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# Interest Rate Swap Futures: An Introduction

by Ken Kapner,
CEO and President, GFMI

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The financial crisis has brought about many changes to the global financial system. One of these changes are the clearing requirements implemented by the Dodd-Frank Act for over the counter (OTC) derivatives such as interest rate swaps. These complex requirements have also increased interest in interest rate swap futures as an alternative hedging instrument. Although they have been around for a while, swap futures have never been very successful, most likely because the OTC dealer community was unwilling to support them. But now it seems the playing field may be leveling out as OTC and futures transactions both require margin—with futures having somewhat less onerous requirements. This introduction looks at the similarities of the contract specifications, their differences, a brief review of net present value and some basic applications.

## Interest Rate Swap Futures: Contract Specifications

There are three varieties of swap futures. Two are standardized contracts while the third has flexible terms. We will explain the two standardized contracts first and then look at the "Flex" contract.

### Standardized Futures: Deliverable Swap Futures and Eris Futures

Deliverable swaps futures (DSF) are traded on the Chicago Mercantile Exchange (http://cmegroup.com) while non-deliverable swap contracts trade on the Eris Exchange (http://erisfutures.com). Both are cleared through the CME.

The contracts have some similarities as outlined below:

- Both are forward starting swaps
- Tenors—Maturities of 2, 5, 10 and 30-year (Eris has added a 7-year tenor)
- Delivery months—quarterly cycles (March, June, September and December). Effective dates are the IMM dates—the third Wednesday of the cycle
- Swap Coupon—A fixed swap coupon which does NOT have to be the same for the two contracts. For example, the coupon for the December 2013 5-year contract for the DSF is 1.50% and for the Eris it is 2.00%
- Fixed leg—day count is 30/360
- Floating leg—3-month LIBOR and the day count is actual/360
- Contract size—USD 100,000
- Price basis—Both are based on an index of 100 but each makes adjustments to the price which is explained in the respective sections. One adjustment is the concept of NPV which is explained below.
- Margin—based on 2-day SPAN (The CME's proprietary methodology to calculate margin)

## NPV: A Review

The CME has defined NPV as the Non-Par Value. Eris exchange has defined it as Net Present Value. Essentially they are the same thing. For example, when a plain vanilla OTC swap is initially executed, the present value of the fixed leg equals the present value of the floating leg. After the execution of the swap, the NPV changes. For example, assume the one-year rate is 4.00% and the two-year rate is 5.00%. Further assume a counterparty pays fixed, the notional principal is 1,000,000, all rates are annual and rates move up in a parallel fashion by 1.00%. The NPV will change from initially being zero to a positive $8,895 (remember it is from a pay fixed viewpoint). This may seem counterintuitive to traditional bond math but in a plain vanilla interest rate swap there are two sets of cash flows. All else being equal, the value of the swap increases when rates move higher. If rates shifted down by 1.00% after the transaction was executed, then the NPV equals negative $9,242. For the standardized swap futures, it is highly unlikely that it will be trading at a zero NPV regardless how NPV is defined!

It also easy to see why both contracts use a base of 100 for pricing as many computer systems have difficulties handling negative prices.

Back to the contracts...

### DSF Contract

Now let's look at the differences. The DSF has the following features:

- Price basis—100% of par plus or minus the Non-Par Value (NPV)
- Minimum Price Movement—Although the face amount is USD 100,000, each point is worth $1,000. This leads to the minimum price or tick movement:
    - 30-Year: The minimum price movement is 1/32nd of a point or $31.25 ($1,000 x .03125). Therefore, 32 ticks, which is equivalent to one full point, multiplied by 31.25 equals $1,000. Anyone familiar with the U.S. bond and note futures will recognize the similarities between the swaps contracts and the corresponding Treasury futures contracts with regard to minimum price movements.
    - 5 and 10-Year: The minimum price movement is ½ of 1/32nd of a point or $15.625 ($1,000 x .015625). Therefore, 64 ticks, which is equivalent to one full point, multiplied by $15.625 equals $1,000.
    - 2-Year: The minimum price movement is ¼ of 1/32nd of a point or $7.8125 ($1,000 x .0078125). Therefore, 128 ticks, which is equivalent to one full point, multiplied by $7.8125 equals $1,000.
- Paying/Receiving Conventions—The long is equivalent to receiving on the fixed leg and the short is equivalent to paying on the fixed leg. Assume a trader buys 10 contracts of the 10-year swaps futures at 101-12 and sells them at 101-25. The profit is $4,062.50 or (10 contracts x 13 x $31.25). If the minimum price moves, or ticks were used, then the calculation would be 10 x 26 x 15.625).

