Nasdaq Calypso

Reset Risk

Version 18

Revision 2.0

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Approved

Document History

Revision	Published	Summary of Changes
1.0	February 2024	First revision for version 18.
2.0	April 2024	Updates for version 18 monthly release.

The Reset Risk analysis calculates the total notional value of a portfolio's at-risk trades on the reset dates of those trades. For interest rates and commodities, it calculates the risk effect of one basis point shift in the rate index at reset date associated with that notional. Support for FX resets on interest rates has also been added.

For FX and Equities, it calculates the change in portfolio Delta across the fixing.

The analysis can be run using the Presentation Server and can therefore be viewed in the Calypso Workstation.

1. Reset Risk

Supported Products

Supported products for interest rates and commodities include the following:

- Swap
- Non Deliverable Swap
- Forward Start Notional Swap
- MTM Swap
- Compounding Swap
- SwapCrossCurrency
- Cancellable Swap
- CapFloor
- Swaption (European only)
- FutureMM
- StructuredFlows
- CommoditySwap
- CommodityOTCOption

ⓘ   [NOTE: You can use this analysis for a Commodity Run Off Report on commodity resets to view how the commodity Delta changes on a specific date or date range due to resets being fixed.]

Supported products for FX include:

- FX NDF and FX NDF Swaps
- FXForwardStart
- Forward Start FX Option
- FX NDO
- FX Accruals
- FX Futures
- Average Rate and Average Strike FX Options

Supported products for Equity include:

- Equity Structured Option (pricer: Black1AnalyticVanilla)

- Equity Swap (pricers: Equity Linked Swap, Equity Linked SwapAccrual)
- ScriptableOTCProduct (pricers: BlackNFMonteCarloExotic, LocalVolatilityNFMonteCarloExotic)
- BondExoticNote (pricers: BlackNFMonteCarloExotic, LocalVolNFMonteCarloExotic)
- Equity Forward

Supported products for LIBOR Fallback Cashflows include:

- Equity Forward
- SwapCrossCurrency
- SwapNonDeliverable
- SwapCancellable

For above products, trades which have IndexCalculator is set to FallbackISDA.
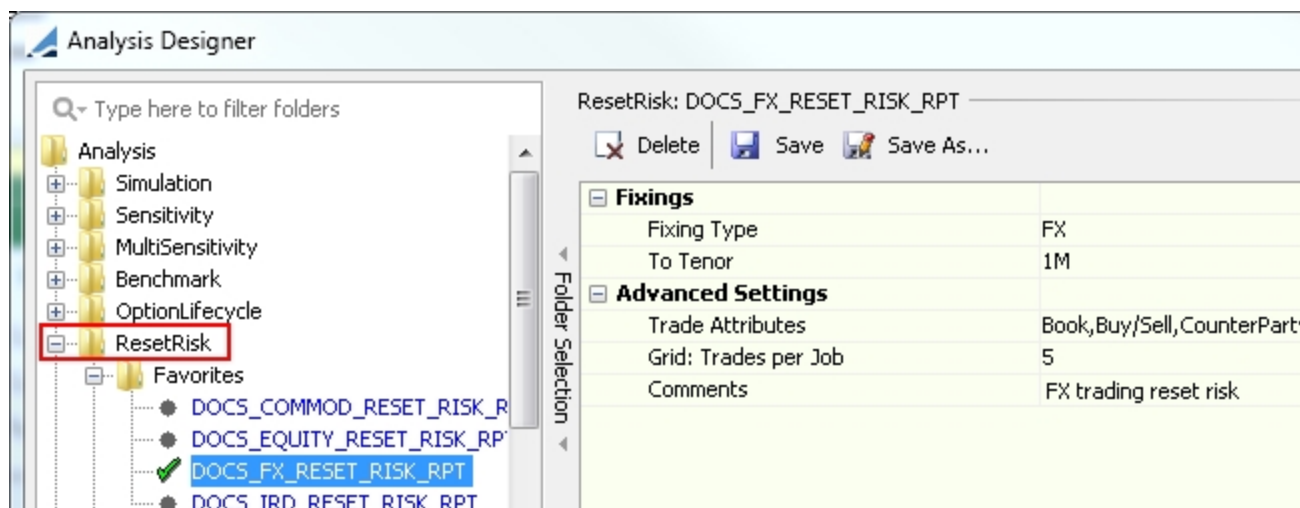
Trades includes:

- With and without Stubs
- Standard or Compounding
- Resetting in advance in the original IBOR trades.

