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## Introduction

Since their introduction in the 1990s, Overnight Indexed Swaps have become a widely-used, highly credit-efficient and liquid derivative in all major currencies. They are used to hedge against, or speculate on, moves in overnight interest rates (both 'micro' moves — daily volatility — and, more importantly, 'macro' moves driven by central banks, who influence overnight rates directly.)

## Description

An Overnight Indexed Swap (OIS) is a fixed/floating interest rate swap with the floating leg tied to a published index of a daily overnight rate reference. The term ranges from one week to two years (sometimes more). The two parties agree to exchange at maturity, on the agreed notional amount, the difference between interest accrued at the agreed fixed rate and interest accrued through geometric averaging of the floating index rate.

This means that the floating rate calculation replicates the accrual on an amount rolled "P plus I" at the index rate every business day over the term of the swap. If cash can be borrowed by the swap receiver on the same maturity as the swap and at the same rate and lent back every day in the market at the index rate, the cash pay-off at maturity will exactly match the swap payout: the OIS acts as a perfect hedge for a cash instrument. Since indices are generally constructed on the basis of the average of actual transactions, the index is generally achievable by borrowers and lenders. Economically, receiving the fixed rate in an OIS is like lending cash. Paying the fixed rate in an OIS is like borrowing cash.

Settlement occurs net on the earliest practical date. There is no exchange of principal.

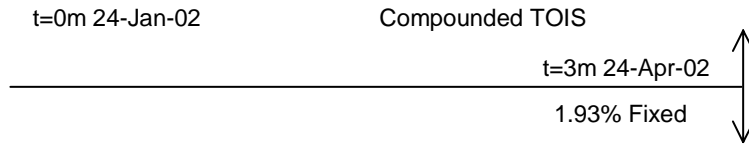
The index rate used is, where it exists, the weighted average rate for overnight transactions as published by the central bank (eg Fed Funds Effective). Where not, banking associations and brokers have arranged equivalent calculations in most major markets (see Appendix). Quoting conventions follow local money-market conventions despite settlement always being against compounded overnight rates (eg a euro OIS will be quoted out of 2-day value and will ignore the EONIA rate for the trade date, T, and T+1. In sterling, quoted out of 'Today', trade date's SONIA rate will be included, which can be critical, for example on a 'loose' Friday.) Indices follow market liquidity, eg they are T/N rates in T/N funding markets such as CHF.

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Sean W. Shepley	London	+44 20 7888 1333	sean.shepley@csfb.com
Neil S. Cooper	London	+44 20 7888 6687	neil.cooper@csfb.com
Jeanine K. Isaac	London	+44 20 7883 8481	jeanine.isaac@csfb.com
Alan P. James	London	+44 20 7888 1314	alan.james@csfb.com
William D. Porter	London	+44 20 7888 1207	william.porter@csfb.com
Julian S. Stewart	London	+44 20 7888 3857	julian.stewart@csfb.com

**Mechanics of OIS — Example:**

**Diagram: Theoretical 3M CHF OIS out of 24<sup>th</sup> January, at 1.93%**



**Table: Cash flows to fixed rate receiver**

Dates	Floating leg	Fixed leg	Net Payment
24-Jan-02	0	0	0
24-Apr-02	$-N \times R_{float} \% \times 94/360$	$-N \times 3.60 \% \times 94/360$	$-N \times (3.60 \% - R_{float} \% ) \times 94/360$

Source: CSFB

In the above example, N is the notional of the swap, and  $R_{float}$  is the compounded TOIS rate for the relevant value dates. The fixed rate receiver will make a net payment to its counterparty if  $R_{float}$  is above 1.93%, and will receive a net payment if  $R_{float}$  is below. There is no exchange of principal. Settlement is made on the end date.