- Who Delivers the Underlying?—If there is a delivery at maturity of the contract it is the responsibility of the short to deliver to the long
- Last Trading Day—The last trading day is the second business day before the third Wednesday of the futures delivery month. This is taken to mean the Monday before the third Wednesday of the quarterly cycle.
- Delivery Date—If the swap is delivered it is "effective", i.e., interest begins accruing, the third Wednesday of the delivery month.
- There is no adjustment for interest on variation margin

## Eris Futures

- Quoting Convention—The Eris contract trades on its NPV or net present value. Assume the 10-year Dec. '13 with a coupon of 3.00% is trading at a positive 1,200. What does this mean? A positive NPV indicates that the current par rate trading in the market which matches the date of the futures contract, i.e., a forward starting swap, is greater than the fixed rate of 3.00%. (recall the review on NPV)
- Pricing Basis—To convert the NPV to a price of 100, simply divide it by 1,000 for a value of 1.2. Add this to 100 and the price is 101.20. Once the conversion to 100 is completed, the price may be referred to as a clean price.
- Settlement Prices—Since the Eris contract's goal is to closely emulate the change in price in the OTC market, there are two additional adjustments that need to be made to the above. The settlement price is officially defined as 100 + A + B—C. A is the NPV as per above or 1.20. The B is the ongoing interest since the effective date, it can be positive or negative and changes every 3 months to take into account the 3-month LIBOR payment. C is the interest earned on variation margin. Both B and C are calculated by Eris Exchange. Once computed this becomes the dirty price.
- Minimum Price Movement -
    - $1 for Contracts where the lesser of Remaining Tenor/Underlying Tenor is less than two years. If the price is 400 then the minimum movement is to 401 (or 399).
    - $2 for Contracts where the lesser of Remaining Tenor/Underlying Tenor is greater than or equal to 2 years and less than 4 years. If the price is 400 then the minimum movement is to 402 (or 398).
    - $5 for Contracts where the lesser of Remaining Tenor/Underlying Tenor is greater than or equal to 4 years and less than 7 years. If the price is 400 then the minimum movement is to 405 (or 395).
    - $10 for Contracts where the lesser of Remaining Tenor/Underlying Tenor is greater than or equal to 7 years and less than 20 years. If the price is 400 then the minimum movement is to 410 (or 390).
    - $20 for Contracts where the lesser of Remaining Tenor/Underlying Tenor is greater than or equal to 20 years.Thus, if the price is 400 then the minimum price movement is to 420 (or 380).

- Paying Receiving Conventions—This contract stipulates the buyer is paying fixed (creating a liability) and the seller is receiving fixed (creating an asset). This more closely aligns to current OTC market convention but is completely opposite of the DSF.
- Who Delivers the Underlying?—The Eris contract is not deliverable.
- Roll versus Holding until Maturity—A unique feature for the Eris contract is that is does not have to be rolled. It can remain outstanding for the life of the contract. Generally speaking, futures contract are either rolled (settle the current position and open a new but similar position in the next trading month) or reversed (the position is closed out). The position may remain open as a futures contract and never have to be delivered. The main advantage to doing this would be to maintain the 2-day SPAN margin vs. the 5-day Value at Risk (VaR) margins for OTC cleared swaps and a DSF after it has been delivered. However, if you don't want to maintain the position, you may close it out and roll it!
- Last Trading Day—The last trading day is the business day before the maturity date of the contract

## Eris Flex Contract

The flex contract attempts to replicate OTC spot and forward starting swaps, up to 10 years, but remains a futures contract. Therefore, an end user can execute a swap at any time and not be tied down to the quarterly cycles for the effective date. The face amount is 100,000, fixed leg is based on 30/360 and the floating leg is 3-month LIBOR. The margin requirements are similar to OTC cleared swap requirements which are derived from a 5-day Historical VaR calculation.

