CBOT® U.S. Treasury Futures

STRATEGY PAPER

A Simple Treasury Short Hedge

When rising yields signal possible erosion in the value of fixed-income assets, CBOT® U.S. Treasury futures provide efficient, cost-effective asset protection.

Institutional investors look to Chicago Board of Trade U.S. Treasury futures for protection of their fixed-income portfolios when signs point to a rise in yields that may erode asset values. The deep liquidity of the CBOT Treasury futures markets means that you can establish this protection for relatively low transaction costs, and you can do so quickly—in minutes as opposed to the hours or days that some markets can take. Also, should your needs or outlook change, you can reverse course just as quickly, easily, and cost-effectively.

Defining the Challenge

Suppose you hold $100 million par of a 2-year U.S. Treasury note, for example, the 3 % coupon issue that matures in February 2008, or more simply, the 3s of Feb 08. As **Exhibit 1** shows, it is currently priced at 97-16 3/4 to yield 4.039%. At this yield, the note has a modified duration of 2.37 years, and your position has a full price of $100,428,867.40.

Exhibit 1: Initial Market Conditions

2-year U.S. Treasury Note (3% of Feb 2008)	
Quoted Price:	97-16 3/4 (97.523438)
Yield:	4.039%
Modified Duration:	2.37 years
Days Since the Last Coupon Payment	60
Days in a Coupon Period	181
Accrued Interest to be Paid	Approximately 16/32 (.497238)
Full Price:	98-00 3/4 (98.020676)
DV01 ($100 million par):	$23,230.90
2-year U.S. Treasury futures, March 2006 (TUH6)	
Price:	102-27 (102.84375)
DV01:	$49.09[1]

[1] The notional value of the TUH6 is $200,000 so the DV01 is doubled. The cash DV01 is $23,230.90 for $100M so for $200,000 it would be $23,230.90 / ($100M / $200,000) or $46.46. The futures DV01 would be $46.46 / conversion factor = $46.46 / .9464 = $49.09. For a detailed explanation on calculating DV01s see the CBOT publication, *Calculating the Dollar Value of a Basis Point*.

Your plan is to sell this note in three weeks to meet an obligation due then. Your concern is that rising yields might erode the value of your holding enough to leave you short on this obligation. For example, if the Fed raises its fed funds target rate, you can expect the 2-year yield to come very close to matching that move; it may even overshoot it by a slight amount. **Exhibit 2** shows that an instantaneous 30 basis point (bp) jump in the 2-year yield will cause the value of your holding to drop to $97,323,749, a $696,927 loss.

Exhibit 2: The Effects of a Range of Yield Increases

Yield Change (in bps)	Initial Full Price	Final Full Price	Loss
10	$98,020,676	$97,788,367.00	-$232,309.00
15	$98,020,676	$97,672,212.50	-$348,463.50
20	$98,020,676	$97,556,058.00	-$464,618.00
25	$98,020,676	$97,439,903.50	-$580,772.50
30	$98,020,676	$97,323,749.00	-$696,927.00

Structuring and Executing Your Hedge

A simple way to protect against this possibility is to go short CBOT 2 -year Treasury note futures. A properly constructed short futures position should gain as much as the actual Treasury position loses. Conversely, if yields were to drop, the actual Treasury position should gain enough to make up for the resulting futures loss. In either case, this short hedge strategy should allow you to fulfill this obligation. In structuring the hedge, you should:

- Define your hedging target
- Determine the apropriate number of 2-year Treasury note futures contracts to sell
- Consider possible outcomes

Define your Target

The goal of the hedge is to protect your asset value in the face of an adverse yield change; your short futures position should gain almost exactly as much as your U.S. Treasury note position will lose. In this example, your target will be in the range of $580,000 to $697,000, the amounts you would lose if yields rose anywhere from 25 to 30 bps.

Determine the Number of Futures Contracts

The one special wrinkle to be aware of in structuring hedge positions with CBOT 2-year U.S. Treasury note futures is that this contract has a $200,000 par value, in contrast to the $100,000 par of other CBOT U.S. Treasury futures contracts. If you obtain your futures DV01 from a quote service, it is likely to be scaled to $100 par. With the longer-dated contracts (5-year T-notes, 10-year T-note, and 30-year T-bond futures), you would multiply this by 1,000 to scale it to the futures contract size. In the case of the 2-year T-note, you must multiply by 2,000 to scale the DV01 correctly. Other than this, the hedge ratio calculation works the same as it does for other U.S. Treasury futures contracts. You divide the DV01 of your actual Treasury position by the 2-year T-note futures DV01 to arrive at the hedge ratio. Given the initial market data in Exhibit 1, this would be 473 contracts:

$23,230.90 / $49.09 = 473.2308, rounded to 473

Consider Possible Outcomes

To see what kinds of results your short—or "inventory"—hedge might generate given moves of these magnitudes, you can construct a simple spreadsheet calculator like the one in **Exhibit 3**.

Exhibit 3: Assessing Possible Results

Scenario A: 25 Basis Point Yield Increase

	DV01 (in $)	Yield Change (in bps)	Position Size	Result (to nearest $)
2-year Treasury Security	$23,230.90	25	$100 million par	-580,772.50
2-year T-note Futures	49.09	25	-473 contracts	580,489.25
				-283.25

Scenario B: 30 Basis Point Yield Increase

	DV01 (in $)	Yield Change (in bps)	Position Size	Result (to nearest $)
2-year Treasury Security	$23,230.90	30	$100 million par	-696,927
2-year T-note Futures	49.09	30	-473 contracts	696,587.10
				-339.90

The column labeled *DV01* contains the DV01s of the $100 million par actual 2-year Treasury position and the 2-year T-note futures contract. The *Yield Change* column lists the projected yield changes in basis points. The *Position Size* column might need some explanation. The hedge ratio calculation shows that you will need 473 futures contracts. The 2-year Treasury position indicates that you are long one $100 million par unit of the relevant 2-year Treasury issue (since this is Treasury inventory you currently hold).

This illustration shows that in these scenarios, given the assumptions of this example, the 2-year T-note futures position will essentially offset the shortfalls caused by the changes in the price of the Treasury note. Given a 25 bp yield increase, the futures position will generate a $580,489.25 gain. That plus the actual value of the 2-year Treasury note position amounts to $98,020,392.75 ($97,439,903.50 + $580,489.25 = $98,020,392.75). This is slightly less than the initial $98,020,676 value of the 2-year Treasury note; the hedge falls short just slightly due to the rounding down of the futures position to 473 contracts.

Should yields fall, for whatever reason, this strategy will generate a futures loss, but the gain in the actual U.S. Treasury position would offset the futures loss. In either case, with the CBOT 2-year T-note futures position in place, you will have reasonable confidence that your asset will amply fund your obligation.

Conclusion

This example shows that strategies involving CBOT U.S. Treasury futures are operationally simple as well as economically effective. This operational simplicity means that these strategies exact little cost either in terms of the time it takes you to plan and execute them or in terms of transaction costs. Clearly, CBOT U.S. Treasury futures can generate effective protection when interest rates threaten to move against your position.

For More Information Visit: **www.cbot.com/interestrates**

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