



INTEREST RATE PRODUCTS

Yield Curve Spread Strategies with On-The-Run U.S. Treasury Futures

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INTRODUCTION

With direct exposure to benchmark points on the yield curve, On-The-Run Treasury futures allow easy yield curve spread construction

2-Year, 5-Year and 10-Year On-the-Run (OTR) U.S. Treasury futures provide convenient and capital-efficient tools for market participants to implement their views on the shape of the Treasury yield curve.

OTR Treasury futures expire by cash settlement, with direct reference to the corresponding on-the-run 2-, 5- and 10-year Treasury note yields. Futures prices that are tied directly to the on-the-run *benchmark* Treasury yields offer many advantages to market participants in yield curve trade construction. Moreover, the delivery month listing schedules for OTR Treasury futures mirror the auction schedule for each contract's underlying on-the-run Treasury note. This makes the set-up of curve trades intuitively similar to curve-trade construction with cash market Treasury securities.

For a comprehensive explanation of OTR Treasury futures contract design including estimation of contract fair value, please see the [On-The-Run \(OTR\) Treasury Futures Reference Guide](#).

New trading opportunities created with the addition of the OTR Treasury futures suite

OTR Treasury futures represent the benchmark points on the curve, which are different terms-to-maturity than those represented by conventional Treasury futures. Combining the OTR Treasury futures suite with the conventional Treasury futures suite results in more points on the Treasury futures yield curve, creating new trading opportunities and allowing more diverse opinions to be expressed.

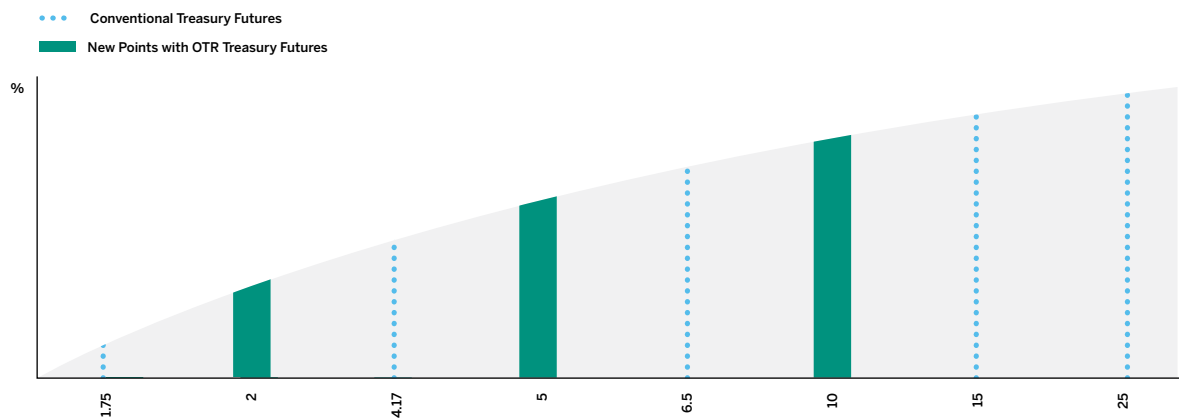
Treasury futures terms-to-maturity before OTR Treasury futures:

1.75-years, 4.17-years, 6.5-years, 15-years and 25-years

Treasury futures terms-to-maturity after OTR Treasury futures:

1.75-years, **2-years**, 4.17-years, **5-years**, 6.5-years, **10-years**, 15-years and 25-years

U.S. TREASURY FUTURES YIELD CURVE COVERAGE



OTR Treasury futures combined with conventional Treasury futures offer more choices along the yield curve, providing unique tools for enhanced expression of level, slope and shape expectations.

II. LEVEL, SLOPE, AND SHAPE APPLICATIONS

Using OTR Treasury futures to hedge or to speculate on the level, slope, or curvature of the term structure of Treasury yields is straightforward.

Level

If you expect Treasury yield levels to rise (or fall) at a particular key maturity point — 2-year, 5-year or 10-year — simply buy (or sell) the corresponding OTR Treasury futures contract in the desired amount.

Slope

If you anticipate the Treasury yield curve to steepen (or flatten) between any particular pair of key maturity points, then buy (or sell) the appropriate OTR Treasury futures curve spread. Exhibit 1 shows the curve strategies that OTR Treasury futures enable. The following section spells out how to tailor spread ratios for these strategies.