Quoting Conventions—At the inception of the transaction the quoting conventions are based on par swap rates and can range from 0.000% to 9.999%. Since it is initially trading at par, the implicit price is 100.

Quoting conventions after the deal is executed—Once the deal is transacted, it will trade based on NPV.

## Applications

Like most rate products, there are various strategies to employ depending on one's forecast for rates moving higher or lower such as relative value trades or specific strategies for hedging purposes.

Initiating a directional play on rates would depend on one's market view. If the forecast is for rates to move higher, then one would pay fixed (buyer in the Eris contract and seller in the DSF). If, on the other hand, the forecast was for rates to move lower, then one would want to receive fixed (seller in the Eris contract and buyer in the DSF).

To initiate a hedge or a relative value play, a hedge ratio is required. Generally speaking, dollar value of a basis point ("DV01") can be used (duration can also be used). This risk metric assumes that a single security or portfolio moves up or down by one basis point (the assumption here is the yield curve moves up/down in a parallel fashion by one basis point) and the difference between the current price and the new price after the change of one basis point is the DV01. For example, assume a 10-year Treasury with a coupon of 1.75%, a yield of 2.00%, and face amount of 1,000,000 is priced at 977,443.06. A one basis point move up results in a new value of 976,552.59 for a DV01 of $890.47. It is scalable resulting in a DV01 for a face amount of 10,000,000 of $8,904.72. The estimated change for 10 basis points can be found in the following table with the difference in estimation due to convexity.

| Face Amounts | DV01 | 10 Basis Point Move Up (Actual) |
|---|---|---|
| 1,000,000 | 890.47 | (8,864.36) |
| 10,000,000 | 8,904.72 | (88,643.60) |

Once these are determined, the hedge ratio is calculated by using the DV01 of the target instrument in the numerator and the DV01 of the hedging instrument in the denominator.

What can be hedged using swap futures? A single OTC swap or a portfolio of swaps, corporate bonds and bond portfolios. Assume a 3-year OTC swap with a 10,000,000 notional has a DV01 of $1,852. Further assume a 2-year swap futures contract with a notional of 100,000 has a DV01 of $20.00. The number of futures for the hedge is calculated as 1,852/20 or 92.60 which equates to 93 futures contracts. If the OTC swap fixed leg was pay fixed, then the hedger would buy the DSF to hedge and for the Eris contract they would sell the futures to hedge. If the OTC swap fixed leg was receive fixed, then the hedger would sell the DSF to hedge and they would buy the Eris futures to hedge. Although the example given is to hedge an OTC swap, the same methodology can used to hedge other fixed income instruments and/or portfolios.

Yield curve and spread trades are examples of relative value trades. In a yield curve trade, the view may be for the relationship between different parts of the curve to either steepen (widen) or flatten (narrow). For example, if the two-year swap rate is 2% and the 10-year is 5%, the view may be for the spread relationship to go to 4% from the current 3%. To execute such a steepening trade you would buy the two-year DSF/sell the Eris and sell the 10-year DSF/buy the Eris in a DV01 weighted trade which is said to be DV01 neutral. Thus, the trade is established to take advantage of a change in the curve rather than an outright directional move. The opposite strategy would be true for a flattener.

Taking a position to capitalize on a change in the spread over the Treasury can be executed either in the Treasury futures or cash market. If the view was for the spread to widen, then the trader would buy the cash Treasury or the Treasury futures and sell the DSF/buy the Eris futures in a DV01 weighted transaction. If the view was for the spread to tighten, then the opposite would be executed. Note that if this trade was being executed in the Treasury futures market, the hedge ratio would need to take into account the conversion factor of the cheapest to deliver security.

Other strategies would be to hedge new issues or to swap a position from fixed to floating.

