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Replicating Swap Spreads with Futures

Swap Spreads replicated with Treasury Futures and Deliverable Swap Futures generate multiple benefits, including potentially higher return on capital

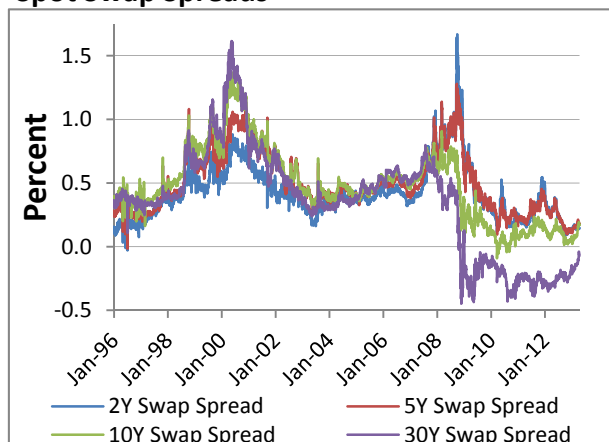
Swap Spreads

A “Spot Swap Spread” combines a long or short position in an interest rate swap (or “IRS”) with an opposing short or long position in a Treasury security of the same tenor, (e.g., a 10-year fixed-rate payer IRS versus a long position in a 10-year Treasury note).

Swap Spreads are a significant portion of daily transactions in the US Dollar IRS market, owing to their versatility. They allow market participants to express views on credit spreads (the difference between IRS rates and Treasury yields) and supply/demand changes in the Treasury market, and they provide an alternative means of taking a view on the slope of the yield curve.

A Swap Spread that combines long Treasuries and fixed-rate payer IRS profits if spreads widen. If it combines short Treasuries and fixed-rate receiver IRS, it profits when spreads tighten.

Spot Swap Spreads



Source: Bloomberg

Futures Swap Spreads vs. Spot Swap Spreads

With the introduction of Deliverable Swap Futures (DSFs), market participants can now express views on Swap Spreads by combining two futures products – a DSF combined with a Treasury future – instead of combining an OTC spot-starting IRS and a Treasury security¹.

The benefits of using “Futures Swap Spreads” include counterparty credit risk mitigation, greater capital efficiencies, standardization, and transparency. Both legs of the Futures Swap Spread are cleared by CME clearing, enabling potentially significant margin savings due to immediate risk offsets given for holding a long and short position in a pair of CME Group interest rate futures.

With both products trading on the CME Globex electronic trading system, those trading the Futures Swap Spread benefit from transparent price discovery. Moreover, the spread is listed as its own standalone ticker; an exchange-defined, inter-commodity spread (or “ICS”), which removes legging risk in the simultaneous transactions and results in the desired positions in both the DSF and Treasury futures legs.

Comparison of Spot Swap Spreads to Futures Swap Spreads reveals two important differences. First, Spot Swap Spreads represent differences in spot

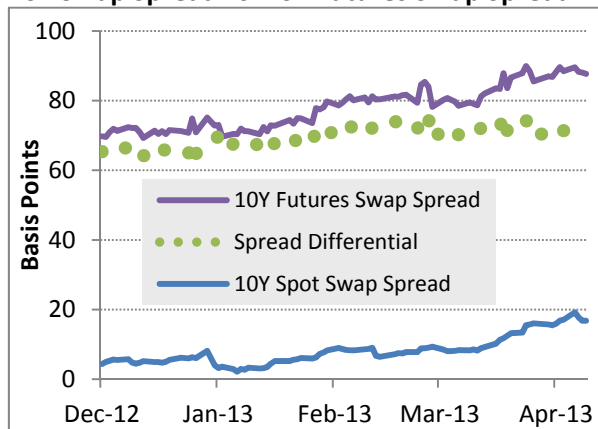
¹ “Futures Swap Spreads” combine a DSF future with a Treasury future. “Spot Swap Spreads” refers to a combination of a spot-starting interest rate swap with a Treasury security.

market yields, while Futures Swap Spreads represent differences in *forward-starting* market yields.

Second, more importantly, at any given moment the price dynamics of the Treasury futures leg in a Futures Swap Spread tends to mirror the price dynamics of the security that is cheapest to deliver (or “CTD”) into the futures contract. Depending on yield levels and the shape of the yield curve, the CTD issue is likely to reflect Treasury yield exposure at a shorter term to maturity than the on-the-run Treasury exposure typically used in constructing the corresponding Spot Swap Spread.

For these reasons, the Spot Swap Spread and the corresponding Futures Swap Spread are apt to differ in terms of level. Their day-to-day or moment-to-moment movements, however, should track one another reasonably well.

10Y Swap Spread vs. 10Y Futures Swap Spread



Source: Bloomberg and CME Group

Example: Spot Swap Spread

Suppose on January 9, 2013 a portfolio manager expects credit conditions to deteriorate, resulting in widening of the 10-year Swap Spread. That is, the portfolio manager expects that IRS rates will either rise more or fall less than the corresponding Treasury yield.

