

## A Simple Treasury Long Hedge

When the interest rate outlook sparks concerns that falling yields will increase prices, CBOT® U.S. Treasury futures offer an effective means to protect the cost of acquiring fixed-income assets.

The U.S. interest rate environment can sometimes be fraught with uncertainty, requiring institutional investors to be ever vigilant in the management of their fixed-income portfolios. When fears emerge that yields may drop and drive up the cost of acquiring fixed income assets, Chicago Board of Trade U.S. Treasury futures allow you to efficiently hedge against this risk. 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.

Consider this scenario: You expect to get a \$50 million cash contribution, which you plan to use to acquire as much of the on-the-run 5-year Treasury note that you can, for example, the 3 7/8% coupon maturing in July 2010. The potential problem is that between the time you make this decision and the day you actually receive the cash, the Fed could lower the Fed Funds target rate by 25 basis points (bps). When the Fed alters its target rate, the normal expectation is that the 2-year and 5-year yields will respond aggressively to this shift.

### Defining the Challenge

Obviously, a 25 bp drop in the 5-year yield will erode the purchasing power of this \$50 million contribution. **Exhibit 1** highlights the challenge you can face by comparing the full prices of various par amounts of the 3 7/8s of July 2010, before and after a 25 bp yield drop.

<b>Exhibit 1: Prices of Par Amounts of 3/78 of July 2010 Before and After 25 Basis Point Drop</b>		
<b>Par Amount</b>	<b>Full Price</b>	
	<b>At 4.16% Yield</b>	<b>At 3.91% Yield</b>
\$49 million	\$48,743,177.28	\$49,284,957.78
\$50 million	\$49,737,936.00	\$50,290,773.16

Note that with the 3 7/8s of July 10 priced at 98-23 1/4 to yield 4.16%, the full price of \$50 million par will be \$49,737,936. A 25 bp drop in yield to 3.91% will boost that cost to \$50,290,773.16, an increase of \$552,837.16. Assuming you are strictly limited to the \$50 million contribution, and are restricted to trading in round lot increments of \$1 million par, the 25 bp yield drop forces you to cut your purchase from \$50 million par to \$49 million par.

## Planning and Executing Your Strategy

Anticipating this kind of adverse yield shift, you can go long CBOT 5-year Treasury note futures to protect the buying power of the \$50 million contribution. In planning a strategy of this kind, you should:

- Define your hedging target
- Determine the appropriate number of 5-year Treasury note futures to buy
- Consider possible outcomes

### Define Your Target

As we saw, a 25 bp increase in yield to 3.91% will drive the cost of \$50 million par of the 3 7/8 of July 2010 up to \$50,290,773.16, a \$552,837.16 difference. Therefore, your goal in turning to the CBOT Treasury futures market is to generate enough from the hedge to make up for that much potential shortfall in purchasing power.

### Determine the Number of Futures Contracts

The easiest way to establish how many futures contracts to use is in terms of the dollar value of a basis point (DV01). The display of initial market data in **Exhibit 2** shows the 3 7/8 of July 2010 to have a 4.446 year modified duration and \$50 million par, at a yield of 4.16%, to have a \$49,737,936 full price.

Using the standard DV01 formula, you can see that a 1 bp yield change will cause the full price of \$50 million par of the security to change \$22,113.49 in the opposite direction:

$$(((0.01 * \text{duration}) * \text{full price}) * 0.01) = \text{DV01}$$

$$(((0.01 * 4.446) * 49,737,936) * 0.01) = \$22,113.48635$$

<b>Exhibit 2: Initial Market Conditions</b>	
<b>5-Year Treasury Note: 3 7/8% of July 2010</b>	
Quoted Price	98-23 1/4 (98.726563)
Yield	4.162
Modified Duration	4.446
Days Since the Last Coupon Payment	70
Days in a Coupon Period	181
Accrued Interest to be Paid	Approximately 24/32 (.03875/2 * 70/181 * 100 = .749309)
Full Price (Quoted Price + Accrued Interest)	99.475872 (98.726563 + .749309)
DV01 (\$50 million par)	\$22,113.49
<b>5-Year Treasury Note Futures: March 2006 (FVH6)</b>	
Price	106-19+
DV01	\$48.08

In contrast, the CBOT 5-year Treasury note futures contract has a DV01 of \$48.08. Technically speaking, Treasury futures do not inherently have a DV01 since they are not coupon-bearing securities. Instead, they derive it from the cash instrument they track. To move from the cash DV01 to the futures DV01 is simple: just take the cash DV01 and divide it by the conversion factor for the security. In this example, the cash DV01 (\$22,113.49) represents a position of \$50 million while a 5-year Treasury note futures contract has a notional value of \$100,000. For this reason, the cash DV01 is reduced to represent a DV01 for a \$100,000 position. By dividing the DV01 by 500 (\$50 million/\$100,000 = 500) you get a DV01 of \$44.23 (\$44.226973) for a \$100,000 cash position. The cash DV01 is then divided by the futures conversion factor for the cash security, which is .9199 in this case, to get a futures DV01 of \$48.08 (\$48.078023).

Finally, to determine the size of the hedge position, simply divide the DV01 of the position being hedged by the futures DV01. In this example, you can see that a hedge position of 460 futures contracts should essentially protect the buying power of this \$50 million contribution.

$$\$22,113.49 / \$48.08 = 459.93, \text{ rounded to } 460 \text{ contracts}$$

**Consider Possible Outcomes**

Actions by the Fed have a significant impact on yields. In this example, suppose the event causing the yield change is the Fed easing the Fed Funds target rate by 25 bps. When the Fed shifts the Fed Funds target rate, yields at the shorter end of the yield curve tend to respond almost on a one-for-one basis. Therefore, if the Fed does ease by 25 bps, you can typically expect to see the 5-year Treasury yield drop 20 or 25 bps.

To see the results your hedge might generate given moves of these magnitudes, consider **Exhibit 3**.

<b>Exhibit 3: Assessing Possible Results</b>				
	<b>DV01 (in \$)</b>	<b>Position Size</b>	<b>-20 bp Yield Change Result</b>	<b>-25 bp Yield Change Result</b>
<b>5-year Treasury Security</b>	<b>\$22,113.49</b>	<b>- 50\$ million</b>	<b>-\$442,269.80</b>	<b>-\$552,837.25</b>
<b>5-year Treasury Note Futures</b>	<b>\$48.08</b>	<b>+460 contracts</b>	<b>+\$442,336.00</b>	<b>+\$552,920.00</b>

The *DV01* column contains the relevant DV01s. The *Position Size* column indicates that you are short one \$50 million par unit of the relevant Treasury issue (since you have yet to buy the securities) and that you will need 460 futures contracts to hedge. The *Yield Change* columns list the projected yield changes in basis points, and the effect on the position.

In these scenarios, the 5-year T-note futures position essentially offsets the shortfalls caused by the changes in the price of the cash Treasury note, achieving the goal of protecting the buying power of the \$50 million cash contribution. The variations are due to rounding error in the hedge ratio.

Should yields rise this strategy will generate a loss, so as with all hedging strategies, the position must be monitored to ensure that market assumptions are still accurate and the hedge is still effective. For example, if the key factor is an expected Fed move, there are often such indications ahead of a Federal Open Markets Committee meeting, allowing you to lift your hedge early if necessary.

## **Conclusion**

This example shows that strategies involving CBOT U.S. Treasury futures are operationally simple as well as economically effective. They exact very little cost in terms of either 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.

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