



Nasdaq Calypso

Calypso Pricing Script Examples

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Approved

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Document History

Revision	Published	Summary of Changes
1.0	February 2024	First revision for version 18.
2.0	July 2024	Added Cash settlement for FXTARF, Basket Worst M
3.0	August 2024	Added Equity Reverse Convertible, Equity Single Reverse Convertible, Equity Single Reverse Convertible Swap, Hybrid Dual Digital.

This document provides Pricing Script examples.

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Example 1 - Basket Performance Option

Description

Performance Option on Equity Basket

Termsheet

Option Buyer	Bank XXX
Option Seller	Bank YYY
Start Date	10-04-2023
Maturity Date	26-05-2023
Notional	USD 1,000,000
StrikePct	100%

Code

Variables

```

Underlying | Complex Variables | Pricing Script | Event Grid | Script Results | Resets
1 Constant Start As ReferenceDate From Product.StartDate
2 Constant Exercise As PaymentDate From Product.Maturity
3 Constant BuySell As Integer From Product.BuySell
4 Constant PaymentCcy As Currency From Product.Currency
5 Constant Basket As Quotable[] From Product.Basket
6 Constant Notional As Double From Product.Notional
7 Constant PutCall As Enum 'Call','Put'
8 Constant StrikePct As Double From 0.9
9 Constant BasketWts As Double[] From Product.BasketWeights
10 Constant N As Integer From Product.BasketSize
11 i As Integer
12 InitialFixing As Double[] From Basket
13 Payoff As Double
14 BasketPerformance As Measure
15 OptionPrice As Measure To NPV
16 Prob_ITM As Measure

```

Variable Name	Type	Description
Start	Reference Date	Trade Start Date
Exercise	Payment Date	Trade Maturity Date
BuySell	Integer	Multiplier to all flows to determine direction
PaymentCcy	Currency	Payment Currency
Basket	Quotable Array	Underlying Basket
Notional	Double	Trade Notional
PutCall	Enum	(Put or Call) Used to calculate payoff
StrikePct	Double	Strike Price of basket performance option in percentage
BasketWts	Double Array	Weights of each component of basket
N	Integer	Basket size
I	Integer	Internal counter for basket components
InitialFixing	Double Array	Initial value of each basket component
Payoff	Double	Trade Payoff
BasketPerformance	Measure	This measure shows basket performance
OptionPrice	Measure	This measure calculates the total price and is mapped to the NPV pricer measure
Prob_ITM	Measure	This measure shows the probability of in the money of option at maturity date

MetaData

Product Types: ScriptableOTCProduct
Calculator: ForwardPayoff
Payoff N

Script: Variables ▾
☐ Swap

Name ▾	Type ▾	Display N... ▾	Format ▾	Decimals ▾
Basket	QuotableArray	Basket	DEFAULT	2
BasketWts	DoubleArray	BasketWts	DEFAULT	2
BuySell	Integer	BuySell	DEFAULT	2
Exercise	PaymentDate	Exercise	DEFAULT	2
N	Integer	N	DEFAULT	2
Notional	Double	Notional	DEFAULT	2
PaymentCcy	Currency	PaymentCcy	DEFAULT	2
PutCall	Enum	PutCall	DEFAULT	2
Start	ReferenceDate	Start	DEFAULT	2
StrikePct	Double	StrikePct	RATE	2

StrikePct variable is declared as RATE.

Forward Script

```

1
2 Start:
3   For i = 1 To N
4     InitialFixing[i] = Basket[i]
5   Next
6 Exercise:
7   For i = 1 To N
8     BasketPerformance += (BasketWts[i] * (Basket[i] / InitialFixing[i]))
9   Next
10  Select Case PutCall
11    Case 'Call'
12      Payoff = Max((BasketPerformance - StrikePct), 0)
13    Case 'Put'
14      Payoff = Max((StrikePct - BasketPerformance), 0)
15  EndSelect
16 EndSelect
17 If (Payoff > 0) Then
18   Prob_ITM = 1.0
19 Else
20   Prob_ITM = 0.0
21 EndIf
22 OptionPrice += Cash((BuySell * Notional * Payoff), PaymentCcy, 1, 'REDEMPTION')