January 9th 2013 (Swap Spread)

T-Note 1-5/8% Nov 2022 (Long)	IRS (Pay Fixed)	Swap Spread
1.858%	1.878%	2 bps

Source: Bloomberg and CME Group. Actual market yields.

The portfolio manager decides to implement this view with a Spot Swap Spread, weighted so that the dollar value of a one basis point change in the rate (the “DV01”) for one leg of the spread is equal and opposite to the DV01 for the other leg. For small to moderate shifts in market yield levels that leave yield spread relationships unchanged, a DV01-weighted spread position ensures that the two legs of the Spot Swap Spread will respond in equivalent but opposite fashion.

The portfolio manager buys the Swap Spread, buying \$10 million face of the on-the-run Treasury security (1-5/8s of 15 November 2022) and entering into a \$9.5 million notional 10-year par (1.878%) interest rate swap, in which the portfolio manager pays fixed rate interest and receives 3-month floating rate interest.

January 9th 2013 (Swap Spread)

Instrument	DV01 per \$100k	Hedge Ratio	Position	Position DV01
T-Note 1-5/8 Nov '22 (Long)	\$89.60	0.9572 = 89.60 / 93.61	Long \$10m	\$8,960
Interest Rate Swap (Pay Fixed/ Rec Float)	\$93.61		Pay Fixed \$9.572m	\$8,960

Source: Bloomberg and CME Group. Actual DV01s.

Several weeks later, on January 25, the Treasury security’s yield rose to 1.950% while the IRS entered into on January 9th (fixed rate of 1.878%) is now valued at a market rate of 1.997%. Thus, the Swap Spread has widened by 2.7 basis points (“bps”) for a spread of 4.7 bps. The portfolio manager exits the position for a total profit of \$23,487.

January 25th 2013 (Swap Spread)

Date	Instrument	Price/Rate	Profit/Loss
Jan 9	T-Note (Long)	97- 29.25 32nds (1.858%)	-(79,688)
Jan 25	T-Note (Long)	97 - 3.75 32nds (1.950%)	
Jan 9	IRS, Pay Fixed	1.878%	+103,174
Jan 25	IRS, Pay Fixed	1.997%	

Source: Bloomberg & CME Group. Actual market prices/yields.

Replication Example: Futures Swap Spread

Now suppose back on January 9th another portfolio manager, with similar expectations for widening of the 10-year Swap Spread, decides to capitalize on this view by combining 10-Year Treasury Futures with 10-Year Deliverable Swap Futures.

January 9th 2013 (Futures Swap Spread)

Long Treasury Futures, TYH3	Short DSF Futures, N1UH3	Futures Swap Spread
CTD Fwd Yld = 1.229%	DSF Rate = 1.948%	72 bps

Source: Bloomberg and CME Group. Actual market yields.

The portfolio manager buys the Futures Swap Spread, buying 108 TYH3 Treasury futures contracts and selling 92 DSF N1UH3 futures contracts. (Note that a short position in DSFs, if held to expiration, results in physical delivery of a CME Cleared interest rate swap that pays fixed interest and receives floating interest.)

January 9th 2013 (Futures Swap Spread)

Instrument	DV01 per \$100k	Hedge Ratio	Position	Position DV01
TYH3 (Long)	\$83.01	0.8509 = 83.01 / 97.56	Long 108 contracts	\$8,966
N1UH3 (Short)	\$97.56		Short 92 contracts	\$8,976

Source: Bloomberg and CME Group. Actual DV01s.

Weeks later, on January 25th, the forward yield (ie, for forward settlement on the last delivery day in March) on the CTD issue for the 10-Year Treasury futures has risen 8.3 bps to 1.312%. At the same time, the forward-starting IRS rate (ie, for forward settlement on March 20th, the delivery day for March DSFs) implied in the DSF price has risen 11.2 bps to 2.060%. The Futures Swap Spread has widened a similar 2.9 bps to a spread of 74.9 bps.

January 25th 2013 (Futures Swap Spread)

Date	Instrument	Futures Price	Profit/Loss
Jan 9	TYH3 (Long)	132 -02 32nds (1.229%)	-(70,875)
Jan 25	TYH3 (Long)	131 -13 32nds (1.312%)	
Jan 9	N1UH3 (Short)	100 -19 32nds (1.948%)	+97,750
Jan 25	N1UH3 (Short)	99 -07 32nds (2.060%)	

Source: Bloomberg and CME Group. Actual market prices.

The second portfolio manager exits the Futures Swap Spread position with a profit of \$26,875.

Capital Use, Margin, and Return on Capital

Two features of these examples are worth remark. First, their outcomes are reassuringly similar, enough to demonstrate that a Futures Swap Spread makes a tolerably good proxy for a Spot Swap Spread.

Second, the Futures Swap Spread enables the user to achieve the objective at hand while employing far less capital than the Spot Swap Spread. To illustrate this, note that the Spot Swap Spread requires approximately \$657,000 of capital, as detailed below. The \$23,487 profit that it generates signifies a 3.6% return on capital for the holding period from January 9 through January 25.

