from the first day of the delivery month or, if not callable, have a maturity of at least 15 years from the first day of the delivery month. The invoice price equals the futures settlement price times a conversion factor plus accrued interest. The conversion factor is the price of the delivered bond ($1 par value) to yield 6 percent.

Tick Size
Minimum price fluctuations shall be in multiples of one thirty-second (1/32) point per 100 points ($31.25 per contract) except for intermonth spreads, where minimum price fluctuations shall be in multiples of one-fourth of one-thirty-second point per 100 points ($7.8125 per contract). Par shall be on the basis of 100 points. Contracts shall not be made on any other price basis.

Price Quote
Points ($1,000) and thirty-seconds of a point. For example, 80-16 equals 80 16/32.

Contract Months
Mar, Jun, Sep, Dec

Last Trading Day
Seventh business day preceding the last business day of the delivery month. Trading in expiring contracts closes at noon, Chicago time, on the last trading day.

Last Delivery Day
Last business day of the delivery month.

Delivery Method
Federal Reserve book-entry wire-transfer system.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:00 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: US
Electronic: ZB

Daily Price Limit
None

Margin Information
For information on margin requirements see www.cbot.com.

Options on 30-Year U.S. Treasury Bond Futures

Contract Size
One CBOT U.S. Treasury Bond futures contract of a specified delivery month.

Expiration
Unexercised 30-year U.S. Treasury Bond futures options shall expire at 7:00 p.m. Chicago Time on the last day of trading.

Tick Size
1/64 of a point ($15.625/contract) rounded up to the nearest cent/contract.

Contract Months
The first three consecutive contract months (two serial expirations and one quarterly expiration) plus the next four months in the quarterly cycle (Mar, Jun, Sep, Dec). There will always be seven months available for trading. Serials will exercise into the first nearby quarterly futures contract. Quarterlies will exercise into futures contracts of the same delivery period.

Last Trading Day
Options cease trading on the last Friday which precedes by at least two business days, the last business day of the month preceding the option month. Options cease trading at the close of trading of the regular daytime open auction trading session for the corresponding 30-year Treasury Bond futures contract.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:02 p.m. - 4:00 p.m. Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: CG for calls, PG for puts
Electronic: OZBC for calls, OZBP for puts

Daily Price Limit
None

Strike Price Interval
One point ($1,000) to bracket the current 30-year T-bond futures price. If 30-year T-bond futures are at 92-00, strike prices may be set at 89, 90, 91, 92, 93, 94, 95, etc.

Exercise
The buyer of a futures option may exercise the option on any business day prior to expiration by giving notice to the Board of Trade clearing service provider by 6:00 p.m. Chicago time. Options that expire in-the-money are automatically exercised into a position, unless specific instructions are given to the Board of Trade clearing service provider.

Margin Information
Find information on margin requirements see www.cbot.com.

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10-Year
U.S. Treasury Note Futures

Contract Size
One U.S. Treasury note having a face value at maturity of $100,000 or multiple thereof.

Deliverable Grades
U.S. Treasury notes maturing at least 6 1/2 years, but not more than 10 years, from the first day of the delivery month. The invoice price equals the futures settlement price times a conversion factor plus accrued interest. The conversion factor is the price of the delivered note ($1 par value) to yield 6 percent.

Tick Size
Minimum price fluctuations shall be in multiples of one-half of one thirty-second (1/32) point per 100 points ($15.625 rounded up to the nearest cent per contract) except for intermonth spreads, where minimum price fluctuations shall be in multiples of one-fourth of one thirty-second point per 100 points ($7.8125 per contract). Par shall be on the basis of 100 points. Contracts shall not be made on any other price basis.

Price Quote
Points ($1,000) and one half of 1/32 of a point. For example, 84-16 equals 84 16/32, 84-165 equals 84 16.5/32.

Contract Months
Mar, Jun, Sep, Dec

Last Trading Day
Seventh business day preceding the last business day of the delivery month. Trading in expiring contracts closes at noon, Chicago time, on the last trading day.

Last Delivery Day
Last business day of the delivery month.

Delivery Method
Federal Reserve book-entry wire-transfer system.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:00 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: TY
Electronic: ZN

Daily Price Limit
None

Margin Information
For information on margin requirements see www.cbot.com.