```

Start	Start Date at which initial value of basket component is observed
Exercise	Maturity date at which payoff is calculated

Trade Example

Trade Entry

Market Data		Pricing	
Default Rate Sides	Choice	Strategy Name	Example2-Basket...
AAPL	171.000000000000	Price	Price
AAPL.NASDAQ	171.000000000000	Save	Save
GOOG	108.000000000000	Solve	Don't Solve
GOOG.NASDAQ	108.000000000000	Trade Date	04/10/2023
AAPL Div Curve	S_AAPL_Div	Trade Time	11:09:25.000 PM
AAPL Borrow Curve	S_AAPL_Borrow	Settlement Date	04/12/2023
AAPL USD Vol	S_AAPL_Vol_Spline_ETO_D...	Start Date	04/10/2023
Correlation CorrelationMatrix	PS_EQEQ	End Date	05/26/2023
GOOG Div Curve	S_GOOG_Div	Observation Source	
GOOG Borrow Curve	S_GOOG_Borrow	Observation Source Time	
GOOG USD Vol	S_GOOG_Vol_Spline_ETO_...	Observation Source Quote Side	
USD LIBOR 3M Curve	ZC USD Libor	Observation Fixing Rate	
		Premium Date	04/12/2023
		Pricing Model	LocalVolatilityNFMo...
		Product ID Type	
		Product ID	423066
		Payout	Example2-BasketPe...
		Underlying	Basket.423066
		Equity Reset	
		CCP/Clearing Broker Combos	
		CCP/Clearing Broker	None
		Dealt Estimated IM	
		Product Code	
		PutCall	Call
		StrikePct	100.00
		NPV	USD 139,473.80
		PV	USD 139,473.80
		PRICE	USD 0.13947
		DELTA	USD 875,223.58
		GAMMA	USD 79,944.89
		THETA	USD -339.70
		VEGA	USD 569.20

Trade Booked in Pricing Sheet

Notional 1M USD

StrikePct 100% Call

Underlying Basket

Underlying Complex Variables Pricing Script Event Grid Script Results Resets							
Weight Type: Weight		Apply equal weights					
Asset	Quotable	Asset Ccy	Size/Weight(%)	FX Pair	Quanto/Compo	FX Reset	Fixed FX Rate
Equity.GOOG	GOOG.NASDAQ	USD	60.00	USD/USD	NONE		
Equity.AAPL	AAPL.NASDAQ	USD	40.00	USD/USD	NONE		

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Amount
1	04/12/2023	Fee	04/12/2023	04/12/2023	NONE		PREMIUM		USD	-139,473.80

Event Grid

Underlying Complex Variables Pricing Script Event Grid Script Results Resets							
Date	Events						
04/10/2023	[Start]						
05/26/2023	[Exercise]						

Product.Maturity		
Last Reset	Reference Date	Payment Date
05/26/2023	05/26/2023	05/30/2023

Product.StartDate	
Last Reset	Reference Date
04/10/2023	04/10/2023

Script Results

Underlying Complex Variables Pricing Script Event Grid Script Results Resets	
Measures: 5/25/23 1:37:43.104 AM EDT	
Measure	Value
OptionPrice	139,473.798712
Prob_ITM	0.659841
BasketPerformance	1.106244

Resets

Underlying Complex Variables Pricing Script Event Grid Script Results Resets						
All	Date	Value	Idx Term	Name	Type	Reset Name
Equity	04/10/2023	150		EquityReset.AAPL.NASDAQ	Equity	NASDAQ
	04/10/2023	100		EquityReset.GOOG.NASD...	Equity	NASDAQ
	05/26/2023			EquityReset.AAPL.NASDAQ	Equity	NASDAQ
	05/26/2023			EquityReset.GOOG.NASD...	Equity	NASDAQ

Example 2 – Altiplano – Basket Digital Option

Description

Digital (Cash or nothing) option on basket of stocks: If the barrier doesn't hit for any of the basket components, the holder receives a coupon on the payment dates. If the barrier hits, the holder receives nothing.