1.1 Reset Risk Parameters

Reset Risk Parameters are defined in the Analysis Designer window. You can open the Analysis Designer from Calypso Navigator by pointing to **Configuration > Reporting & Risk > Analysis Designer**.
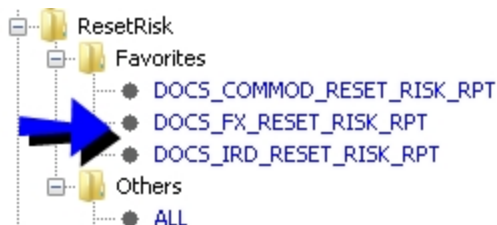
When configuring report output for Reset Risk, you can also open the Analysis Designer in the following two ways:

- From the Calculation Server Setup window: In Calypso Navigator, point to **Configuration > Reporting & Risk > Calculation Server**. Select "ResetRisk" for Type, then click ... next to the Params field.
- From the Risk Config window: In Calypso Navigator, point to **Position & Risk >Risk Config**, select "ResetRisk" for the Analysis Type, then click ... next to the Analysis Param Set field.

Sample Analysis Designer parameters

» Open either a Favorites or Others subfolder under ResetRisk in the Folder Selection pane and select an analysis configuration.

▶ For details on adding analysis configurations, see "Analysis Designer Overview" in the Calypso *Risk Reports* documentation.
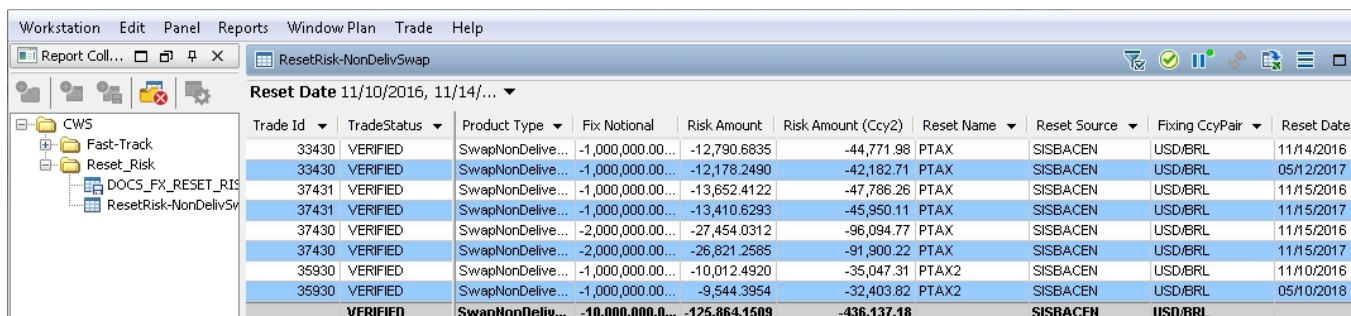
» Make settings for parameters:

– **Fixing Type** - Select FX, IR, Commodity, EQUITY, or All

– **To Tenor** - The selected tenor includes fixings with reset risk that come before or are equal to the tenor's interval of time in the future.

ⓘ   [NOTE: Since this parameter setting determines how far into the future market data is rolled to measure reset risk, keep in mind that the chances of the tenor having an impact on system performance may increase with the length of the tenor and, therefore, the number of fixings it captures.]

– **Trade Attributes** - Allows you to limit the fixings by trade attributes.

– **Grid: Trades per Job** - Determines the number of trades in a job. Used only with a calculation grid.

» Click Save to save your changes. You will be prompted to enter a Parameters Set name.

1.2 Reset Risk Results

Reset Risk results are displayed in the Calypso Workstation.

Example Reset Risk report in Calypso Workstation

Risk analysis can be run using the following methods:

- On Demand Analysis using either preset reports or ad hoc configurations.

- The end-of-day scheduled task RISK_ANALYSIS to save results to the database and/or to a file - Saved results can be viewed in the Calypso Workstation using Risk Config in conjunction with the risk servers.

- In real-time using the risk servers - "Live" results are displayed in the Calypso Workstation.

▶ Refer to *Calypso Workstation* documentation for details.