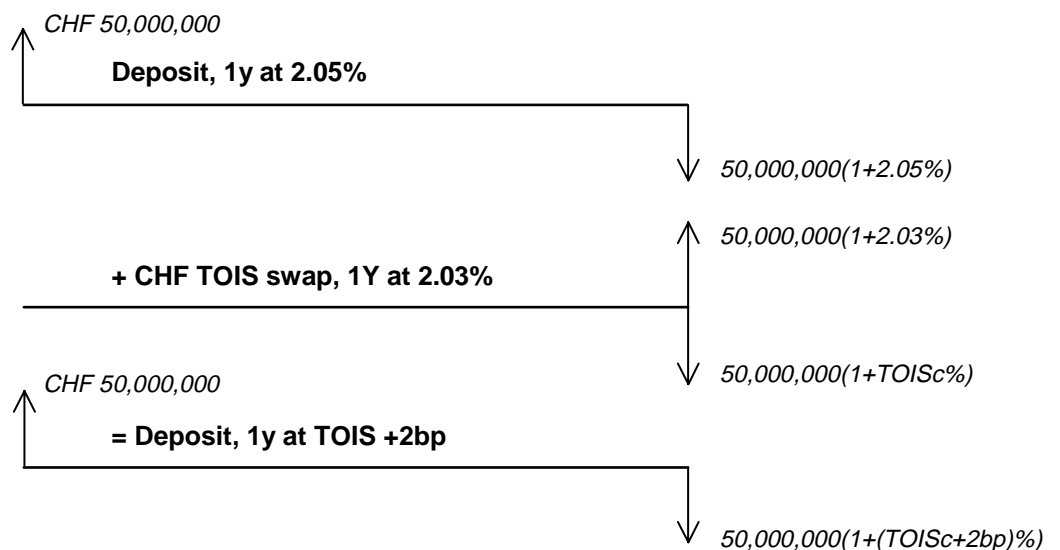
**Using OIS: General — Interest Rate Risk Management**

OIS allow the interest rate risk profile of a portfolio to be changed as if by the addition of a cash asset or borrowing but with no use of cash and with minimal use of credit. These features allow much better risk management and separate funding maturity from interest rate duration.

**Bank Liquidity Management**

OIS allow banks to manage their liquidity requirements more effectively. Term deposits may be raised at effectively floating overnight rates, improving liquidity ratios but without locking in the term interest rate. This involves paying the fixed rate on the term funds, then, through an OIS, receiving back the fixed rate and paying the overnight floating rate. For instance, a bank receiving a CHF 50 million 1-yr deposit might wish to keep the liquidity but not the 1-yr term and rate (often the case when the curve is steeply positive. A 1-yr TOIS swap would solve this. With a 1-yr deposit rate of 2.05%, and a 1-yr OIS rate of 2.03%, the net for the bank would be a one year liability at TOIS plus 2bp as shown in Chart 1 overleaf).

**Diagram: OIS used to manage a deposit (Cash inflows upwards). TOISc = compounded TOIS rate. 360 day-count convention omitted for clarity**



Source: CSFB

Note what has happened here: the bank has locked in funding but pays overnight rates. There is value to this, rather than having to refund every night. OIS rates therefore tend to trade below cash, with the basis widening in times of stress.

The bank could have achieved the same interest rate profile by redepositing the CHF 50 million, borrowing it in the market every night. This would involve a 1-yr credit risk on the counterparty for the full nominal plus interest amounts. Credit exposure on the overnight indexed swap is a fraction of one percent (See credit section below). Redeposit is a much less flexible hedge: bid offer spreads in deposit markets are often 12.5bp or more against 3bp or less in the swaps. Moreover, by using a redeposit, the bank would have foregone the liquidity itself and would be refunding itself overnight, adversely affecting its liquidity ratios.

**Managing Repo**

OIS can dramatically simplify risk management in a Repo book, contributing to liquidity and solvency in the market. Collateral can be changed overnight, but a fixed interest rate maintained. Or, a term repo can be indexed to overnight rates.

**Asset and Liability Management**

Using OIS, corporations can raise term funds (bills, CP etc) but pay overnight interest rates. This is widely utilised by corporate Treasury Centres, many of whom fund their subsidiaries at overnight rates.

