CBOT® Treasury Futures Contracts

STRATEGY PAPER

Yield Curve Shifts Make Trading Opportunities

The twists and turns of the U.S. Treasury yield curve can wreak havoc on a portfolio, but with CBOT® U.S. Treasury futures, they can also generate interesting trading opportunities for those in search of enhanced returns.

Proprietary traders and portfolio managers are well aware of the damage that changes in the U.S. Treasury yield curve can inflict on a fixed-income portfolio. However, those who anticipate these yield curve shifts will find that Chicago Board of Trade U.S. Treasury futures may be used to design a variety of trades that can serve both risk management and yield enhancement purposes.

The deep liquidity of the CBOT Treasury futures markets means you can capitalize on your yield curve expectations quickly and for relatively low transaction costs. It is also important to realize that, should your outlook change, you can reverse such a strategy as easily and cost effectively as you can initiate it.

Structuring a Yield Curve Trade

As you design such trades, it is important to be aware that discussions of the yield curve take place in yield terms, while futures trade in price terms. If your trade preparation follows a simple four-step process, you can make the appropriate adjustments with relative ease. In planning a yield curve trade, you should:

- Develop a yield curve outlook
- Review spread logic
- Filter out extraneous factors
- Consider possible outcomes

Developing a Yield Curve Outlook

The first task in designing a yield curve trade is to decide how you expect the Treasury yield curve to react to interest rate developments during the term of the trade.

In general, when yields are falling, the yield curve will steepen. When yields are rising, the yield curve will flatten. These shifts happen because shorter-term yields typically respond more to an event like a Fed policy shift than do longer-term yields.

Consider a simple example. The yield curve slope is simply the difference between the longer-term yield and the shorter-term yield. Suppose that yields perform as in **Exhibit 1**. Initially, the yield curve shape (or slope) is 71 basis points (bps). The *Change* column shows that the 5-year yield subsequently drops 20 bps while the 10-year yield drops 10 bps. This results in the yields in the *Final Yield* column which defines an 81 bp slope, 10 bps steeper than initially.

Exhibit 1: Falling Yields, Steeper Slope

Futures Maturity	Initial Yield (%)	Change (bps)	Final Yield (%)
5-year	2.84	-20	2.64
10-year	3.55	-10	3.45
Slope	0.71		0.81

The converse is also true. When yields rise, the yield curve will typically flatten, as **Exhibit 2** illustrates.

Exhibit 2: Rising Yields, Flatter Slope

Futures Maturity	Initial Yield (%)	Change (bps)	Final Yield (%)
5-year	2.84	20	3.04
10-year	3.55	10	3.65
Slope	0.71		0.61

It is important to note that from time to time, events can interrupt the normal pattern. For example, the Fed may be in a tightening mode, which would normally lead to a flatter Treasury yield curve. However, if the market concludes that what the Fed is doing will not be enough to control growing inflation, the longer term yields, which are more sensitive to inflation fears than shorter-term yields, may rise more than shorter term yields do. If this happens, the yield curve can steepen even though yields are rising.

Even in the absence of a Fed move, supply and demand imbalance in one sector may cause a nontypical yield curve shift. Suppose extra heavy issuance and slack demand in the 5-year sector force that yield to rise at a time when yields are generally falling. This can alter the yield curve shape. In the extreme case, the 5-year to 10-year segment could flatten when, normally, you would expect it to steepen.

Awareness of factors such as these can inform your yield curve outlook, but whatever your expectation for yield curve change, you can structure a yield curve spread trade to capitalize on it.

Review Spread Logic

The logic of spread trading is straightforward. If you expect something to rise in value, you typically want to buy it. If you expect its value to decline, you typically want to sell. It follows that if you expect the yield curve to steepen, you will want buy the spread. You buy or sell a yield curve spread in terms of what you do on the short maturity leg of the trade.

If you expect the spread to widen (the spread widening is the same as the yield curve steepening), you can buy the spread by going long 5-year Treasury note futures and going short 10-year Treasury note futures. When the yield curve steepens, the 5-year yield will fall relative to the 10-year yield, and the 5-year price will rise relative to the 10-year price. That is, a long position in 5-year T-note futures will gain more than a short position in 10-year T-note futures will lose.

Exhibit 3 shows that a 20 bp yield drop, given an initial 2.88% 5-year yield, boosted the 5-year T-note futures price 0-30+ (prices are cited in points and 32nds unless otherwise noted, and the + notation indicates half a 32nd or a half tick). At the same time, a 10 bp yield drop, given an initial 3.58% 10-year yield, boosted the 10-year T-note futures price 0-21+, 9 ticks less.

Exhibit 3: Price Responses to Falling Yields

Futures Maturity	Initial Price	Yield Change (bps)	Final Price	Difference
5-year	111-29	-20	112-27+	0-30+
10-year	112-18	-10	113-07+	0-21+

If you expect the yield curve to flatten, you can sell the curve by going short 5-year T-note futures and long 10-year T-note futures. Because the 5-year price will fall more than the 10-year price, the short position in the 5-year T-note futures will gain more than the long position in the 10-year T-note futures will lose. This is illustrated in **Exhibit 4**.