Termsheet

Option Buyer	Bank XXX
Option Seller	Bank YYY
Start Date	10-04-2023
Maturity Date	26-05-2023
Notional	USD 1,000,000
Coupon Rate	5%
Relative Barrier Level	90%

Payout on Payment Date	
If barrier level hits for any of the basket component	Coupon Rate * Notional
Otherwise,	0%

Code

Variables

```

Underlying Complex Variables Pricing Script Event Grid Script Results Resets
1 Constant Start As ReferenceDate From Product.StartDate
2 Constant Observation As ReferenceDate[]
3 Constant Payment As PaymentDate[]
4 Constant Basket As Quotable[] From Product.Basket
5 Constant BuySell As Integer From Product.BuySell
6 Constant PaymentCcy As Currency From Product.Currency
7 Constant Notional As Double From Product.Notional
8 Constant RelativeBarrierLevel As Double From 0.90
9 Constant CouponRate As Double From 0.05
10 Constant BasketWts As Double[] From Product.BasketWeights
11 Constant N As Integer From Product.BasketSize
12 i As Integer
13 StrikePrice As Double[] From Basket
14 BarrierBreakCount As Integer
15 OptionPrice As Measure To NPV
16 Prob_ITM As ScheduleMeasure From Payment

```

Variable Name	Type	Description
Start	Reference Date	Trade Start Date
Observation	Reference Date Array	Observation Dates
Payment	Payment Date Array	Coupon Payment Dates
Basket	Quotable Array	Underlying Basket
BuySell	Integer	Multiplier to all flows to determine direction
PaymentCcy	Currency	Payment Currency
Notional	Double	Trade Notional
RelativeBarrierLevel	Double	Percentage barrier level applied to basket component to get strike price
CouponRate	Double	Coupon Rate
BasketWts	Double Array	Weight of each component of basket
N	Integer	Basket size

Variable Name	Type	Description
i	Integer	Internal counter for basket components
StrikePrice	Double Array	Strike Price of each basket component
BarrierBreakCount	Integer	Internal counter to check if barrier hit for any of the basket components
OptionPrice	Measure	This measure calculates the total price and is mapped to the NPV pricer measure
Prob_ITM	Schedule Measure	This measure shows the probability of in the money of option

MetaData

Product Types:	ScriptableOTCProduct	Calculator:	ForwardPayoff	Payoff Name:	Example 1-Bas
Script: Variables	<input type="checkbox"/> Swap				
Name	Type	Display Name	Format	Decimals	
Basket	QuotableArray	Basket	DEFAULT		2
BasketWts	DoubleArray	BasketWts	DEFAULT		2
BuySell	Integer	BuySell	DEFAULT		2
CouponRate	Double	CouponRate	RATE		2
N	Integer	N	DEFAULT		2
Notional	Double	Notional	DEFAULT		2
Observation	ReferenceDateArray	Observation	DEFAULT		2
Payment	PaymentDateArray	Payment	DEFAULT		2
PaymentCcy	Currency	PaymentCcy	DEFAULT		2
RelativeBarrierLevel	Double	RelativeBarrierLevel	RATE		2
Start	ReferenceDate	Start	DEFAULT		2

CouponRate and RelativeBarrierLevel variables are defined as RATE.

Forward Script

```

1
2 Start:
3 For i = 1 To N
4   StrikePrice[i] = Basket[i] * RelativeBarrierLevel
5 Next
6 Observation:
7 For i = 1 To N
8   If (BasketWts[i] > 0) Then
9     BarrierBreakCount += If(Basket[i] <= StrikePrice[i], 1, 0)
10  EndIf
11 Next
12 Payment:
13 If (BarrierBreakCount == 0) Then
14   OptionPrice += Cash((BuySell * Notional * CouponRate), PaymentCcy, 1, 'EXERCISE')
15   Prob_ITM = 1.0
16 EndIf
17 BarrierBreakCount = 0

```

Start	Strike price is calculated using Relative Barrier Level and initial fixing for each component of basket
Observation	Barrier hits are counted on observation dates only if weight of basket component is positive
Payment	Payment of coupon, if no barrier hits have been recorded