Options on 10-Year
U.S. Treasury Note Futures

Contract Size
One CBOT 10-year U.S. Treasury Note futures contract of a specified delivery month.

Expiration
Unexercised 10-year Treasury Note futures options shall expire at 7:00 p.m. Chicago time on the last day of trading.

Tick Size
1/64 of a point ($15.625/contract) rounded up to the nearest cent/contract.

Contract Months
The first three consecutive contract months (two serial expirations and one quarterly expiration) plus the next four months in the quarterly cycle (Mar, Jun, Sep, Dec). There will always be seven months available for trading. Serials will exercise into the first nearby quarterly futures contract. Quarterlies will exercise into futures contracts of the same delivery period.

Last Trading Day
Options cease trading on the last Friday which precedes by at least two business days, the last business day of the month preceding the option month. Options cease trading at the close of trading of the regular daytime open auction trading session for the corresponding 10-year Treasury Note futures contract.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:02 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: TC for calls, TP for puts
Electronic: OZNC for calls, OZNP for puts

Daily Price Limit
None

Strike Price Interval
One point ($1,000/contract) to bracket the current 10-year T-note futures price. If 10-year T-note futures are at 92-00, strike prices may be set at 89, 90, 91, 92, 93, 94, 95, etc.

Exercise
The buyer of a futures option may exercise the option on any business day prior to expiration by giving notice to the Board of Trade clearing service provider by 6:00 p.m., Chicago time. Options that expire in-the-money are automatically exercised into a position, unless specific instructions are given to the Board of Trade clearing service provider.

Margin Information
Find information on margin requirements see www.cbot.com.

5-Year
U.S. Treasury Note Futures

Contract Size
One U.S. Treasury note having a face value at maturity of $100,000 or multiple thereof.

Deliverable Grades
U.S. Treasury notes that have an original maturity of not more than 5 years and 3 months and a remaining maturity of not less than 4 years and 2 months as of the first day of the delivery month. The 5-year Treasury note issued after the last trading day of the contract month will not be eligible for delivery into that month's contract. The invoice price equals the futures settlement price times a conversion factor plus accrued interest. The conversion factor is the price of the delivered note ($1 par value) to yield 6 percent.

Tick Size
Minimum price fluctuations shall be in multiples of one-half of one thirty-second (1/32) point per 100 points ($15.625 rounded up to the nearest cent per contract) except for intermonth spreads, where minimum price fluctuations shall be in multiples of one-fourth of one thirty-second point per 100 points ($7.8125 per contract). Par shall be on the basis of 100 points. Contracts shall not be made on any other price basis.

Price Quote
Points ($1,000) and one half of 1/32 of a point. For example, 84-16 equals 84 16/32, 84-165 equals 84 16.5/32.

Contract Months
Mar, Jun, Sep, Dec

Last Trading Day
The last business day of the contract's named expiration month.

Last Delivery Day
The third business day following the last trading day.

Delivery Method
Federal Reserve book-entry wire-transfer system.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:00 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: FV
Electronic: ZF

Daily Price Limit
None

Margin Information
For information on margin requirements see www.cbot.com.

Options on 5-Year
U.S. Treasury Note Futures

Contract Size
One CBOT 5-Year U.S. Treasury Note futures contract of a specified delivery month.

Expiration
Unexercised 5-year Treasury Note futures options shall expire at 7:00 p.m. Chicago time on the last day of trading.

Tick Size
1/64 of a point ($15.625/contract) rounded up to the nearest cent/contract.

Contract Months
The first three consecutive contract months (two serial expirations and one quarterly expiration) plus the next four months in the quarterly cycle (Mar, Jun, Sep, Dec). There will always be seven months available for trading. Serials will exercise into the first nearby quarterly futures contract. Quarterlies will exercise into futures contracts of the same delivery period.

Last Trading Day
Options cease trading on the last Friday which precedes by at least two business days, the last business day of the month preceding the option month. Options cease trading at the close of trading of the regular daytime open auction trading session for the corresponding 5-year Treasury Note futures contract.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday.
Electronic: 6:02 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: FL for calls, FP for puts
Electronic: OZFC for calls, OZFP for puts

Daily Price Limit
None

Strike Price Interval
One-half point ($500/contract) to bracket the current 5-year T-note futures price. For example, if 5-year T-note futures are at 94-00, strike prices may be set at 92.5, 93, 93.5, 94, 94.5, 95, 95.5, etc.

