CME Group

INTEREST RATES

Understanding Euro MAC Swap Futures

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Financial Research & Product Development

CME Group is offering Deliverable EUR Interest Rate Swap futures ("Euro DSFs") as a novel means of managing the risks attendant to Euro (EUR) denominated Interest Rate Swap (IRS) instruments.

This note provides a review of how Euro DSF contracts work and how they may be used to hedge, or serve as a proxy, for EUR IRS exposures.

EUR Deliverable Swap Futures

Euro DSF contracts are intended to provide a facile means of trading and managing Euro-denominated interest rate swap risk exposure on a forward basis with the financial protections attendant to a standard futures contract. These contracts culminate in the delivery of "plain-vanilla" EUR denominated interest rate swap ("IRS" or "swaps") carried by the CME Clearing House. As such, Euro DSFs converge elements of both futures and over-the-counter (OTC) derivative instruments in a consolidated package.

Euro DSFs represent an extension of CME Group's U.S. dollar (USD) DSF product line. But they call for the delivery of a EUR-denominated interest rate swap instrument through the facilities of the CME Clearing House. These delivered swaps are structured using standardized or plain-vanilla terms and conditions.

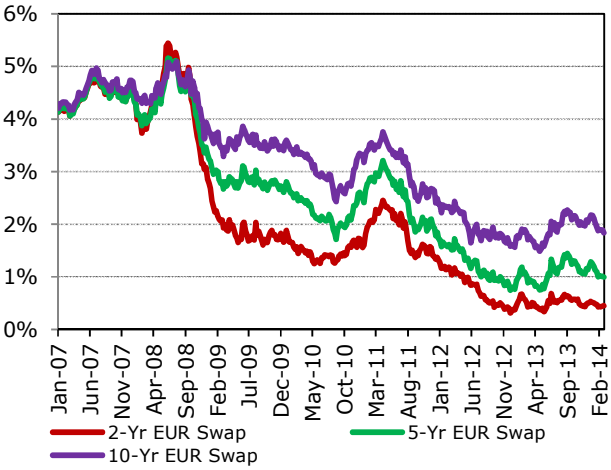
Euro DSF contracts call for the delivery of an IRS denominated in Euros (EUR). Contracts are listed that call for the delivery of a 2-, 5- and 10--year term swaps with a notional value of €100,000.

Euro DSFs are listed for expiration on a quarterly basis (generally) concluding on the Monday preceding the 3rd Wednesday of the contract months of March, June, September and December. Physical delivery or the effective date on which a EUR denominated IRS is assigned to the accounts of buyer and seller occurs on that Wednesday.

Contracts are listed with a specific fixed rate or coupon that approximates current market rates, *e.g.,* 0.50%, 0.75%, 1.00%, 1.25%, etc. To illustrate, the 2-year Euro DSF for June 2014 delivery is listed with a 0.75% coupon. Similarly, the June 2014 5- and 10-year Euro DSFs carry coupons of 1.75% and 2.50%, respectively.

Euro DSF contracts are quoted as 100 points of par value plus the Non-Par Value (NPV) of the swap to-be-delivered, in percent of par. NPV may be positive or negative, contingent upon the relationship between prevailing swap rates and the fixed rate or coupon associated with the swap. Thus, DSF contracts may be quoted as either above or below par, *e.g.,* 101.00, 98.50%, etc. [1]

EURO Swap Rates



The minimum allowable price fluctuation, or tick size, for the 5- and 10-year contracts equals 0.01 points or €10.00, based on a €100,000 face value contract (= 0.01 x 1% of €100,000). The tick size for the 2-year contract equals 0.005 points or €5.00 per contract.

Reference Conventions

Swap Futures	Delivered or Actual Swap
Buyer (Long)	Fixed Rate Receiver (Floating Rate Payer)
Seller (Short)	Fixed Rate Payer (Floating Rate Receiver)

DSF contracts utilize the convention of referring to the buyer of Swap futures (or "long") as the receiver of the fixed rate (payer of floating rates) upon

[1] This quote convention ensures that quotes will be displayed as positive numbers. As an alternative, the Exchange could have adopted the convention of quoting the contract by reference to the Non-Par Value (NPV) of the underlying swap. This convention might be consistent with prevailing OTC market practices but could possibly create confusion or difficulties with quotation or bookkeeping systems that are sometimes programmed to reject negative quotes as erroneous.

delivery of the underlying Swap. Likewise, the seller (or "short") is the payer of the fixed rate (receiver of floating rates) upon delivery.