Moreover, as the right-hand column of Exhibit 1 indicates, the CME Globex electronic trading platform makes all of these curve spreads available as exchange-defined Intercommodity Spreads (ICS). The spread ratios are pre-defined at values expected to remain stable absent substantial changes in the market prices. To learn more about CME Globex Intercommodity Spreads, including the current spread ratios, please visit www.cmegroup.com/ics.

Shape

Finally, various OTR Treasury futures curve spreads may be combined to construct butterfly spread positions with which contract users can take views on the curvature of the term structure of Treasury yields.

EXHIBIT 1: TREASURY YIELD CURVE TRADES WITH OTR TREASURY FUTURES

Treasury Yield Curve Spread	Curve Steepener with OTR Futures	Curve Flattener with OTR Futures	CME Globex Intercommodity Spread (ICS) Ticker Symbol
2-Yr / 10-Yr	Buy 2-Yr OTR + Sell 10-Yr OTR	Sell 2-Yr OTR + Buy 10-Yr OTR	OTT
2-Yr / 5-Yr	Buy 2-Yr OTR + Sell 5-Yr OTR	Sell 2-Yr OTR + Buy 5-Yr OTR	OTF
5-Yr / 10-Yr	Buy 5-Yr OTR + Sell 10-Yr OTR	Sell 5-Yr OTR + Buy 10-Yr OTR	OFT

III. YIELD CURVE SPREAD RATIOS

The goal of any yield curve trade is to capitalize upon changes in spreads among the yields embedded in the curve trade position. For small to moderate shifts in yield spread relationships, a familiar, manageable and suitable approach is to balance the legs of the curve trade position so that the dollar value of a one basis point change in the yield (the DV01) for one leg of the spread is equal in magnitude and opposite in sign to the DV01 for the other leg¹. A DV01-weighted spread ratio will capitalize on differences in basis point movements between tenors.

OTR Treasury futures employ direct Price-Yield-DV01-Convexity relationships

OTR Treasury futures contracts are designed to remove the guesswork from DV01-weighting. For any given OTR Treasury futures contract price level, there is one and only one implied forward-starting on-the-run Treasury note yield (based on notional forward settlement on the business day following the contract expiration). The same one-to-one property applies to relationships between OTR Treasury futures contract prices and key characteristics of contract price behavior, including:

interest rate sensitivity of contract price (i.e., the futures contract's DV01) and

convexity of contract price with respect to changes in the underlying forward Treasury yield (i.e., the rate at which the magnitude of the contract DV01 shrinks or expands in response to changes in the underlying forward Treasury note yield).

Moreover, these standardized relationships apply to all contract delivery months. The values of the OTR Treasury futures contract's forward-starting Treasury yield, DV01 and price convexity that are implied by the futures contract price remain the same, regardless of whether the contract is listed for delivery a day from now or three months from now.

Yield curve spread strategies for OTR Treasury futures are intuitive to construct and maintain. The simplicity of the contract design ensures the performance of yield curve spread positions constructed with OTR Treasury futures should be easy to monitor in terms of both futures price and implied futures yield spreads. It also ensures the price/yield action of OTR Treasury futures yield curve spread trades should closely track the dynamics of cash market yield curve spreads. Exhibit 2 illustrates.

EXHIBIT 2: SAMPLE SLICE: 10-YEAR OTR TREASURY FUTURES PRICES, IMPLIED YIELDS, IMPLIED DV01S, \$ CONVEXITY

10-Year OTR Futures Price	Handle (Points)	Tail (32nds)	Implied Treasury Yield (Pct per Annum)	DV01 (\$ per Basis Point per Contract)	Dollar Convexity*
111.937500	111	30	2.6343	93.340	4.552
111.953125	111	30 1/2	2.6327	93.355	4.553
111.968750	111	31	2.6310	93.371	4.554
111.984375	111	31 1/2	2.6293	93.386	4.554
112.000000	112	0	2.6276	93.401	4.555
112.015625	112	1/2	2.6260	93.416	4.556
112.031250	112	1	2.6243	93.432	4.557

* \$ per 100 contracts per basis point

The full arrays of OTR Treasury futures prices, implied contract yields, implied DV01s and implied convexities are freely available in "OTR Treasury Futures Price-Yield-DV01 Tables" in the Resources section at www.cmegroup.com/otr.