Exercise
The buyer of a futures option may exercise the option on any business day prior to expiration by giving notice to the Board of Trade clearing service provider by 6:00 p.m., Chicago time. Options that expire in-the-money are automatically exercised into a position, unless specific instructions are given to the Board of Trade clearing service provider.

Margin Information
For information on margin requirements see www.cbot.com.

2-Year
U.S. Treasury Note Futures

Contract Size
One U.S. Treasury note having a face value at maturity of $200,000 or multiple thereof.

Deliverable Grades
U.S. Treasury notes that have an original maturity of not more than 5 years and 3 months and a remaining maturity of not less than 1 year and 9 months from the first day of the delivery month but not more than 2 years from the last day of the delivery month. The invoice price equals the futures settlement price times a conversion factor plus accrued inter¡est. The conversion factor is the price of the delivered note ($1 par value) to yield 6 percent.

Tick Size
Minimum price fluctuations shall be in multiples of one-quarter of one thirty-second (1/32) point per 100 points ($15.625 rounded up to the nearest cent per contract). Par shall be on the basis of 100 points. Contracts shall not be made on any other price basis.

Price Quote
Points ($2,000) and one quarter of 1/32 of a point. For example, 91-16 equals 91 16/32, 91-162 equals 91 16.25/32, 91-165 equals 91 16.5/32, and 91-167 equals 91 16.75/32.

Contract Months
Mar, Jun, Sep, Dec

Last Trading Day
The last business day of the calendar month. Trading in expiring contracts closes at noon, Chicago time, on the last trading day.

Last Delivery Day
Third business day following the last trading day.

Delivery Method
Federal Reserve book-entry wire-transfer system.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday
Electronic: 6:01 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: TU
Electronic: ZT

Daily Price Limit
None

Margin Information
For information on margin requirements see www.cbot.com.

Options on 2-Year
U.S. Treasury Note Futures

Contract Size
One CBOT 2-year U.S. Treasury Note futures contract of a specified delivery month..

Expiration
Unexercised 2-year Treasury Note futures options shall expire at 7:00 p.m. Chicago time on the last day of trading.

Tick Size
1/2 of 1/64 of a point ($15.625/contract) rounded up to the nearest cent/contract.

Contract Months
The first three consecutive contract months (two serial expirations and one quarterly expiration) plus the next four months in the quarterly cycle (Mar, Jun, Sep, Dec). There will always be seven months available for trading. Serials will exercise into the first nearby quarterly futures contract. Quarterlies will exercise into futures contracts of the same delivery period.

Last Trading Day
Options cease trading on the last Friday which precedes by at least two business days, the last business day of the month preceding the option month. Options cease trading at the close of trading of the regular daytime open auction trading session for the corresponding 2-year Treasury Note futures contract.

Trading Hours
Open Auction: 7:20 a.m. - 2:00 p.m., Chicago time, Monday - Friday.
Electronic: 6:02 p.m. - 4:00 p.m., Chicago time, Sunday - Friday

Ticker Symbols
Open Auction: TUC for calls, TUP for puts
Electronic: OZTC for calls, OZTP for puts

Daily Price Limit
None

Strike Price Interval
One-quarter point ($500/contract) to bracket the current 2-year T-note futures price. For example, if 2-year T-note futures are at 94-00, strike prices may be set at 93.25, 93.50, 93.75, 94.00, 94.25, 94.50, 94.75, etc.

Exercise
The buyer of a futures option may exercise the option on any business day prior to expiration by giving notice to the Board of Trade clearing service provider by 6:00 p.m., Chicago time. Options that expire in-the-money are automatically exercised into a position, unless specific instructions are given to the Board of Trade clearing service provider.

Margin Information
For information on margin requirements see www.cbot.com.

KEY FINANCIAL MARKETS CONCEPTS

To effectively use the Treasury futures contracts traded at the CBOT, it is essential to understand the concepts that affect them. Although the futures market is separate and distinct from the cash market, the prices at which an instrument is bought or sold in both markets have a fundamental interrelationship.

