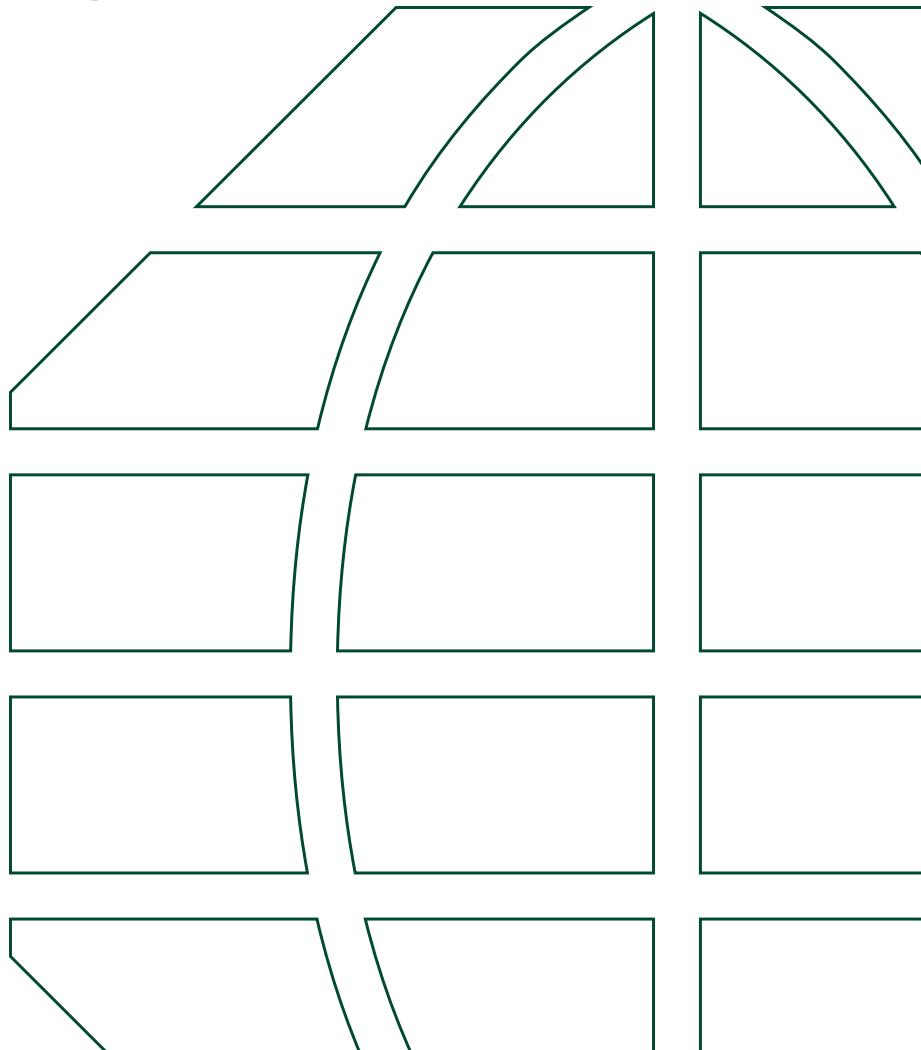


RESEARCH AND PRODUCT DEVELOPMENT

Spreading Opportunities with 3-Month OIS Futures

- *Trading the OIS vs. Eurodollar (ED) Spread*
- *Trading the OIS vs. Federal Fund (FF) Spread*

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TRADING THE OIS-EURODOLLAR SPREAD

The introduction of 3-Month Overnight Index Swap (OIS) futures presents several interesting spread trading opportunities.

3-Month OIS futures are tailor-made for spreading against Eurodollar futures (ED). This enables quick and easy manufacture of synthetic exposure to the interest rate spread between a three-month term money market asset and the effective overnight cost of financing the asset over the same three-month interval.

Spread Ratio = One-to-One

Because both contracts are similarly scaled – with notional value of \$1 million and with dollar value of a one basis point (bp) price change fixed at \$25 – the appropriate spread ratio is one-to-one.