The various columns in the report will occasionally serve different purposes for different products. When viewing results, keep the following definitions in mind.
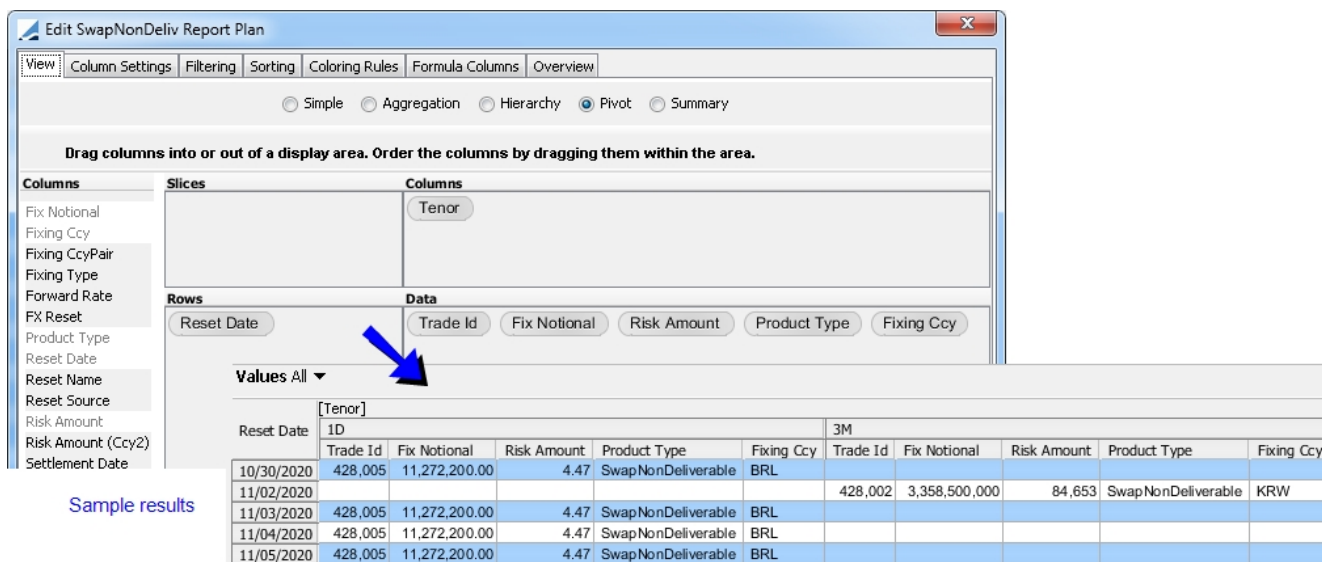
- **Fix Notional** - This is the current notional of the trade fixed on a specific day and shouldn't be mistaken with the original notional. The fix notional is used to accommodate such trades as amortizing swaps and notional adjusting cross currency swaps.

- **Fix Risk** - This is the risk of a trade fixed on a specific day, whose meaning differs depending on the asset class. For rates products, this is the DV01 of the fixing. For FX and equity products, this is the change in Delta across the fixing.

- **Risk Amount** - For Interest Rate and Commodity fixings, this is the dollar per basis point value of the fixing. For FX and Equity trades, this is calculated as the difference between the trade's Delta without the fixing and the trade's Delta with the fixing in place and based on the current spot rate. When the fixing is already available in the quote table, the risk on the fixing is zero.

- **Risk Amount (Ccy2)** - For FX fixings, this is the risk amount converted from the risk currency into Ccy2 at the trade's strike.

- **Underlying** - Information in the Underlying column varies depending on the fixing type. The elements and format that define the underlying for the four fixing types are as follows:

Fixing Type	Format	Example
FX	Fixing Ccy Pair / Reset Name / Reset Source	USD/BRL/PTAX/SISBACEN
IR	Fixing Ccy / Reset Source / Tenor	EUR/EURIBOR/1M

Fixing Type	Format	Example
Commodity	Fixing Ccy / Reset Source	USD/CBOT.CBOT Soybeans S.2:NOV19
EQUITY	Fixing Ccy / Reset Name	USD/EquityReset.AMZN.NASDAQ

1.2.1 Interest Rate Products

Results can be bucketed by a number of different properties, such as reset date, reset source, tenor, and fixing currency.

Sample results

Notional at Risk = Notional * (Days in Fwd Period / Basis) * 0.0001

Where:

- Days in Fwd Period = Fwd End - Fwd Begin
- Basis = basis set on index (360 or 365).
- Notional = total notional at risk
- 0.0001 = 1 basis point

For Compounding trades, the formula uses the days in the compounding period:

Notional at Risk = Notional * ((Cmp end - Cmp begin) / Basis) * 0.0001

ⓘ [NOTE: The Notional at Risk is 0 for a Cap Floor which is out-of-the-money. A Cap Floor is out-of-the-money if fwd rate <= strike for Cap and fwd rate >= strike for Floor.]

