Tool: MTM Interest Rate Swap

See the previous W5 version guide.

PURPOSE

To explain how Interest Rate Swap are revalued in the CS Lucas system.

WHY IS THIS IMPORTANT?

The gains and losses incurred arising from interest rate swap transaction has implications for financial risk management and the accounting instrument.

PREREQUISITE

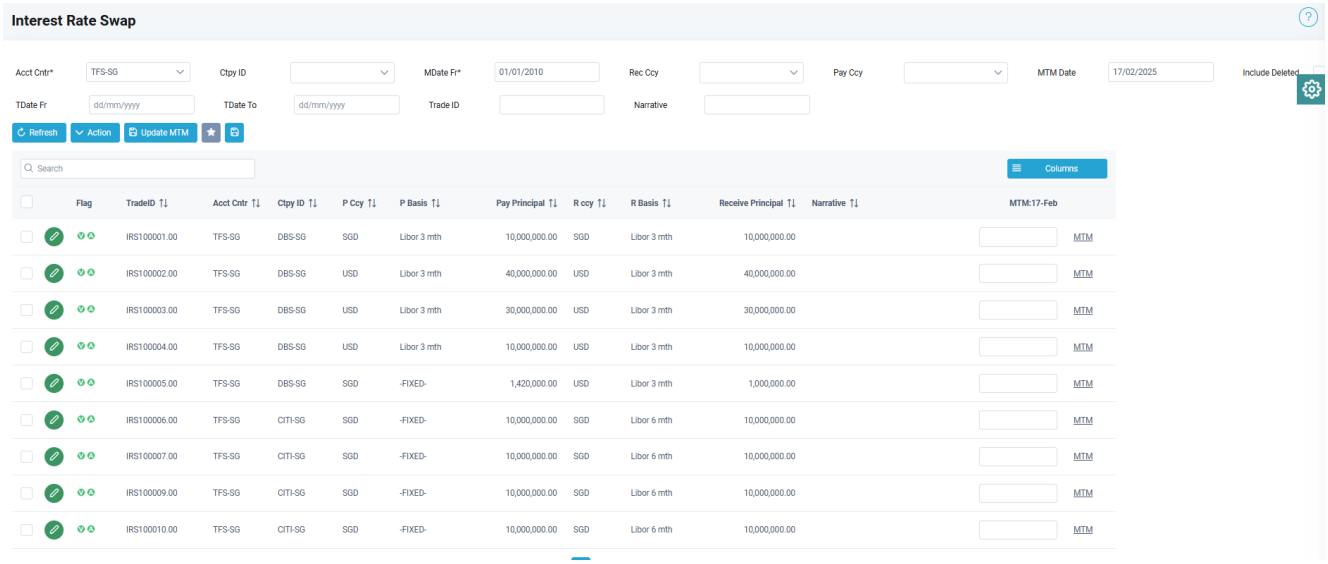
1. The appropriate rate structure has been set up in the system at the date for the revaluation.

2. The exchange change has been set up in the system at the date for the valuation.

PROCEDURE

1. Navigate to the IRS module and filter the trade to revalue. (Transaction > Interest Rate Swap)

2. Click on the hyperlink MTM against the trade.



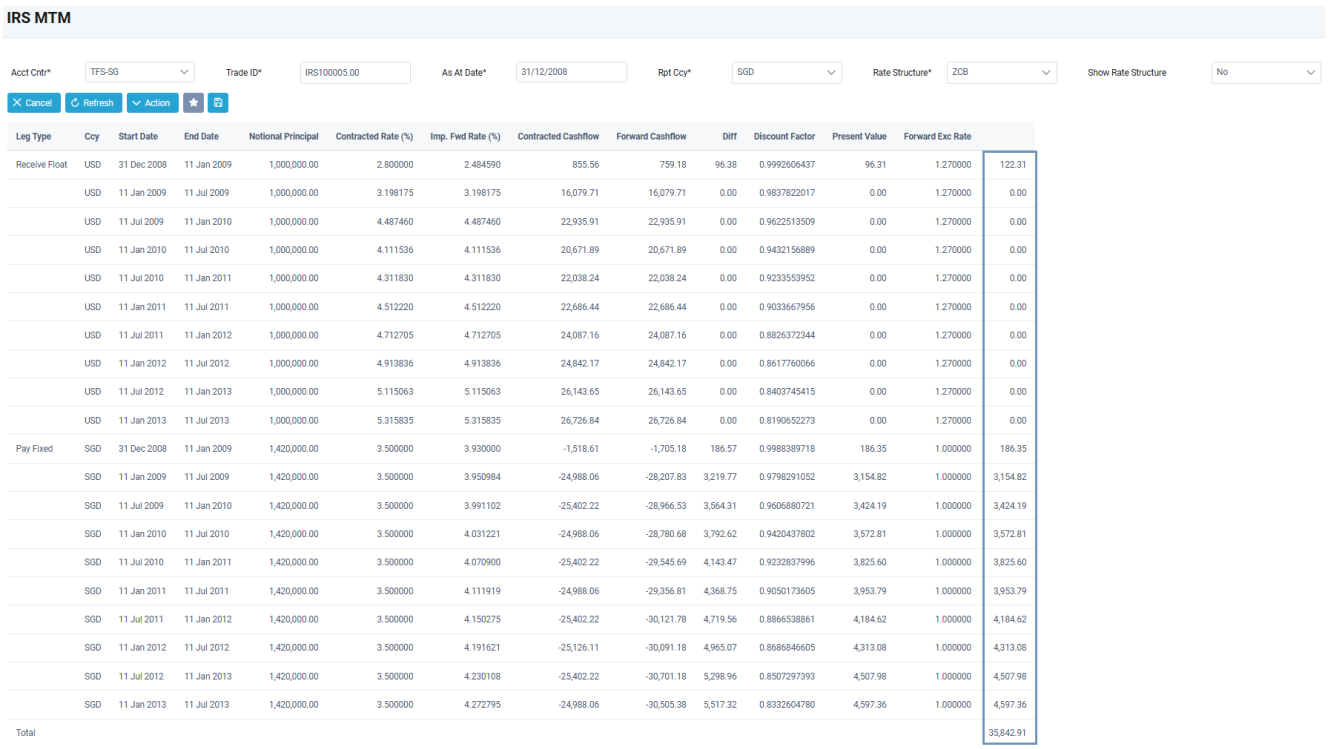
3. The system brings you to the tool for MTM IRS.