Upon delivery of an actual swap in satisfaction of a maturing contract with a settlement price above par, an invoice amount is paid from long to short. Upon delivery in satisfaction of a maturing contract with a settlement price below par, an invoice amount is paid from short to long. Upon delivery in satisfaction of a maturing contact with a settlement price equal to par, no payments are made upon delivery at all.

Settlement Price > Par	➔	**Invoice Amount Paid from Long to Short**
Settlement Price = Par	➔	**No Invoice Amount Paid**
Settlement Price < Par	➔	**Invoice Amount Paid from Short to Long**

These invoice amounts represents the NPV of the deliverable-grade swap as reflected in the futures settlement price on the final trading day of the DSF contract.

Once the invoice price is paid and the IRS instrument established, the Swap is subject to a margin requirement and is marked-to-market (MTM) on a daily basis. This implies that if the swap is originally booked at an invoice price that departs from zero (€0), the MTM during the forthcoming clearing cycle will effective offset that amount. Thus, like futures, there are no unrealized gains or losses associated with the swap position created upon delivery of the DSF.

A summary of DSF contract terms and conditions may be referenced in the appendix to this document.

Deliverable-Grade EUR IRS

The Exchange lists separate DSF contracts that call for the delivery of 2-, 5- or 10-year term swap instruments. The swaps delivered in satisfaction of an expiring futures contract are configured as a swap between semi-annual floating rate payments vs. annual fixed rate payments.

Fixed rate payments occur on the anniversaries of the IRS effective date, i.e., the DSF contract delivery date, and are established at the DSF contract fixed rate per a corporate 30/360 day count convention.

Foating rate payments occur on semi-annual anniversaries of the IRS effective date and are determined by reference to the Euro interbank offered rate, per an Actual/360 day count convention. Floating rate resets are made by reference to 6-month EURIBOR rates, administered by EURIBOR-EBF.

Both fixed and floating rate interest payments observe the ISDA Modified Following day count convention.

Futures Quote Convention

To understand the Euro DSF quote convention, it may be useful to review the NPV concept. In short, the NPV or non-par value represents the present value (PV) of IRS fixed rate payments minus the PV of the floating rate payments.

$$Non\ Par\ Value = PV(Fixed\ Rate\ Payments) - PV(Floating\ Rate\ Payments)$$

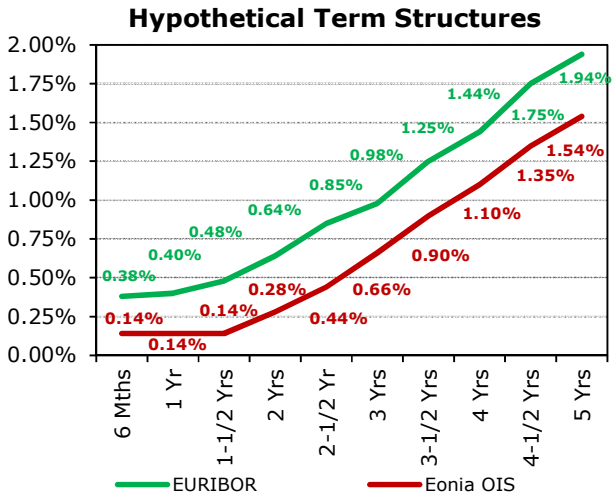
As noted above, fixed rate payments associated with deliverable-grade EUR IRS are determined by the standardized fixed rate assigned to the DSF contract by the Exchange when it is initially listed.

Future floating rate payments are sometimes estimated by reference to the term structure of 6-month EURIBOR forward rate agreements (FRAs).

Market practitioners frequently reference the term structure of EONIA Overnight Interest Swap (OIS) rates as the basis for assessing the present value of future fixed and floating rate payments. [2]

Against this backdrop, consider a hypothetical 5-year EUR IRS with a 1% fixed rate. Assume that the floating rate payments may be estimated by reference to a hypothetical EURIBOR FRA term structure per our graphic. We discount the net floating vs. fixed rate payments by reference to a hypothetical EONIA OIS curve.

[2] EONIA refers to the Euro Overnight Interest Average, administered by EURIBOR-EBF and calculated by the European Central Bank.



Our calculations indicate that the PV of the fixed rate payment stream is €35.69 less than the PV of the floating rate payments.[3] For these purposes, we apply the simplifying assumption of precise 180 day counts between reset dates.