Spot Swap Spread Capital Requirements

T-Note Capital Use*	IRS Init Margin Req**	Spread Credit	Total Capital Use	Return on Capital
\$413,340	\$244,162	(none)	\$657,502	3.6%

* Assumes the Treasury note is financed in the repo market with a 2% haircut and is subject to a cash-market margin requirement. Amounts are approximate.

** Actual CME Clearing initial margin for the interest rate swap in this example. Source: CME CORE Margin Tool

In comparison, the Futures Swap Spread ties up only \$157,850 of capital – approximately one quarter of the capital required by the Spot Swap Spread -- as shown below. The benefit of margin offsets between countervailing positions in the two CME Group futures products is apparent. Because it generates similar profits of \$26,875, the



Futures Swap Spread's return on capital is 17% for the holding period, exceeding the return on capital of the Spot Swap Spread by a multiple of nearly 5x.

Based on actual market prices during the holding period from January 9 – 25, the Futures Swap Spread produces the following MTM cash flows:

TYH3 Initial Margin*	N1UH3 Initial Margin*	50% Spread Credit (1:1)*	Total Capital Use	Return on Capital
\$160,380	\$131,560	134,090	\$157,850	17.0%

* Risk offsets among futures occur automatically. Source: CME SPAN. Margin requirement for this trade is \$157,850

Mark-to-Market

New U.S. regulations require clearing of many types of derivatives. Clearing introduces a daily mark-to-market process that resets each position to its current market value. This safeguard prevents losses from accumulating, as they are settled up daily with each clearing cycle.

The following tables illustrate the daily marks-to-market ("MTM") cash flows that would be associated with the Spot Swap Spread example and the Futures Swap Spread example.

Based on actual market prices during the holding period from January 9 – 25, the Spot Swap Spread produces the following MTM cash flows:

Spot Swap Spread Mark-to-Market Cash Flows

Date	10Y T-Note Price (Long \$10m Face)	MTM Daily Cash Flows	IRS Swap Rate (Pay Fixed, \$9.572m)	MTM Daily Cash Flows	TOTAL MTM Cash Flows
1/9	97.9140625		1.8782%		
1/10	97.5703125	(\$34,375)	1.9141%	\$32,058	(\$2,317)
1/11	97.8203125	\$25,000	1.8921%	(\$19,672)	\$5,328
1/14	98.0234375	\$20,313	1.8693%	(\$20,472)	(\$159)
1/15	98.1015625	\$7,813	1.8597%	(\$8,644)	(\$831)
1/16	98.2578125	\$15,625	1.8444%	(\$13,693)	\$1,932
1/17	97.7226563	(\$53,516)	1.9141%	\$60,557	\$7,041
1/18	98.0546875	\$33,203	1.8826%	(\$28,210)	\$4,993
1/22	98.0546875	\$0	1.8830%	\$299	\$299
1/23	98.2109375	\$15,625	1.8700%	(\$11,659)	\$3,966
1/24	97.9843750	(\$22,656)	1.8934%	\$20,976	(\$1,680)
1/25	97.1171875	(\$86,719)	1.9968%	\$91,636	\$4,917
		(\$79,688)		\$103,174	\$23,487

Futures Swap Spread Mark-to-Market Cash Flows

Date	TYH3 Futures Price	MTM Daily Cash Flows (Long 108 TYH3)	N1UH3 Futures Price	MTM Daily Cash Flows (Short 92 N1UH3)	TOTAL MTM Cash Flows
1/9	132.062500		100.593750		
1/10	131.718750	(\$37,125)	100.218750	\$34,500	(\$2,625)
1/11	131.906250	\$20,250	100.328125	(\$10,063)	\$10,188
1/14	132.031250	\$13,500	100.578125	(\$23,000)	(\$9,500)
1/15	132.265625	\$25,313	100.796875	(\$20,125)	\$5,188
1/16	132.296875	\$3,375	100.875000	(\$7,188)	(\$3,813)
1/17	131.875000	(\$45,563)	100.265625	\$56,063	\$10,500
1/18	132.140625	\$28,688	100.531250	(\$24,438)	\$4,250
1/22	132.265625	\$13,500	100.593750	(\$5,750)	\$7,750
1/23	132.296875	\$3,375	100.625000	(\$2,875)	\$500
1/24	132.234375	(\$6,750)	100.562500	\$5,750	(\$1,000)
1/25	131.406250	(\$89,438)	99.531250	\$94,875	\$5,438
		(\$70,875)		\$97,750	\$26,875

Bloomberg Professional Tools

Subscribers to Bloomberg Professional® service can access the FIHR <GO> page to assist in constructing Futures Swap Spreads.

Conclusion and Additional Resources

CME Group offers the unique opportunity for Interest Rate market participants to choose the best solutions for their needs. Available client solutions include products such as futures and options on futures that cover the Treasury and Swap curves, OTC interest rate swap clearing with cross margining against CME Group futures positions available, and powerful analytical tools available on CME Group's website.

Additional Resources

Contact: James.Boudreault@cmegroup.com

Deliverable Swap Futures: www.cmegroup.com/dsf

Analytical Product Tools: www.cmegroup.com/tools

Interest Rates Landing Page: www.cmegroup.com/ir

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