To establish long exposure to the OIS-ED spread, i.e., to benefit from a widening in the spread between three months of compounded overnight financing on one hand and three-month term interbank interest on the other, one would buy a 3-Month OIS futures contract and sell the ED contract that expires one quarter sooner.

Conversely, to sell the OIS-ED spread, i.e., to benefit from a narrowing in the spread between the compounded overnight financing rate and the corresponding three-month term interbank interest rate, one would sell a 3-Month OIS futures contract and buy the ED contract that expires one quarter sooner.

One Quarter for the ED Futures Leg.

Next Quarter for the 3-Month OIS Futures Leg.

To achieve the desired synthetic interest rate spread, the crucial detail to remember is that the contract spread must be constructed with staggered contract expiry dates:

- December ED vs. March 3-Month OIS
- March ED vs. June 3-Month OIS
- June ED vs. September 3-Month OIS
- September ED vs. December 3-Month OIS

In terms of their underlying interest rate exposures, both ED and 3-Month OIS futures contracts reference exactly the same three-month interval, formalized as the 3-Month OIS contract's Reference Quarter. The difference between them is that the contracts expire at different ends of the Reference Quarter:

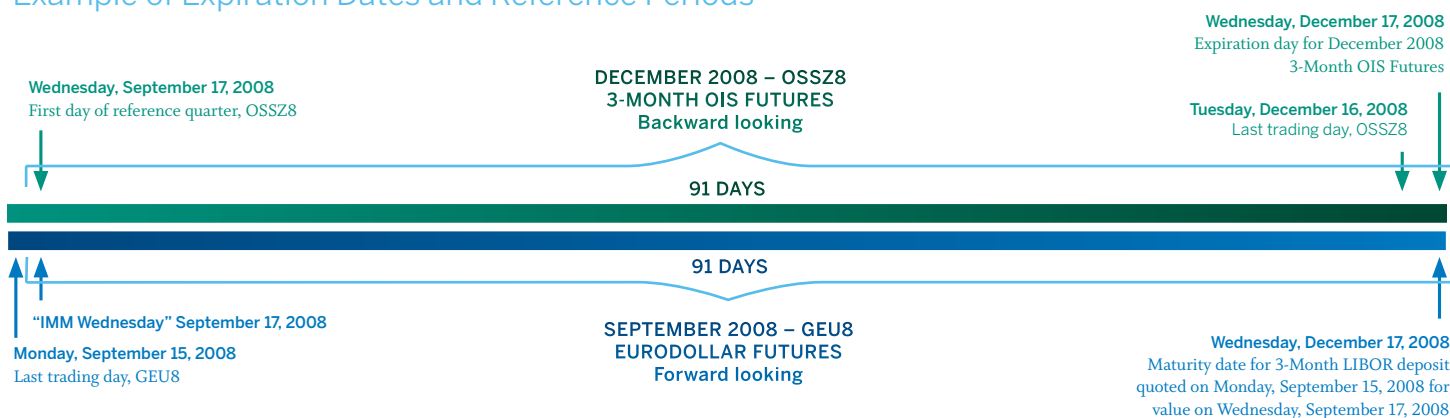
The ED futures expiration process is **forward-looking**. The contract expires two days before the Reference Quarter starts, and its final settlement price is determined by the rate on a term interbank deposit, with a value date two days later (on the third Wednesday of the ED contract expiry month, the start of the Reference Quarter) and a maturity date three calendar months thereafter (the end of the Reference Quarter).

The 3-Month OIS futures expiration process is **backward looking**. Its final settlement price is determined by overnight interest rate exposure that accumulates over exactly the same Reference Quarter. Clearly, the outcome of this accumulation process – and therefore the contract's expiry value – is not known until the Reference Quarter concludes.

Exhibit 1 on the top of page 3 illustrates the relationship between these two timetables for the Reference Quarter spanning from mid-September to mid-December 2008.

EXHIBIT 1:

Trading Identical Reference Periods – 3-Month OIS Futures and Eurodollar Futures: Example of Expiration Dates and Reference Periods



A hypothetical illustration of the timing of these events appears on page 4 in Panel A of Exhibit 2, with the spread between December 2006 ED futures and hypothetical March 2007 3-Month OIS futures serving as the example.