Hypothetical 5-Year EUR DSF
(with 1.00% Coupon)

Forward Date	Fixed Pay	Floating Pay	Net Pay	Discount Factor	Present Value
6 Month		€190	-€190	0.9993005	-€189.87
1 Year	€1,000	€200	€800	0.9986015	€798.88
1-½ Year		€240	-€240	0.9979029	-€239.50
2 Year	€1,000	€320	€680	0.9965078	€677.63
2-½ Year		€425	-€425	0.9943203	-€422.59
3 Year	€1,000	€490	€510	0.9910499	€505.44
3-½ Year		€625	-€625	0.9866101	-€616.63
4 Year	€1,000	€720	€280	0.9812134	€274.74
4-½ Year		€875	-€875	0.9746347	-€852.81
5 Year	€1,000	€970	€30	0.9671873	€29.02
				TOTAL	**-€35.69**

[3] This analysis may be generated using Bloomberg's "Swap Manager" or "SWPM" functionality. From the descriptive landing page DES, select "Swap Manager (SWPM)" to view real-time interest rate swap pricing based on current or forward starting interest rate swaps. Further details regarding the calculations are accessible from the SWPM page as well including the interest rate curves references, cash flows, scenario analysis, etc. Bloomberg provides a series of recommended settings but users may override these recommendations in order to deploy their own preferred settings as well. This tool represents a powerful and efficient functionality. Note that this analysis does not take into account cost of carry considerations. However, carry may generally be rather negligible to the extent that an OTC IRS instrument may be transacted on a par basis with no explicit up-front payment or cost. In any event, the results of this analysis do not necessarily indicate where DSF will trade but might be considered a general guidance or reference.

DSFs are quoted as 100 points plus the Non-Par Value (NPV) of the swap to-be-delivered. Per our example, an expiring 1% 5-year EUR DSF contract might be quoted as 99.96 points.

$$EUR\ DSF\ Quote = 100 + Non\ Par\ Value\ in\ \%\ of\ Par$$
$$= 100\% + \left(\frac{-€35.69}{€100{,}000}\right) \sim 99.96$$

If the EUR DSF contract were to expire at a settlement price of 99.60, a €40 payment is made from short open interest holders (fixed rate payers upon delivery) to long open interest holders (fixed rate receivers upon delivery).

If the NPV of the EUR DSF contract had equaled €448.51, the contract would have been quoted as 100.45. If the EUR DSF contract were to expire at a settlement price of 100.45, a €450 payment is made from long open interest holders (fixed rate receivers upon delivery) to short open interest holders (fixed rate payers upon delivery).

$$EUR\ DSF\ Quote = 100\% + \left(\frac{€448.51}{€100{,}000}\right) \sim 100.45$$

Delivery Eligibility

Anyone with a properly established futures account may trade EUR DSF contracts. However, regulations restrict holding of actual interest rate swaps (IRS) to Eligible Contract Participants (ECPs) as defined in Section 1a(18) of the Commodity Exchange Act. ECPs may generally be thought of as institutional market participants or high-net worth individuals. Thus, only ECPs are permitted to participate in the delivery process of actual swaps.

Moreover, only CME IRS Clearing Members may carry IRS exposures assigned upon delivery of expiring EUR DSF contracts. Participation in a EUR DSF delivery is limited to (1) CME IRS Clearing Members; or (2) customers registered with CME by a CME IRS Clearing Member as a CME IRS Participant.

Risk Management with EUR DSFs

EUR DSF contracts may be used to manage risk exposure associated with Euro denominated swaps or other correlated instruments. For these purposes, consider a hedge ratio (HR) that balances the change in the value of the instrument to be

hedged (Δ_{hedge}) with any change in the value of the DSF contract (Δ_{DSF}). We use the Greek letter delta or Δ to denote the concept of a change in value.

$$\Delta_{hedge} = HR \; x \; \Delta_{DSF}$$

We solve for the hedge ratio (HR) as follows.

$$HR = \Delta_{hedge} \div \Delta_{DSF}$$

But the concept of a "change in value" is rather abstract. Thus, we operationalize this concept by substituting Basis Point Value (BPV) for the abstract change in value as follows. [4]

$$HR = BPV_{hedge} \div BPV_{DSF}$$

The BPV of a EUR DSF may be estimated by "shocking" the calculations as illustrated in our pricing example above by 1 basis point. *I.e.,* compare the current NPV with the NPV calculated assuming that all rates along the term structures of the 6-month EURIBOR and EONIA OIS forward curves rise uniformly by 1 basis point.