4. If you do not have access rights to the IRS module to select the trades in the steps above, you may launch the tool directly. Tools > MTM IRS. Then select the accounting centre and enter the TradeID of the relevant trade.

5. Select the As At Date for the MTM and the reporting currency you wish to use to revalue this position.

6. Select the Rate Structure that you want to use to revalue.

7. Click Refresh.



8. The system displays the MTM of the outstanding individual legs of the IRS and a total in the reporting currency.

ANALYSIS OF THE COMPUTATION

(In the illustration below, numbers may have been rounded for display purposes.)

Consider the following scenario.

As At Date: 31-Dec-2008

IRS Structure

	Start Date	End Date	Leg Type	CCY	Notional Principal	Contracted	
Pay Fixed Leg	31-Dec-08	11-Jan-09	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jan-09	11-Jul-09	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jul-09	11-Jan-10	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jan-10	11-Jul-10	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jul-10	11-Jan-11	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jan-11	11-Jul-11	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jul-11	11-Jan-12	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jan-12	11-Jul-12	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jul-12	11-Jan-13	Pay Fixed	USD	1,000,000.00	2.800000%	
	11-Jan-13	11-Jul-13	Pay Fixed	USD	1,000,000.00	2.800000%	
Received Float Leg	31-Dec-08	11-Jan-09	Received Float	SGD	1,420,000.00	3.500000%	Float reset pending
	11-Jan-09	11-Jul-09	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jul-09	11-Jan-10	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jan-10	11-Jul-10	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jul-10	11-Jan-11	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jan-11	11-Jul-11	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jul-11	11-Jan-12	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jan-12	11-Jul-12	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jul-12	11-Jan-13	Received Float	SGD	1,420,000.00	3.500000%	
	11-Jan-13	11-Jul-13	Received Float	SGD	1,420,000.00	3.500000%	

Rate Structure (USD)

Date	Tenor	Rate
1-Jul-09	182	3.120000%
31-Dec-10	365	3.800000%
31-Dec-11	730	4.000000%

Rate Structure (SGD)

Date	Tenor	Rate
11-Jan-09	11	3.930000%
13-Jul-09	194	3.950000%
11-Jan-10	376	3.970000%
12-Jul-10	558	3.990000%
11-Jan-11	741	4.010000%
11-Jul-11	922	4.030000%
11-Jan-12	1,106	4.050000%
11-Jul-12	1,288	4.070000%
11-Jan-13	1,472	4.090000%
11-Jul-13	1,653	4.110000%

I. Computation of the implied forward interest rate.

The forward rate is the future yield that can be implied from the prevailing zero coupon curve. The formula is given as:

$$r_{t1,t2} = \left(\frac{(1 + r_2)^{d_2}}{(1 + r_1)^{d_1}}\right)^{\frac{1}{d_2 - d_1}} - 1$$

$r_{t1,t2}$ is the forward rate between term t_1 and term t_2,

d_1 is the time length between time 0 and term t_1 (in years)

d_2 is the time length between time 0 and term t_2 (in years)

r_1 is the zero-coupon yield for the time period $(0, t_1)$

r_2 is the zero-coupon yield for the time period $(0, t_2)$

See also

Illustration of computing zero coupon rates from known implied rates and vice versa using the above formula.

Example 1

To compute the forward rate on SGD between 11 Jul 11 and 11 Jan 12.