Theory vs. Practice

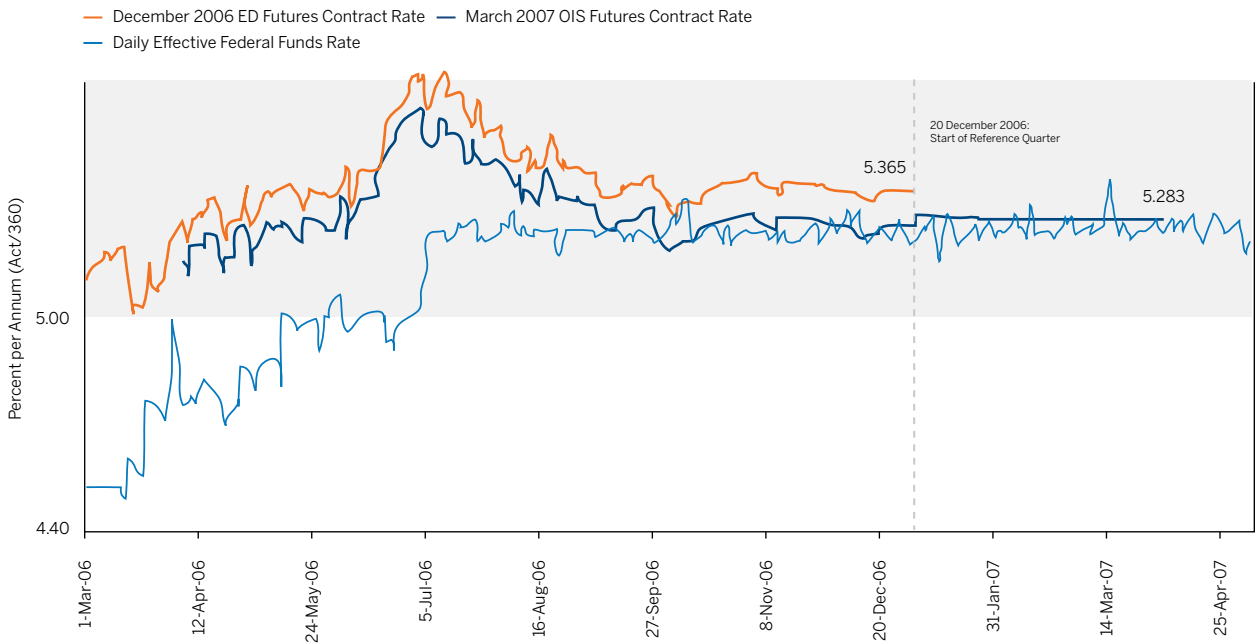
As Panel A of Exhibit 2 illustrates, the structure of the OIS-ED spread is such that the holder cannot simply ride the position to a single coordinated cash settlement on one expiration day. In theory, for the trader to realize the synthetic interest rate spread embodied in the OIS-ED spread, the 3-Month OIS futures leg must be held to expiry, three months beyond expiration of the ED futures leg. As a practical matter, however, many market practitioners will be reluctant to carry one leg of the contract spread in isolation.

Thus, any consideration of position risk management will require careful thought with regard to tactics for trade exit as well as trade initiation. For example, would it be more opportune to leg out of the position prior to ED contract expiry? Or, for a sufficiently large position, to unwind the trade through bilaterally negotiated block transactions? Or to permit the ED futures leg to expire and then to trade out of the 3-Month OIS futures leg on an outright basis?