Hypothetical 5-Year EUR DSF
Assuming Yields Rise 1 Basis Point
(with 1.00% Coupon)

Forward Date	Fixed Pay	Floating Pay	Net Pay	Discount Factor	Present Value
6 Month		€195	-€195	0.999251	-€194.85
1 Year	€1,000	€205	€795	0.998502	€793.81
1-½ Year		€245	-€245	0.997753	-€244.45
2 Year	€1,000	€325	€675	0.996309	€672.51
2-½ Year		€430	-€430	0.994072	-€427.45
3 Year	€1,000	€495	€505	0.990753	€500.33
3-½ Year		€630	-€630	0.986266	-€621.35
4 Year	€1,000	€725	€275	0.980822	€269.73
4-½ Year		€880	-€880	0.974197	-€857.29
5 Year	€1,000	€975	€25	0.966705	€24.17
				TOTAL	**-€84.85**

Thus, we calculate an NPV equal to -€84.85. BPV is estimated as the difference in our NPV relative to the NPV calculated assuming rates were lower by 1 basis point. BPV is calculated as €49.16 or -€35.69 less -€84.85.

[4] BPV measures the expected change in the value or price of a fixed income instrument per the assumption that interest rates fluctuate by one basis point (0.01%).

Hedging OTC Swap Exposures

Fixed rate receivers in an IRS instrument are exposed to the risk of rising rates. To neutralize these risks, construct a hedge by selling EUR DSF contracts. Fixed rate payers are exposed to the risk of falling rates and should buy EUR DSF futures as a hedge.

The critical terms of the IRS to be hedged may not match precisely with the terms of the EUR DSF in a number of respects. Note that EUR DSF contracts are based upon an Exchange established coupon while the IRS to be hedged may have been established at a different coupon.

Hedging Tactics

IRS Instrument	EUR DSF Contracts
Buyer or Fixed Rate Receiver	Sell EUR DSFs
Seller or Fixed Rate Payer	Buy EUR DSFs

Other characteristics of the IRS instrument may likewise depart from those associated with the standardized EUR DSF including the term, reset dates, day count conventions or the reference floating rate.

But presuming that the terms are tolerably similar, in particular, if the IRS to be hedged is based upon the 6-month EURIBOR rate, there may be sufficient correlation to facilitate effective BPV weighted hedging. [5]

Consider the position of a fixed rate receiver on a hypothetical 5-year, 0.95% coupon, €50 million notional IRS exposure, which calls for a semi-annual floating rate payment referencing 6-month EURIBOR rates. The BPV of this exposure equals €47.71 per €100,000 face value or €23,854.96 per €50 million in face value.

[5] Fixed income instruments, including IRSs, often represent multiple points along the yield curve in terms of maturity or reset dates. Use of the BPV hedge ratio implies a presumption that yields might move in parallel or equally along the curve. While this presumption may adequately serve many hedgers, a fixed-income trader might harbor beliefs about the prospects for future steepening or flattening of the yield curve that influence her hedging strategy.

A hedge ratio (HR) of 485 contracts may be calculated by comparing the BPVs of the hedged instrument to that of the EUR DSF. Our analysis suggests the sale of 485 5-year 1% coupon EUR DSF contracts. [6]

$$HR = €23{,}854.96 \div €49.16 = 485.2 \; or \; SELL \; 485 \; contracts$$

EUR DSFs as Proxy for IRS Portfolio

EUR DSF contracts may serve as efficient proxies for portfolios of IRS, with several potentially significant benefits.

- *Effective Auto-Netting* – Swap market participants often carry a portfolio of multiple IRS positions with many counterparties on its books. Although netting agreements may be utilized to consolidate cash flows between counterparties., this normally requires separate agreements with each individual counterparty to effect such netting.

  EUR DSF futures introduce operational convenience insofar as they are centrally cleared through the CME Clearing House. Thus, netting is fully automated through normal futures back-office accounting processes.

- *Minimize Line Items* – Firms carrying a large portfolio of IRS positions with diverse terms and with multiple counterparties must maintain a correspondingly long list of individual accounting line items. EUR DSF contracts effectively consolidate those line items into a concise position that may readily be maintained, minimizing the burdens borne by back-office accounting and risk management staff.

- *Reduced Transaction Costs* – OTC IRS exposures typically benefit from competitive pricing at entry. When one seeks to close out seasoned IRS exposures, however, one may find that competitive pressures and fineness of pricing have faded.

  In this sense, EUR DSF contracts may enable users to economize on transaction costs while simultaneously facilitating ease of position entry and exit. They are competitively and transparently executed through the CME Globex® electronic trading platform, via open outcry or through block trades.

- *Capital Efficiencies* – The Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) of 2010 requires US holders of standardized swaps to clear their swap exposures through centralized counterparties (CCPs), ie, clearing houses.

  Dodd-Frank establishes standards that CCPs must uphold in margining such swap exposures. Thus, certain cleared swaps are subject to margins adequate to cover a five-day close-to-close price movement.[7] Futures contacts remain subject to margin coverage adequate for at least a one-day close-to-close price movement. In this light, EUR DSFs offer potential capital efficiencies relative to IRS exposures that are otherwise economically equivalent.