**Positioning**

OIS are an excellent positioning tool for putting on carry trades or expressing a directional view. Since the floating leg exactly follows overnight rates, rate cuts or hikes can be directly exploited, with none of the expectations element at settlement involved in trading FRAs or futures.

**Managing fixings**

The risk of a swap book changes, sometimes dramatically, as fixings occur. Many players elect to replace imminent fixings with OIS, distributing the risk changes.

**Managing swap-spread risk**

A swap spread is sometimes seen as being the difference between the swap rate and the lifetime repo of the government security (neglecting specialness, or on an open basis). If the OIS index rate is a good proxy for GC, as it generally is, then the spread between the 2yr swaps and 2yr OIS is closely related to the 2yr swap spread. The latter can then be managed on a pure derivative basis, conserving balance sheet.

**Credit exposure**

Because OIS counterparties' exposure to each other is only for the amount of any P/L, credit exposures are minimal, much less than in a cash transaction and lower than in a LIBOR swap.

**Liquidity**

OIS usually trade on spreads of 1.5 – 5bp, depending on the currency, and spreads are usually broadly comparable with FRAs. OIS can be traded for forward and broken dates.

**Appendix: Indices and settlement conventions in the major OIS currencies.**

**CSFB Reuters pages for levels: CSISO01**

**USD:** The Fed Funds Effective Rate is calculated by the New York Fed based on broker-reported overnight Fed Funds transactions and is published daily on Reuters page FEDM (Telerate 118) at around 10am New York time the following day. The reserve-period average of the Fed Funds Effective rate is the Fed's policy objective. Start date is T+2 and Settlement is made two days after maturity. See Reuters **CSUSD01**.

**EUR:** EONIA (Euro Overnight Index Average) is calculated by the ECB and published by the European Banking Federation on Reuters page EONIA (Telerate 247) by around 7pm CET the day of value. The basic data is contributed to the ECB by the banks of the Euribor fixing panel, based on all overnight interbank assets created before the close of RTGS systems at 6pm CET. Start date is T+2 and Settlement is made the day after maturity. See **CSEUR01**

**GBP:** SONIA is calculated by the BBA and published by the WMBA on Reuters page SONIA (Telerate 3937) at 9am on the following day. SONIA is not the BoE's policy rate, but tends to follow it. Start date is T and settlement is made on the day of maturity. (Note that the last calculation rate needed is that for the day before maturity and is available at 9am the day of maturity, enabling same-day settlement.) a/365. See Reuters **CSGBP01**.

**CHF:** The 'TOIS' rate, a T/N interbank fixing, is published on Reuters TN/SWAP (Telerate 3450). Start date is T+2. Settlement is made on final maturity date. a/365. See Reuters **CSCHF01**.

**JPY:** The Mutan (uncollateralised) overnight average call rate is published by the Bank of Japan and is available, along with other details, on Reuters page TONAR. The index rate is the BoJ's policy rate. Settlement is made 2 days after maturity. a/365. See Reuters **CSJPY01**.

**CAD:** The Canadian Overnight Repo Rate Average ('CORRA') is the BoC's policy rate. The BoC publishes it on Reuters BOCWATCS. Start date is T+1 and settlement is made one day after maturity. See Reuters **CSCAD01**.

**AUD:** The RBA publishes the Interbank Overnight Cash Rate on RBA30. Start date is T+1 and settlement is made one day after maturity. a/365. See Reuters **CSAUD01**.

**NZD:** The RBNZ publishes the Interbank Overnight Cash Average. See RBNZINDEX. Start date is T+2 and settlement is made one day after maturity. a/365. See Reuters **CSNZD01**.

**DKK:** known as 'T/N DKK swaps'. The T/N average is published by the Nationalbank on DKNA14. Settlement is made on final maturity date.

**SEK:** Less active. 'STINA' is based on an interbank T/N fixing published on Reuters SIOR. Settlement is made on final maturity date.

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