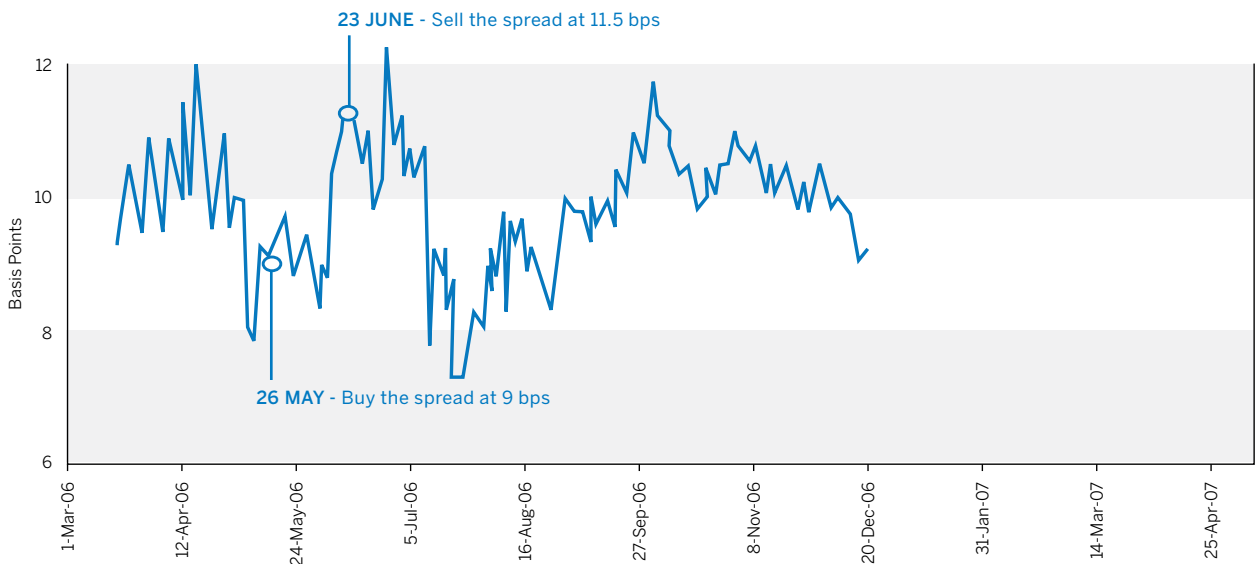
Let's look at an example. Suppose we are reasonably convinced that the OIS-ED spread is fairly valued between 10 and 12 bps, and that any departures from this neighborhood should be transient. We take note when, in late May 2006, the spread shrinks to around 8 bps. As Panel B of Exhibit 2 illustrates, on May 26, we decide to purchase the OIS-ED spread 1,000 times at 9 bps. Specifically, we buy 1,000 Mar07 3-Month OIS futures at 94.75 (for a contract rate of 5.25 percent), and we sell 1,000 Dec06 ED futures at 94.66 (for a contract rate of 5.34 percent).

Four weeks later, market events have borne out our conjecture. On June 23, we sell our OIS-ED spread position at 11.5 bps. That is, we sell 1,000 Mar 07 3-Month OIS futures at 94.420 (for a contract rate of 5.580 percent), and we buy back 1,000 Dec06 ED futures at 94.305 (for a contract rate of 5.695 percent). We've lost 33 bps per contract on the 3-Month OIS leg, while earning 35.5 bps on the ED leg. Our net gain is 2.5 bps per contract, making a profit of \$62,500 (equal to 2.5 bps per contract spread, times \$25 per bp, times 1,000 contracts).

EXHIBIT 2:
PANEL A: CONTRACT RATES FOR DEC06 ED FUTURES AND HYPOTHETICAL MAR07 3-MONTH OIS FUTURES



PANEL B: THE OIS-ED SPREAD
 (DEC06 ED futures contract rate minus Mar07 3-Month OIS futures contract rate)



Data Source: CME Group

As Exhibit 3 shows, even in periods of lower volatility, the OIS-ED spread provided opportunities for those trading relative value.