Exhibit 4: Price Responses to Rising Yields

Futures Maturity	Initial Price	Yield Change (bps)	Final Price	Difference
5-year	111-29	20	110-30+	0-30+
10-year	112-18	10	111-29	0-21

Filtering Out Extraneous Effects

One piece to this trade still lacking is that a true yield curve spread filters out directional effects; it responds only to changes in the shape of the yield curve. Suppose that, expecting the yield curve to steepen, you bought the curve only to see both yields drop 10 bps. **Exhibit 5** shows how the futures prices would change given this 10 bp parallel shift in the yield curve. Obviously, a spread position that is long 5-year T-note futures and short 10-year T-note futures would generate a loss even though the yield curve has not changed shape. This is hardly a satisfactory outcome when what you want is a position that will benefit from changes in yield curve shape, and nothing else.

Exhibit 5: Price Responses to Rising Yields

Futures Maturity	Initial Price	Yield Change (bps)	Final Price	Difference
5-year	111-29	-10	112-12	0-15
10-year	112-18	-10	113-07+	0-21+

The goal is to filter out directional effects and design a trade that will respond only to a change in the shape of the yield curve. You can do this by calculating a spread ratio much as you would a hedge ratio using the futures DV01s, which indicate approximately what one futures contract will gain or lose in dollars for every 1 bp change in yield[1]. For example, given a 5-year T-note futures DV01of $47.54 and a 10-year T-note futures DV01 of $66.45, you can divide the 5-year DV01 by the 10 year DV01 to generate a 0.7154 spread ratio (47.54 / 66.45 = 0.7154).

If you expect the yield curve to steepen, this ratio indicates that you should go long 1,000 5-year T-note futures and short 715 10-year T-note futures. This spread position should generate essentially no result in the case of a parallel shift in the yield curve, regardless of yield direction. It should generate gains any time the yield curve steepens—again, regardless of yield direction. It should generate losses in all other cases.

Assessing a Variety of Outcomes

Exhibit 6 shows parallel shifts, curve steepenings, and curve flattenings with both falling and rising yields. It amply makes the case for properly ratioed yield curve spreads. You can easily replicate these results on a spreadsheet.

The first column shows the DV01s for the two futures contracts. The second column shows the yield change in basis points. The third column shows the number of contracts required at each futures maturity to balance price sensitivities to yield change on each leg of the spread trade. The minus sign on the 10-year T-note contract number indicates a short position; if you were selling the spread, the minus sign would be on the 5-year T-note contract number. Finally, the *Result* column is the product of the values in the other four columns, and "Spread Result," is the sum of the two maturity results.

[1] For a more detailed explanation of DV01 see the CBOT publication, *Calculating the Dollar Value of a Basis Point.*

Exhibit 6: Assessing Yield Curve Trade Potential

Parellel Shift—Yields Down

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	-10	1000	475,400.00
10-year	66.45	-10	-750	-475,117.50
Spread Results				282.50

Parellel Shift—Yields Up

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	10	1000	-475,400.00
10-year	66.45	10	-750	475,117.50
Spread Results				-282.50

Curve Steepens—Yields Down

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	-20	1000	950,800.00
10-year	66.45	-10	-750	475,117.50
Spread Results				475,682.50

Curve Steepens—Yields Up

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	10	1000	475,400.00
10-year	66.45	20	-750	950,235.00
Spread Results				474,835.00

Curve Flattens—Yields Down

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	-10	1000	475,400.00
10-year	66.45	-20	-750	-950,235.00
Spread Results				-475,835.00

Curve Flattens—Yields Up

Futures Contract	DV01	Yield Change (bps)	Number of Contracts	Result
5-year	47.54	20	1000	-950,800.00
10-year	66.45	10	-750	475,117.50
Spread Results				-475,682.50

Exhibit 6 shows how this spread typically performs given six different yield curve changes. A spreadsheet set up in this manner will help you explore the potential of this kind of trade.

A spread trade structured like this should respond only to a change in the shape of the yield curve. You can see from the two parallel shift scenarios that, regardless of yield direction, a parallel shift produces essentially no result. Note that the $282.50 residual reflects nothing more than rounding error, and is inconsequential given the scale of the trade. The next two scenarios show that whether yields go up or down, as long as the yield curve steepens, this trade will generate a gain. The last two scenarios show that if the yield curve flattens, this trade will lose money regardless of yield direction.

Conclusion

A yield curve spread trade is a speculative trade, but it shifts the burden of speculation from taking a position on interest rate or price direction to taking a position on what you expect the yield curve to do. This gives you an extra way to be right, for you have no concern for price direction, only for yield curve steepening or flattening. Further, because spread trades implemented with CBOT U.S. Treasury futures receive margin credits, this type of strategy can be a low-cost means to capitalize on your yield curve outlook or to defend your portfolio from adverse yield curve shifts.

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

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