ⓘ   [NOTE: All Compounding Swaps should use the compounding notional for reset risk rather than actual notional.]

For a trade with a stub period, the notional at risk is interpolated between the two indexes specified in the trade. In this example, the stub period is interpolated between Libor 1M and Libor 2M.

Values All ▼

Reset Date	[Tenor, Reset Source, Reset Name]								
	1M			2M			3M		
	LIBOR			LIBOR			LIBOR		
	Fix Notional	Risk Amount	Fixing Ccy	Fix Notional	Risk Amount	Fixing Ccy	Fix Notional	Risk Amount	Fixing Ccy
08/16/2018	0.00	0.00	USD	5,000,000.00	129.17	USD			
11/19/2018							5,000,000.00	127.78	USD
02/19/2019							5,000,000.00	123.61	USD
05/17/2019							5,000,000.00	127.78	USD
08/19/2019							5,000,000.00	127.78	USD
11/19/2019							5,000,000.00	127.78	USD
02/19/2020							5,000,000.00	125.00	USD
05/19/2020							5,000,000.00	127.78	USD

Swap Non Deliverable

Non Deliverable Cross Currency Interest Rate Swaps display interest rate reset risk as well as FX reset risk in the report. Additionally, on the final fixing date of the trade, Non Deliverable Swaps should display the details and risk associated with any FX resets.

The IR fixing risk measure for Non Deliverable Swap displays interest rate reset risk.

The FX fixing risk measure for Non Deliverable Swap trades appears up to the fixing date of the cashflows of the trade, and the amount should be equal to the discounted value of the cashflow.

> Risk Amt= Interest Amt * Pmt Dt df

> RiskAmt2= Risk Amt1 * FX Spot

RiskAm1 and RiskAmt2 will be driven by the setup in the currency pair definition.

Forward Start Swap

Forward Start FX trades have fixing risk on the rate-setting date (the date on which the adjusted notional gets fixed). The risk amount displayed is the risk effect of one basis point shift in the forecast FX rate associated with that notional. Once the Rate Reset process is applied, there will be no more FX Reset Risk.

> Risk Amt1= (PV – PV +1bp) * Ccy Pair Point Factor

RiskAmt2= Risk Amt1 * FX Spot

PV and PV + 1bp should be computed using the forecast FX rate.
RiskAm1 and RiskAmt2 will be driven by the setup in the currency pair definition.

MTM Swap

MTM Swap trades have FX fixing risk on the date of the fixing of the principal adjustments. (the date on which the principal adjustments become known). The risk amount displayed is the risk effect of one basis point shift in the forecast FX rate associated with that notional adjustment. Only the risk for the principal adjustment is displayed and not the interest payments.

Risk Amt1=(Fix Notional * Proj FX Rate - Fix Notional * Proj FX Rat +1 bp) * Adj Ccy DF * Ccy Pair PointFactor

RiskAmt2= Risk Amt1 * FX Spot

RiskAm1 and RiskAmt2 will be driven by the setup in the currency pair definition.

1.2.2 FX Products

The table below provides details on specific trades covered under reset risk reporting for FX products.

Trade	Details
FX NDFs and FX NDF Swaps	• The Risk measure for FX NDF trades appears on the fixing date of the trade, and the amount should be equal to the notional of the trade. • The Risk measures for FX NDF Swap trades appear on the two reset dates of the trade, and the amounts should be equal to the Traded Amt and Far Amt of the trade.
Forward Start FX	• Forward Start FX trades have fixing risk on the rate-setting date (the date on which the strike of the trade is set) and the risk should be equal to the change in the trade's Delta on that date, which may not be equal to the notional. • Because Forward Start FX trades don't have a Strike until the strike is set, the Risk Amount (Ccy2) field should be blank.
FX NDOs	The Risk measure for FX NDOs should appear on the Expiry Date of the trade, and the amount should be equal to the Delta measure of the trade.
Forward Start FX Options	• The Risk measure for forward starting FX options should appear on the Reset Effective Date of the option; the amount should be equal to the change in the Delta of the trade when a fixing is applied to the trade. • Because forward start trades don't have a Strike until the strike is set, the Risk Amount (Ccy2) field should be blank.