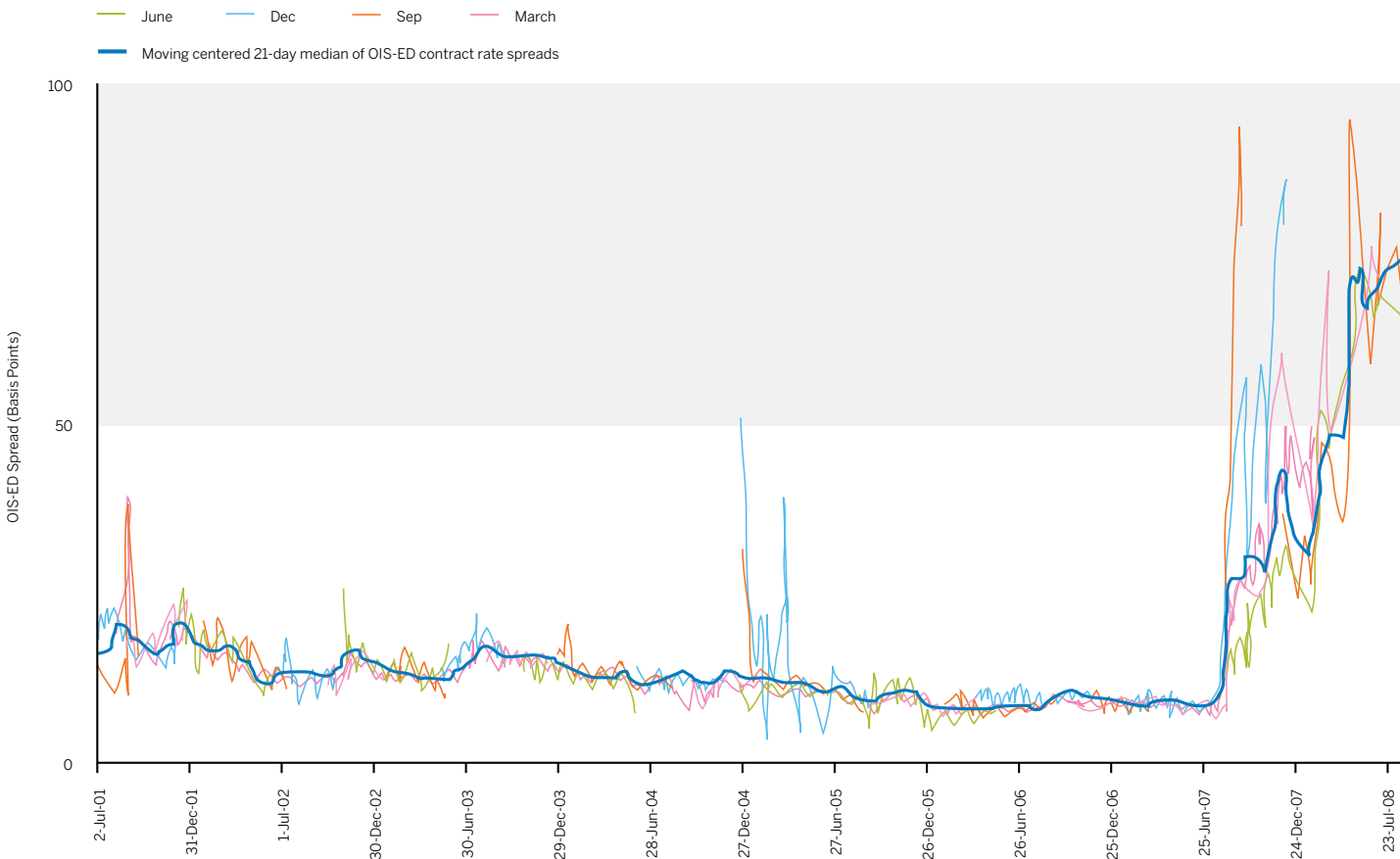
OIS-ED Spread Dynamics

As Exhibit 3 illustrates, between mid-2001 and mid-2007, the OIS-ED spread exhibited only modest volatility. Within any arbitrarily chosen short-run stretch, it would have fluctuated narrowly around a local mean level somewhere between 8 and 20 bps, with only occasional short-lived divergences from the norm.

Since the summer of 2007, however, with the advent of significant counterparty credit concerns among major financial center banks, and with the attendant disruption in U.S. dollar LIBOR, the OIS-ED spread would have grown considerably wider and more volatile.

Important to note is that even in earlier and more placid times, the OIS-ED spread would have furnished decent opportunities for attentive relative value traders.