A convenience for subscribers of the Bloomberg Professional® service is that Bloomberg displays OTR Treasury futures markets in both price terms and yield terms (e.g., HP, CT, among other screens).

¹ Another possible approach to constructing spread ratios might be to augment the DV01s with corresponding yield-betas, to account for systematic differences in yield volatility at different key maturity points along the yield curve. However, incorporating yield-beta adjustments tends to make most sense in connection with strategic hedge positions or when structuring one-way long or short positions, in order to equalize differences in basis point movements.

IV. TRADING THE SLOPE: FLATTENERS AND STEEPENERS

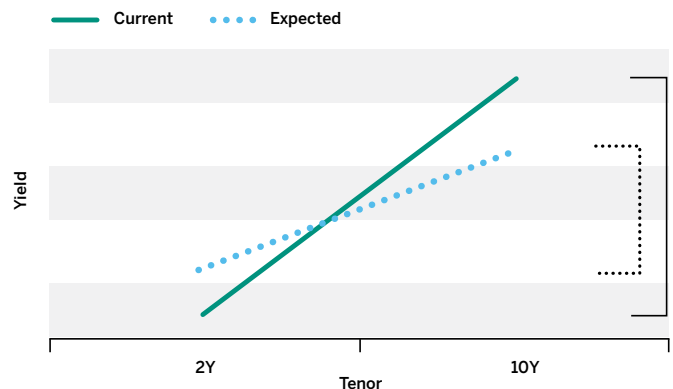
Consider the spread between the on-the-run Treasury 2-year and 10-year yields. If you expect the curve to steepen, you would buy the 2-Year/10-Year OTR Treasury futures spread by buying 2-Year OTR Treasury futures and selling a DV01-equivalent number of 10-Year OTR Treasury futures. Conversely, if you are bracing for the yield curve to flatten, you would sell the 2-Year/10-Year OTR Treasury futures spread by selling 2-Year OTRs and buying 10-Year OTRs.

Either way, the yield spread exposure embedded in the OTR Treasury futures spread will bear a close and reasonably direct relationship to the corresponding yield spread as reflected in cash-market Treasury note yields. This is due to the contract designs of OTR Treasury futures, which reflect the dynamics of the corresponding forward on-the-run Treasury yields (i.e., based on notional forward settlement as of the day after futures expiration).

Example 1:

Suppose it is November 1, 2010, there is an upcoming FOMC meeting on November 4th, and you anticipate the yield curve to flatten in response to the outcome of the FOMC meeting (Exhibit 3). The yield spread between cash-market Treasury 2-year and 10-year notes is 228 basis points (bps), while the spread between implied forward yields for nearby 2-Year and 10-Year OTR Treasury futures is 229 bps (Exhibit 4). With your flattening view in mind, you decide to sell the 2-Year/10-Year OTR Treasury futures spread.

EXHIBIT 3: 2-YEAR/10-YEAR CURVE FLATTENER



Expecting the 2s-10s spread to flatten; you sell the spread by shorting 2-Year OTRs Treasury futures while buying 10-Year OTR Treasury futures

Exhibit 4 summarizes futures market conditions on November 1. At prevailing nearby contract price levels, the appropriate spread ratio for DV01-neutrality is 4.483 2-Year OTR Treasury futures per each 10-Year OTR Treasury futures contract (equal to (\$93.34 per bp per 10-Yr OTR) / (\$20.82 per bp per 2-Yr OTR)). Accordingly, you decide to sell 448 2-Year OTR Treasury futures and buy 100 10-Year OTR Treasury futures.

EXHIBIT 4: 2-YEAR/10-YEAR CURVE FLATTENER: POSITION ENTRY, NOVEMBER 1, 2010

Futures Contracts	Price*	Implied Yield (Pct)	Contract DV01 (\$ per bp)	Spread Ratio (Number of Contracts Long (+) or Short (-))	Position DV01 (\$ per bp)
2-Year OTR	107 and 8.75/32nds	0.347	\$20.82	-448	-\$9,327
10-Year OTR	111 and 30/32nds	2.634	\$93.34	+100	\$9,334
Implied Forward Yield Spread		228.7 bps			

* Actual market prices (last price)

A week later, on November 8, the spread between implied forward yields for the nearby 2-Year and 10-Year OTR Treasury futures contracts has narrowed by 14 bps, to a spread level of 215 bps. (Reassuring to observe is that the spread between yields on cash-market on-the-run Treasury 2-year notes and 10-year notes has narrowed comparably by 13 bps, to a spread of 215 bps.)