Trade	Details
	• Forward start options don't have any Delta until the strike is set. Once the strike is set, the need to hedge for a substantial amount of Delta becomes a concern.
FX Accruals	The Risk measure for FX Accrual products should appear on each Observation Date of the accrual, and the Expiry Date for cash settled FX or Fader type accruals. In each case, the amount should be equal to the change in the Delta of the trade when a fixing is applied to the trade.
FX Futures	• Cash settled FX futures have fixing risk on their expiration date, as defined in the futures configuration.
	• The risk measure on Future FX trades should appear on their expiration date, and the amount should be equal to the change in Delta of the trade when a fixing is applied.
	• The change in Delta (the rate reset analysis by definition) should be roughly equal to the trade's notional in the Delta display currency.
Average Rate and Average Strike FX Options	• The Delta for Average Rate Options decays to zero, and the Delta for Average Strike Options increases to that of a vanilla, as they progress through their fixings. A small change in the Delta of the option will be observed at each fixing.
	• The Risk measure on Asian FX Option trades should appear on each one of the fixing dates, and the amount should be equal to the change in Delta of the trade when a fixing is applied.
	• Because average strike options don't have a fixed strike until the final fixing, they will not be able to report a value for Risk Amount (Ccy2). This is intended behavior.

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Split Fixings for Trades with FX Resets

Split fixings are cross-currency exposures with two-part fixings (e.g. EURKRW, EURBRL, KRWJPY).

• The Reset Risk Report has the ability to select FX fixings created using the FX Reset Pairs function in all fields where FX fixings can be selected. For the Pricing Sheet, this includes Reset Source, Observation Source, and Settlement Source properties. For the Swap trade window, this includes the Intermediate Ccy and Settlement Ccy fields for both legs of a swap trade, and the FX Reset field in the Principal Adjustments feature.

• When a trade uses a split fixing, as configured in the FX Reset Pairs function, the trade generates two lines on the reset risk report – one for each leg of the split fixing. Each fixing will have a separate Risk Amount.

ⓘ   [NOTE: When a fixing has a rate available in the quote table, the fixing's Risk Amount will be zero and does not appear in the report. Otherwise, the fixing's risk amount will be equal to the trade's Ccy1 notional or Ccy2 notional, converted at the current spot rate.]

1.2.3 Equity Products

The Reset Risk Report shows the change in Delta at each reset. For a simple Equity Vanilla, the trade will have two resets: the underlying fixing on the trade date, and the underlying fixing at expiration. Similar results are seen on the

left side of the report below.

For options with multiple resets, the report shows the risk across each fixing. Results of this kind are seen on the right side of the report below.

Reset Date	OTCOption/CALL European Equity.AAPL Jun 24, 2016 Strike=100% Risk Amount	ScriptableOTCProduct/ EquityAsianSCOT Equity.AAPL Jun 24, 2016 Risk Amount
05/24/2016	520,912	
05/25/2016		176,593
05/26/2016		187,377
05/27/2016		198,666
06/21/2016		(220,700)
06/22/2016		(232,843)
06/23/2016		(246,057)
06/24/2016	(1,001,163)	(250,280)

Sample reset risk results for an Equity Vanilla trade and Equity Asian SCOT trade.

1.2.4 LIBOR Fallback Cashflows

» Libor Fallback rate is based on Adjusted SOFR rate, which is an overnight rate. Reset Risk Analysis report for Libor Fallback contains all the reset dates and rate index details which constitute the fallback rate; such that users can see Risk Amount based on Daily RFR Index resets on trades where Fallback is setup.

» Inclusion of Reset date for Libor fallback trades in Reset Risk Analysis Report is based on the below date range criteria:

– Start Date of the report will be from Val Dt, i.e. the report will have the first Reset Date / Sample Date = Val Dt.

– End Date of the Report will be Val Dt + Tenor as set in Reset Risk Analysis Configuration.

» Each Reset / Sample date shows the respective Risk Amount until the reset rate for that Reset / Sample date is known (i.e. the quote is saved in quote set). Once the quote is saved, the Risk Amt for that Reset / Sample date becomes '0'.

» Columns under Reset Risk Analysis report such as: Underlying, Reset Source and Tenor are based on Nominal index as configured in Rate Index Attributes of the IBOR index.

» There could be overlapping reset dates (sample dates) between 2 cashflow periods. In such cases the overlapping dates will be repeated. The unique identifiers in such cases would be 'Settlement dt' for trades without compounding or 'Settlement dt + Fix Notional' for trades with compounding.

» Products in scope include: Swaps, SwapCrossCurrency, SwapNonDeliverable and SwapCancellable trades which have:

– IndexCalculator set to FallbackISDA and

– Reset in advance in the original IBOR trades.