Debt Market Primer

Debt instruments are legal obligations of the issuer. When an individual or institution loans money to the government or a corporation, the lender becomes a creditor. In return for use of the creditor's money, the issuer promises to make periodic interest payments to the creditor. Usually, the interest is paid semiannually. (Interest on US Treasury bills, which sell at a discount from their maturity value, is paid at maturity.)

At maturity, in the case of Treasury notes, Treasury bonds, and corporate and municipal bonds, the creditor receives a final interest payment in addition to the original principal. For mortgage-backed securities, the creditor receives interest payments and a portion of the principal monthly.

Debt Market Terminology

The rate of interest earned or paid on a debt instrument is typically expressed as an annualized percentage. In the debt market, it is commonly referred to as the coupon.

The yield of a bond is the rate of return given a bond's annual interest income, the current market price, redemption value and time to maturity.

The length of time between the maturity date of a debt instrument and its issuance is its term.

Fixed-income securities are actively traded everyday. The price received by the holder of the instrument, however, will vary according to several factors, including interest rates for comparable issues, remaining time to maturity, the degree of credit risk of the issuer, supply and demand, and the market's perception of the state of the economy.

Interest Rates and Bond Prices

The price of a specific bond (or note) with a fixed coupon fluctuates to compensate for changes in current interest rates. When interest rates rise above the fixed-rate coupon, the market value of a bond declines because investors are less likely to invest in or hold an instrument offering a lower return. The opposite is true when interest rates decline and fall below the fixed-rate coupon. This is a simple explanation for the inverse relationship that exists between bond prices and interest rates. When interest rates rise, the market value of the debt instrument declines; when interest rates fall, the market value of the debt instrument rises.

The Yield Curve

A yield curve visually depicts the term structure of interest rates for debt instruments of the same quality (rating).
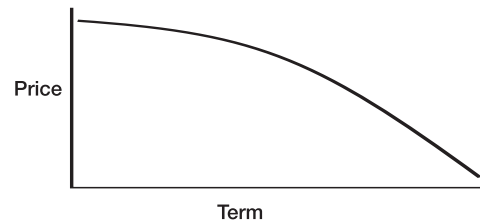
Positive Yield Curve
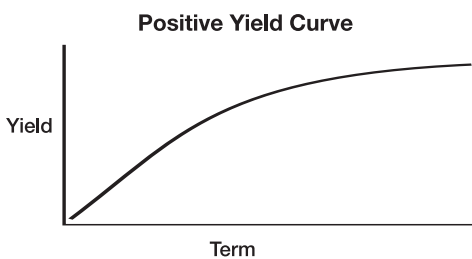
An upward sloping yield curve is referred to as positive, with short-term yields lower than long-term yields. In such an economic environment, investors are compensated, to a point, for lending their money for an extended period of time. For this reason, it is also called a normal yield curve.

Negative Yield Curve
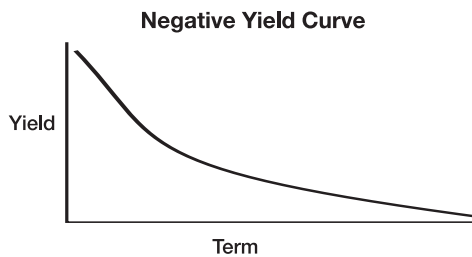
A downward sloping yield curve is referred to as negative, or inverted, because short-term rates are higher than longer-term rates. A negative yield curve typically occurs during a period of inflation, when heavy demand for credit pushes short-term rates up in relation to long-term rates.

The configuration of the yield curve based on futures prices generally is just the opposite, because price is inverse to yield. So the price of the nearest contract expiration month in Treasury futures is usually higher than that of the next month in the expiration cycle.

### Futures Price with a Positive Yield Curve

In a positive yield curve environment, prices of corresponding financial futures contracts decrease the more the delivery date is deferred.