Exhibit 5 summarizes the performance of your 2-Year/10-Year OTR Treasury futures position. A notable feature of the outcome is that both legs of the spread position have generated positive returns. Not only did on-the-run 2-year Treasury note yields rise over the course of the week, but 10-year on-the-run yields also fell.

EXHIBIT 5: 2-YEAR/10-YEAR CURVE FLATTENER: PROFIT/LOSS, NOVEMBER 8, 2010

Futures Contracts	Nov 1, Entry Price*	Nov 1, Implied Yield	Nov 8, Exit Price*	Nov 8, Implied Yield	Price Change Per Contract	Spread Ratio (Contracts)	Profit (+) / Loss (-) (\$)
2-Year OTR	107-087	0.347%	107-045	0.411%	-4.25/32nds = -\$132.81	-448	\$59,498.88
10-Year OTR	111-300	2.634%	112-200	2.561%	+22 /32nds = \$687.50	+100	\$68,750.00
Implied Forward Yield Spread		228.7 bps		215.0 bps		-13.7 bps	

* Actual market prices (last price)

Profit/Loss:

Total profit on the spread is \$128,248.88, comprising +\$59,498.88 on the short position in 2-Year OTR Treasury futures and +\$68,750 on the long position in 10-Year OTR Treasury futures.

Exchange-defined Intercommodity Spreads (ICS)

An alternative to legging into the spread position is to use the CME Globex Intercommodity Spreads. As shown in Exhibit 1, the CME Globex ticker symbol for the 2-Year OTR/10-Year OTR ICS is OTT.

Trading OTT simplifies trade entry and exit by removing legging risk. The quid pro quo is that the exchange-defined spread ratio will be less granular, thereby reducing the precision of the DV01-neutrality of the position.

On November 1, 2010, for example, the ICS spread ratio for OTT is fixed at five (5) OTR 2-Year contracts for every one (1) OTR 10-Year

contract. At the scale of position that interests you, you might sell 100 OTT to obtain a short leg of 500 2-Year OTR Treasury futures and a long leg of 100 10-Year OTR Treasury futures, in which case, compared to the DV01-neutral spread ratio shown in Exhibits 4 and 5, you are overexposed to 2-Year OTR Treasury futures.

For the opportunistic trader who is willing to use less precision to advantage, the one-size-fits-all feature of ICS is not merely a transactional convenience but also a potential source of profit. Suppose, for example, that on November 1 you sold the 2-Year/10-Year OTR Treasury spread by selling 100 OTT ICS. Your profit/loss would be as shown in Exhibit 6.

EXHIBIT 6: 2-YEAR/10-YEAR CURVE FLATTENER VIA CME GLOBEX ICS: PROFIT/LOSS, NOVEMBER 8, 2010

Futures Contracts	Nov 1, Entry Price	Nov 1, Implied Yield (Pct)	Nov 8, Exit Price	Nov 8, Implied Yield (Pct)	Price Change Per Contract	Spread Ratio (Contracts)	Profit (+) / Loss (-) (\$)
2-Year OTR	107-087	0.347	107-045	0.411	-4.25/32nds = -\$132.81	-500	+66,405
10-Year OTR	111-300	2.634	112-200	2.561	+22/32nds = +\$687.50	+100	+68,750
Implied Forward Yield Spread		228.7 bps		215.0 bps	-13.7 bps		

Profit/Loss:

Total profit on the spread as implemented via CME Globex ICS is \$135,155, comprising \$66,405 on the short position in 2-Year OTR Treasury futures and \$68,750 on the long position in 10-Year OTR Treasury futures. In this case, fortunately, the extra (unbalanced) 52 contracts of short exposure on the 2-Year OTR Treasury futures leg that the ICS mechanism brings with it generates an extra \$6,906.12 of profit.

V. TRADING THE SHAPE: BUTTERFLY TRADES

Trading the shape of the Treasury yield curve is also a popular strategy to which OTR Treasury futures are ideally suited. When constructing a butterfly trade, such as the 2-Year/5-Year/10-Year OTR Treasury futures butterfly, the DV01 spread ratio should typically be +1:-2:+1 — that is, the sum of the DV01s of the 2-Year and 10-Year (the “wings”) should be equal and opposite to the DV01 of the 5-Year (the “body”).