EXHIBIT 3:
THE OIS-ED SPREAD: SOME HYPOTHETICAL HISTORY



TRADING THE FEDERAL FUNDS-OIS SPREAD

Fed Funds vs. 3-Month OIS futures provides compelling opportunities when used in a three-to-five spread ratio.

Natural spreading opportunities of a different sort abound in the interaction between 3-Month OIS futures and 30-Day Federal Funds (FF) futures.

Spread Ratio = Three-to-Five

At first blush, the FF-OIS spread looks trivial. Both contracts reference the daily effective federal funds rate. Moreover, there would appear to be no art, ingenuity or judgment involved in determining the appropriate spread ratio, which is invariably three FF futures contracts for every five 3-Month OIS futures contracts.

To see this, suppose we are interested in spreading FF futures against 1,000 3-Month OIS futures contracts. The dollar value of a one bp price change (DV01) for a 3-Month OIS futures contract is set at \$25, and the DV01 for any FF contract is defined to be \$41.67. Thus, for a one bp interest rate move in both legs of the spread to have equal and offsetting financial impact on the spread's profit/loss, the following equality must hold:

$$\begin{aligned} & (\text{Number of FF}) * (\$41.67/\text{FF contract}) \\ & = (1,000 \text{ 3-Month OIS}) * (\$25/\text{3-Month OIS contract}) \end{aligned}$$

Solving for the correct number of FF futures gives us an invariant result of 600 FF contracts for every 1,000 3-Month OIS futures contracts, or three-to-five.

The Grit in the Spread

First appearances are deceiving, however. There are several sources of nontrivial mismatch between the two contracts. For one, the reference for 3-Month OIS futures is not simply the daily effective federal funds rate, but the compounded daily rate over the contract Reference Quarter. By contrast, each FF futures contract prices with reference to the arithmetic average of the daily effective federal funds rate over the contract's expiry month.

More significantly, there is no clean match between contract reference intervals. The 3-Month OIS futures Reference Quarter overlaps, in whole or in part, the reference intervals for four distinct FF contracts.

Example: Mar07 3-Month OIS futures are based upon the daily effective federal funds rate compounded over the 90-day Reference Quarter beginning Wednesday, 20 December 2006, and ending Monday 19 March 2007. The corresponding FF futures strip involves:

Jan07 FF and Feb07 FF, which are based on arithmetic averages of the daily effective federal funds rates for January and February, respectively. In each case, the entire one-month interval of interest rate exposure (31 and 28 days, respectively) is contained within the Mar07 3-Month OIS contract Reference Quarter.

Dec06 FF, which is based on the average daily effective federal funds rate during December. Importantly, the price dynamics of the Dec06 FF contract depend not only upon what happens in the final 12 days of December, which overlap with the Mar07 3-Month OIS Reference Quarter, but also upon events during the first 19 days of December.

Mar07 FF, which is based on the average daily effective federal funds rate during March. Like the Dec06 FF contract, the Mar07 FF contract has only partial overlap with the Mar07 3-Month OIS futures Reference Quarter, limited to the first 19 days of March. Thus, as with Dec06 FF, the Mar07 FF futures contract contains interest rate risk exposure that is extraneous to the FF-OIS spread, insofar as its price dynamics also rely upon the course of the daily effective federal funds rate during the last 12 days of March.

Thus, it is not enough to know that one wishes to spread 600 FF futures against 1,000 3-Month OIS futures. Constructing the spread position requires a careful decision as to which 600 FF futures. Exhibit 4 indicates one possible approach, based on the reference period overlaps detailed above.

EXHIBIT 4:

CALENDAR-BASED SPREAD RATIOS – FF FUTURES STRIP VS. HYPOTHETICAL MAR07 3-MONTH OIS FUTURES

FF Contract Expiry Month	(1) Length of Overlap, FF Expiry Month vs. Mar07 3-Month OIS Reference Quarter (Days)	(2) Fraction of Mar07 3-Month OIS Reference Quarter = Column (1) / 90	(3) Number of FF Contracts = Column (2) * 600
Dec06	12	0.133	80
Jan07	31	0.344	207
Feb07	28	0.311	187
Mar07	19	0.211	126
Totals	90		600

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