## Conclusion

There seems to be a lot of competition in the plain vanilla interest rate swap space! Will the OTC and futures market be able to live in harmony? Maybe they will take their cue from the forward rate agreement and Eurodollar futures which are extremely similar and have lived side by side for over two decades! If not, may the best instrument win!

### References


http://cmegoup.com/dsf

- DSF Fact Card
- Product Overview
- Understanding Deliverable Swap Futures

http://www.erisfutures.com

- Product Reference Guide
- Eris Swaps Futures Overview
- Contract Specifications 2—30 years and Flex Contract
- Eris Highlights
- Trading Reference Card

## About the author

Ken Kapner, CEO and President, started Global Financial Markets Institute, Inc. (GFMI) a NASBA certified financial learning and consulting boutique, in 1998.

### Professional Experience

Since 1997, Ken has designed, developed and delivered custom instructor led training courses for a variety of clients including Government Regulators, Asset Managers, Banks and Insurance Companies as well as a variety of support functions for these clients. Ken is well-versed in most aspects of the Capital Markets. His specific areas of expertise include derivative products, risk management, foreign exchange, fixed income, structured finance, and portfolio management.

He has been a Risk Management Advisor to a Mutual Fund's Board of Trustees and has served as an Expert Witness using knowledge of derivatives, trading and risk management

Prior, Ken spent 14 years with the HSBC (Hong Kong and Shanghai Banking Corporation) Group in their Treasury and Capital markets area where he traded a variety of instruments including interest rate derivatives, spot and forward foreign exchange, money markets, managed the balance sheet, sat on the Asset Liability Committee and was responsible for the overall Treasury activities of the bank. He spent two years in Hong Kong where he headed up HSBC's Global Treasury and Capital Markets Product training. Specifically, his responsibilities included developing new courses and delivering courses to traders, support staff and relationship managers. In New York, he established a training department for the firms' Securities Division where he was in charge of the MBA Associates Program, continuing education and Section 20 license. He currently runs his own training and consulting firm called Global Financial Markets Institute (GFMI). He has co-authored/co-edited seven books on derivatives including The Swaps Handbook and Understanding Swaps.

### Articles

March 2002 Futures Magazine, Doing Your Homework on Individual Equity Futures (co-written with Robert McDonough)

### Books

1996 Como Entender Los Swaps, (co-author: John Marshall), published by CECSA (a Mexican publishing firm). This is a translated edition of our book Understanding Swaps, but with adaptations to fit the Mexican markets. (289 pages)

1993 he Swaps Market: 2nd edition, Kolb Publishing, 288 pages (co-author: John Marshall, copyright 1993). This book is directed to the graduate business student.

1993 Understanding Swaps, John Wiley & Sons, 270 pages (co-author John Marshall, copyright 1993). This book is directed to the practitioner market and is published as part of Wiley's Finance Series.

1993 1993-94 Supplement to the Swaps Handbook, New York Institute of Finance, a Simon & Schuster Company, 494 pages, (co-authors John Marshall and Ellen Lonergan, copyright 1993). This book is directed to a practitioner audience and is a supplement to The Swaps Handbook. My role was largely that of editor.

1991 1991-92 Supplement to The Swaps Handbook, New York Institute of Finance (Simon & Schuster Professional Information Group), 300+ pages (co-author: John Marshall copyright 1992). This book is directed to a professional practitioner audience and is an annual supplement to The Swaps Handbook.

1990 The Swaps Handbook: Swaps and Related Risk Management Instruments, New York: New York Institute of Finance, a Simon & Schuster Company, 543 pages. (co-author: John Marshall). This book is directed to derivative product professionals.

1988 Understanding Swap Finance, Cincinnati: South Western publishing Company, 155 pages. (co-author John Marshall, copyright 1990). This was the first academic text published on the swaps markets.

## Affiliations

International Association of Financial Engineers
Board of Advisors - 1994 - 2010

Global Association of Risk Professionals

ASTD National and New York Chapters

PO Box 388
Jericho, NY 11753-0388
+1 516 935 0923
www.GFMI.com