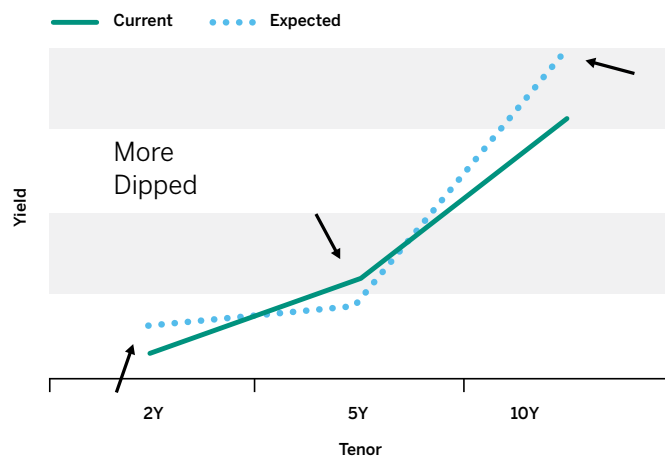
If you expect the on-the-run 5-year yield to rise relative to on-the-run 2-year and 10-year yields, you could capitalize on this view by buying the 2-5-10 OTR Treasury futures butterfly. That is, you would buy a DV01-weighted combination of 2-Year and 10-Year OTR Treasury futures (the “wings”), and sell appropriately DV01-weighted 5-Year OTR Treasury futures (the “body”). Building upon the previous discussion of curve steepeners and flatteners, you could view the construction of this long 2-5-10 butterfly as combining a long position in the 2-Year/5-Year OTR Treasury futures spread with a short position in the 5-Year/10-Year OTR Treasury futures spread.

Conversely, if you expect the on-the-run 5-year yield to fall relative to the 2-year and 10-year yields, you could sell the 2-5-10 OTR Treasury futures butterfly by selling a DV01-weighted combination of 2-Year and 10-Year OTR Treasury futures and buy appropriately DV01-weighted 5-Year OTR Treasury futures. In effect, this short butterfly position is the same as combining a short 2-Year/5-Year OTR Treasury futures spread with a long 5-Year/10-Year OTR Treasury futures spread.

Example 2: Butterfly

To illustrate, return to November 1, 2010. Suppose you expect the 5-year maturity point on the Treasury yield curve to outperform the 2-year and 10-year maturity points. Specifically, you anticipate that the on-the-run 5-year yield will either fall more than the on-the-run 2-year and 10-year yields, or that the on-the-run 5-year yield will rise less than the on-the-run 2-year and 10-year yields. Graphically speaking, you expect the yield curve to become more dipped (Exhibit 7).

EXHIBIT 7: SELLING THE 2-5-10 BUTTERFLY



A short butterfly that is properly balanced in DV01 terms combines a short position in a DV01-weighted 2-Year/5-Year OTR Treasury futures spread with comparably scaled long position in a DV01-weighted 5-Year/10-Year OTR Treasury futures spread.

Given futures price levels on November 1 (Exhibit 8) the DV01-neutral 2-Year/5-Year OTR Treasury futures spread comprises 2.504 2-Year OTR Treasury futures per 5-Year OTR Treasury futures contract (equal to $(\$52.13 \text{ per bp per 5-Yr OTR}) / (\$20.82 \text{ per bp per 2-Yr OTR})$). Similarly, the DV01-neutral 5-Year/10-Year OTR Treasury futures spread comprises 1.791 5-Year OTR Treasury futures per 10-Year OTR Treasury futures contract (equal to $(\$93.34 \text{ per bp per 10-Yr OTR}) / (\$52.13 \text{ per bp per 5-Yr OTR})$).

To ensure that the 5-Year/10-Year component of the butterfly is equivalent in DV01 terms to the 2-Year/5-Year component requires only that the 5-Year leg should be the same size for both. Given this, your first step in scaling the butterfly position might be to sell 250 2-Year OTR Treasury futures and buy 100 5-Year OTR Treasury futures. If so, the second step would be to buy 100 5-Year futures and sell 56 10-Year futures. (Note that $100/56 \times$ the requisite 1.791 5-Year OTR Treasury futures per 10-Year OTR Treasury futures.)