	Ref	d1	d2
End Date		11-Jul-11	11-Jan-12
Zero Coupon Rate	r	4.030000%	4.050000%
Tenor (Days)		922	1,106
Tenor (Yrs)	d = Days/365	2.526027	3.030137

Working Breakdown

$\frac{1}{d_2 - d_1}$	1.983695652	
$(1 + r_i)^{d_i}$	1.10495118	1.12783581
$\left(\frac{(1 + r_2)^{d_2}}{(1 + r_1)^{d_1}}\right)^{\frac{1}{d_2 - d_1}} - 1$	4.150275%	

Example 2

In general, the dates of the zero coupon rate curve do not coincide with the periodic cash flow date of the interest rate swap.

For example, the fixed leg, on the USD leg.

		Available
End Date	Tenor	ZCR
1-Jul-09	182	3.120000
31-Dec-09	365	3.800000

Interpolation for 11 July 09

11-Jul-09	192	3.157158	$\left(\frac{3.80 - 3.12}{365 - 182} \times (192 - 182)\right) + 3.12$

The rate of 3.157158% is then used as in Example 1 to compute the forward rate between 11 Jan 09 and 11 Jul 09.

	Ref	d1	d2
End Date		11-Jan-09	11-Jul-09
Zero Coupon Rate	r	2.484590%	3.157158%
Tenor (Days)		11	192
Tenor (Yrs)	d = Days/365	0.030137	0.526027

Working Breakdown

$\frac{1}{d_2 - d_1}$	2.016574586	
$(1 + r_i)^{d_i}$	1.00073990	1.01648515
$\left(\frac{(1 + r_2)^{d_2}}{(1 + r_1)^{d_1}}\right)^{\frac{1}{d_2 - d_1}} - 1$	3.198175%	

II. Compute the present value of all cash flow differences between contracted and implied rate.

All the fixed leg cash flow will be revalued between the contracted rate and the implied forward rate.

In the case of the floating legs, the appropriate reset rates in the future would be best represented by the implied forward rate. The exception will be the current float leg, where the interest rate has been determined. This leg is, in fact, fixed.

	Start Date	End Date	CCY	Notional Principal	Contracted	Implied Rate	Period Tenor	Cash Flow Contracted	Revalued	Diff	ZCR	Tenor	DF	PV
Pay Fixed Leg	31-Dec-08	11-Jan-09	USD	1,000,000.00	2.800000%									
	11-Jan-09	11-Jul-09	USD	1,000,000.00	2.800000%	3.198175%	181	14,077.78	16,079.71	2,001.93	3.157158	192	0.9837822	1,969.46
	11-Jul-09	11-Jan-10	USD	1,000,000.00	2.800000%		Note A	Note B	Note C	Note D	Note E	Note F	Note G	Note H
	11-Jan-10	11-Jul-10	USD	1,000,000.00	2.800000%									
	11-Jul-10	11-Jan-11	USD	1,000,000.00	2.800000%									
	11-Jan-11	11-Jul-11	USD	1,000,000.00	2.800000%									
	11-Jul-11	11-Jan-12	USD	1,000,000.00	2.800000%									
	11-Jan-12	11-Jul-12	USD	1,000,000.00	2.800000%									
	11-Jul-12	11-Jan-13	USD	1,000,000.00	2.800000%									
	11-Jan-13	11-Jul-13	USD	1,000,000.00	2.800000%									

Ref	Column	Remarks
A	Period Tenor	11-Jan-09 to 11-Jul-09 = 181 days
B	Cash Flow Contracted	Notional Principal (1m) * Contract Rate (2.8%) * A / 360 This amount is rounded to 2 dp. The day count of 360 follows the currency (USD) For the purpose of revaluation, the pay leg will be signed positive and received leg would be signed negative.
C	Cash Flow Revalued	Same as B but using 3.198175% instead of 2.800000%
D	Difference	C – B
E	Zero Coupon Rate	Based on Zero coupon rate curve. Interpolated if necessary.
F	Tenor	This is the number of days from the As At date to the End Date 31-Dec-2008 to 11-Jul-09 = 192
G	Discount Factor (DF)	$\frac{1}{(1+ZCR)^{\frac{Tenor}{365}}} = \frac{1}{(1+3.157158\%)^{\frac{192}{365}}} = 0.9837822$
H	Present Value	D * G Rounded to 2 dp.

III. Translating to reporting currency

To translate the present value of currency amount to the reporting currency, the system will compute the forward rates using the End Date of each periodic item.

FREQUENTLY ASKED QUESTIONS

FAQ01. What happens when there is no zero coupon rate curve at the As At Date of the valuation?

The system will look up the latest available curve before the As At Date and use that curve for revaluation.

RELATED INFORMATION

Illustration of computing zero coupon rates from known implied rates and vice versa

CHANGE HISTORY

Date	By	Changes
15-Feb-2016	CS	Created
14-Jun-2016	Douglas	Proofread.
25-Nov-2019	Lyra	Updated Screenshots.
17-Feb-2025	Lyra	Updated to W6 instructions and screenshots.