### Futures Price with a Negative Yield Curve
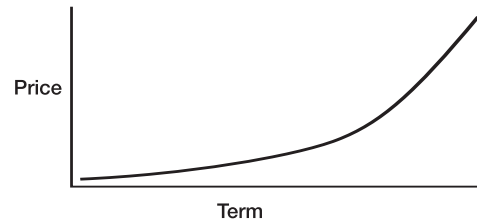
When short-term interest rates exceed long-term rates, the yield curve is negative. Financial futures prices would then be lower for shorter-dated maturities relative to longer maturities. Prices may also move progressively higher from the nearby expiration month to the more distant months, resulting in an upward-sloping price curve.
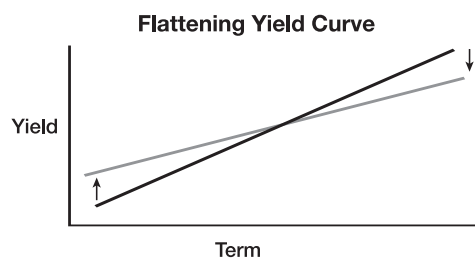
Flat Yield Curve
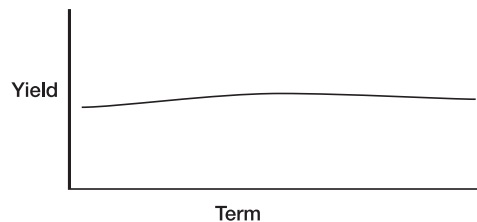
A flat yield curve may result when there is little or no credit premium demanded for longer-term loans and investments. A flat curve may be slightly positive, slightly negative, or even slightly humped.

Steepening Yield Curve
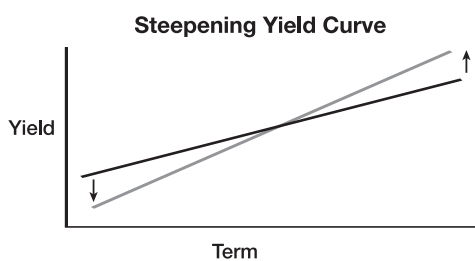
A steepening yield curve is one whose slope is increasing. Steepening occurs as the long-term yields rise faster than short-term yields.

Flattening Yield Curve

When the slope of the yield curve becomes less positive, the curve is said to be flattening. Flattening occurs as the short-term yields rise faster than long-term yields.

Federal Reserve Board and the FOMC

One of the most significant factors impacting interest rates is the Federal Reserve Board and its administrative arm, the Federal Open Market Committee. The FOMC sets interest rate and credit policies for the Federal Reserve System, the United States central bank. The FOMC's decisions are closely watched by those who participate in both fixed income and equity markets. Generally speaking, "The Fed" manages interest rates by directing the flow of funds. This is achieved through the use of monetary policy and its three main tools: the reserve requirement, the discount rate and open market operations. Since the Fed does not operate in a vacuum, any move it makes must be judged in terms of the current market conditions.

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Fed Activities	Market Price of Treasury Securities	Explanation
Fed raises discount rate	Lower	An increase in the borrowing rate for banks from the Fed usually results in increased rates for the bank's customers. This action is used to slow credit expansion.
Fed lowers discount rate	Higher	Usually results in decreased rates to bank borrowers.
Fed does repurchase agreement	Higher	Fed puts money into the banking system by purchasing collateral and agreeing to resell later, essentially a lending transaction. With more money available for lending, the expectation is for downward pressure on customer rates.
Fed does match sales	Lower	This is the opposite transaction to the above. The Fed is essentially borrowing available liquidity, putting upward pressure on customer rates.
Fed buys bills	Higher	Fed lends money to the banking system, essentially increasing the supply of loanable funds that should put downward pressure on rates.
Fed sells bills	Lower	Essentially decreases supply of loanable funds in the economy creating competition for funds and upward pressure on rates.

For more information on the Federal Reserve consult www.federalreserve.gov.

Key Economic Indicators

Economic indicators give market participants a gauge to measure the strength of the economy. That condition will determine the availability of funds and in turn, the level of interest rates. While these indicators are released to the market at specific times, most often there is tangential evidence in related data that gives the market the ability to forecast the numbers. As always, the data must be interpreted in terms of the prevailing market conditions.

A comprehensive list of current economic indicators can be obtained from the Bureau of Labor Statistics on its website www.bls.gov.

Some suggested reading that gives a general overview of economic indicators:

A Guide to Economic Indicators, The Economist Series, Bloomberg Press

7 Indicators that Move Markets, Paul Kasriel and Keith Schap, McGraw-Hill

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