The second column from the right in Exhibit 8 displays the resultant proportions of the butterfly body and wings. The rightmost column demonstrates that, apart from rounding, the combination of the body and wings is indeed DV01 neutral.

EXHIBIT 8: 2-5-10 OTR TREASURY FUTURES BUTTERFLY, POSITION ENTRY, NOVEMBER 1, 2010

Futures Contracts	Price	Implied Yield (Pct)	Contract DV01 (\$ per bp)	Spread Ratio (Number of Contracts Long (+) or Short (-))	Position DV01 (\$ per bp)
2-Year OTR	107 and 8.75/32nds	0.347	20.82	-250	-\$5,205
5-Year OTR	113 and 22/32nds	1.173	52.13	+200	\$10,426
10-Year OTR	111 and 30/32nds	2.634	93.34	-56	-\$5.227

On November 1, the butterfly spread relationship among implied forward yields for the nearby 2-Year, 5-Year and 10-Year OTR Treasury futures contracts is 63.5 bps (equal to 0.347% + 2.634% – 2x1.173%). A week later, on November 8, it has widened by 6.5 bps, to a spread level of 70 bps (equal to 0.411% + 2.561% – 2x1.136%). See Exhibit 9.

EXHIBIT 9: 2-5-10 OTR TREASURY FUTURES BUTTERFLY: PROFIT/LOSS, NOVEMBER 8, 2010

Futures Contracts	Nov 1, Entry Price	Nov 1, Implied Yield (Pct)	Nov 8, Exit Price	Nov 8, Implied Yield (Pct)	Price Change Per Contract	Spread Ratio (Contracts)	Profit (+) / Loss (-) (\$)
2-Year OTR	107-087	0.347	107-045	0.411	-4.25/32nds = -\$132.81	-250	+33,202.50
5-Year OTR	113-220	1.173	113-282	1.136	+6.25/32nds = +\$195.31	+200	+39,062.00
10-Year OTR	111-300	2.634	112-200	2.561	+22/32nds = +\$687.50	-56	-38,500.00

Profit/Loss:

Total profit on the spread is \$33,764.50, comprising gains of \$33,202.50 on the short position in 2-Year OTR Treasury futures and \$39,062 on the long position in 5-Year OTR Treasury futures, tempered by a loss of -\$38,500 on the 10-Year OTR Treasury futures leg.

IV. CONCLUSION

Position Management

Maintaining a yield curve strategy position in OTR Treasury futures for a period of over a calendar month will require position management due to potential expirations of nearby contracts. You would simply roll the leg that is nearing expiration into the first deferred contract, much the same as one would perform a dollar roll in the cash market to maintain the current on-the-run issue within a yield curve strategy position. Also, if the price of one of your OTR Treasury futures legs moves substantially, that contract will reflect a different DV01, potentially requiring the need to adjust your position if you wish to maintain DV01-neutrality.

Capital efficiencies

Performance bond margin offsets are available when combining OTR Treasury futures with opposing positions in other CME Group Interest Rate products. Yield curve trades using OTR Treasury futures also precludes the need to be involved in the repo market in order to express a view on the Treasury yield curve.

Advantages

Futures prices that are tied directly to the on-the-run benchmark Treasury yields offer many advantages to market participants in yield curve trade construction. OTR Treasury futures enable the creation of direct yield curve strategies, as the relationships between the yields and yield spreads between the cash market and OTR Treasury futures market are intuitive. OTR Treasury futures are specifically designed to easily express outright views of the level of the yield curve and relative views of the slope and shape of the yield curve.

Other potential trade combinations include combining OTR Treasury futures with conventional Treasury futures to focus on additional strategic points on the yield curve. One such popular strategy is the conventional 10-Year/10-Year OTR/conventional Bond futures butterfly. This trade allows you to express a view on the 7-year/10-year/15-year points of yield curve, while exclusively utilizing futures contracts. Yield curve spreads among OTR Treasury futures, as well as spreads between OTR Treasury futures and conventional Treasury futures are available as pre-defined Intercommodity Spreads (ICS) on CME Globex. For more information, including current spread ratios, visit www.cmegroup.com/ics.

To learn more about On-The-Run Treasury futures, please visit www.cmegroup.com/otr.



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