To Learn More

To learn more about the Exchange's suite of Deliverable Swap Futures (DSFs), please visit our website at www.cmegroup.com/dsf.

[6] The terms of the EUR DSF contract's deliverable-grade IRS may deviate in a number of ways from the IRS exposure you want to hedge. In this example, we varied the fixed rates. Other differences may arise in respect of terms of fixed or floating payment dates, day count conventions, or floating rate reference. It is reasonable to anticipate that the futures hedge may become less effective as such deviations in terms accumulate. One should investigate the effects of such deviations in advance of a hedge placement. Further, one should monitor hedge effectiveness and, if necessary, adjust the hedge ratio (HR) in response to fluctuating market conditions and relationships.

[7] For swap exposures not subject to compulsory centralized counterparty (CCP) clearing, Dodd-Frank stipulates that bilateral margins must be adequate, at minimum, to cover a 10-day close-to-close price movement.

Euro DSF Specifications

Trading Unit	€100,000 notional face value Interest Rate Swap (IRS), cleared by CME Clearing House, with tenors of 2-, 5- or 10-years, exchanging annual fixed interest payments at a rate per annum equal to Contract Fixed Rate for semi-annual floating interest rate payments based on the 6-month Euro interbank offered rate.	
Delivery Months	March, June, September or December	
Contract Fixed Rate	Established by Exchange at integer multiples of 25 basis points with 30/360 or Actual/360 day count fraction	
Quote Convention	Prices quoted in price points: 100 points + non-par value (NPV) of Deliverable-Grade IRS where NPV is present value of IRS fixed-rate payments minus present value of IRS floating-rate payments as of Delivery Day	
Minimum Price Increment	*2-Year*	0.005 points (€5 per contract)
	5-Year & 10-Year	0.01 points (€10 per contract)
Termination of Trade	Trading in expiring futures terminates at 5:15 pm (CET) (generally 10:15 am CT) on 2nd TARGET business day before 3rd Wednesday of Delivery Month	
Delivery Day	3rd Wednesday of Delivery Month	
Deliverable-Grade IRS	*Reference Conventions*	Fixed Rate Payer is "short" and "makes" delivery Floating Rate Payer is "long" and "takes" delivery
	Reference Tenors	2-, 5- and 10-Year IRS Instruments
	Notional Amount	€100,000 (EUR) per futures contract
	IRS Effective Date	3rd Wednesday of Delivery Month
	Termination Date	3rd Wednesday of month of Reference Tenor anniversary of IRS Effective Date *or* Reference Tenor anniversary of IRS Effective Date
	Fixed Pay Dates	Annually from IRS Effective Date
	Fixed Rate	Contract Fixed Rate
	Fixed Rate Day Count	30/360
	Floating Pay Dates	Semi-Annually from IRS Effective Date
	Floating Rate Day Count	Actual/360
	Floating Rate Reference	6-month EUR-EURIBOR-Reuters rate with no spread or compounding
Delivery Method	Physical delivery of IRS per Delivery Standard with Clearing Acceptance Date and Clearing Effective Date = 1st Business Day preceding 3rd Wednesday of Delivery Month Delivery Invoice Price = IRS Initial Payment Amount, per Final Settlement Price (P) If 100 < P, then IRS Floating Rate Payer pays, and IRS Fixed Rate Payer receives, €1,000 x (P – 100) per contract, rounded to nearest €0.01 If P ≤ 100, then IRS Fixed Rate Payer pays, and IRS Floating Rate Payer receives, €1,000 x (100 – P) per contract, rounded to nearest €0.01	
Delivery Eligibility	Limited to Eligible Contract Participants (per17 CFR 1.3(m) and CME Rule 90005.C.) and must be registered with CME by CME IRS Clearing Member as IRS Participant (CME Rules 90005.A. and 90005.B.)	
Position Accountability	5,000+ contracts	
Reportable Positions	1+ contracts	
Block Trade Thresholds		Minimum Block Trade Size (Cnts)
	2-Year	1,500
	5-Year	750
	10-Year	500
	Block trades must be reported to Exchange by seller with 15 minutes of transaction	
Trading Hours and Venue	*CME Globex*	5:00 pm to 4:00 pm (CT), Sun-Fri
	Open Outcry	7:20 am to 2 pm (CT), Mon-Fri

Euro Interest Rate Swap futures shall trade on, and according to the rules of, the Chicago Board of Trade (CBOT) pending completion of all US Commodity Futures Trading Commission regulatory review periods

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