Trade Example

Trade Entry

Market Data		1	
Default Rate Sides	Choice	Strategy Name	Example1-BasketDigitalOption
AAPL	171.000000000000	Price	Price
AAPL.NASDAQ	171.000000000000	Save	Save
GOOG	108.000000000000	Solve	Don't Solve
GOOG.NASDAQ	108.000000000000	Trade Date	04/10/2023
AAPL Div Curve	S_AAPL_Div	Trade Time	01:52:29.000 AM
AAPL Borrow Curve	S_AAPL_Borrow	Settlement Date	04/12/2023
AAPL USD Vol	S_AAPL_Vol_Spline_ETO_D...	Start Date	04/10/2023
Correlation CorrelationMatrix	PS_EQEQ	End Date	05/26/2023
GOOG Div Curve	S_GOOG_Div	Solve Strike Shortcut	
GOOG Borrow Curve	S_GOOG_Borrow	Product Type	ScriptableOTCProduct
GOOG USD Vol	S_GOOG_Vol_Spline_ETO_...	Product Subtype	Example1-BasketDigitalOption
USD LIBOR 3M Curve	ZC USD Libor	Deal Pricing Model	LocalVolatilityNFMonteCarloExotic
		Product ID Type	
<div> <div>×</div> <div>Pricing</div> </div>		Product ID	424066
Valuation Date	05/10/2023	Payout	Example1-BasketDigitalOption
Valuation Time	9:00:00 PM	Underlying	Basket.424066
Pricing Env	PS_EQDFX	Equity Reset	
Output 1 or 2 way	1-way	CCP/Clearing Broker Combos	
<div> <div>×</div> <div>ODA Shortcuts</div> </div>		Notional	1,000,000.00
<div> <div>×</div> <div>Solver</div> </div>		Notional Ccy	USD
<div> <div>×</div> <div>Strip Generator</div> </div>		Buy/Sell	Buy
Generate F11	Apply	CouponRate	5.00
Legs to strip	None	RelativeBarrierLevel	90.00
<div> <div>×</div> <div>Rate Delta</div> </div>		Observation	04/10/2023 - 05/26/2023 DLY NYC
<div> <div>×</div> <div>Property Shortcut</div> </div>		Payment	04/10/2023 - 05/26/2023 WK NYC 1D
Fields: Main	Fields: Pricing		
Fields: Sales	Fields: Detail		
PRICING	GREEKS		
		NPV	USD 79,135.70
		PV	USD 79,135.70
		PRICE	USD 0.07914
		DELTA	USD 453,082.70
		GAMMA	USD 890,494.22
		THETA	USD -39,137.40
		VEGA	USD 412.68

Trade Booked in Pricing Sheet

Notional 1M USD

Barrier Level set to 90% of Initial Fixing

Coupon rate set to 5%

Payment Dates with 1Day lag

Underlying Basket

Underlying							
Complex Variables Pricing Script Event Grid Script Results Resets							
Weight Type: Weight Apply equal weights							
Asset	Quotable	Asset Ccy	Size/Weight(%)	FX Pair	Quanto/Compo	FX Reset	Fixed FX Rate
Equity.GOOG	GOOG.NASDAQ	USD	60.00	USD/USD	NONE		
Equity.AAPL	AAPL.NASDAQ	USD	40.00	USD/USD	NONE		

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount
1	04/17/2023	Cash Flow	04/14/2023	04/14/2023	NONE		PAYOUT		USD					04/14/2023	50,000.00
1	05/01/2023	Cash Flow	04/28/2023	04/28/2023	NONE		PAYOUT		USD					04/28/2023	50,000.00
1	05/08/2023	Cash Flow	05/05/2023	05/05/2023	NONE		PAYOUT		USD					05/05/2023	50,000.00
1	04/12/2023	Fee	04/12/2023	04/12/2023	NONE		PREMIUM		USD						-56,628.98

Event Grid

Underlying							
Complex Variables Pricing Script Event Grid Script Results Resets							
Date	Events						
04/10/2023	[Start]						
04/11/2023	[Observation]						
04/12/2023	[Observation]						
04/13/2023	[Observation]						
04/14/2023	[Observation, Payment]						
04/17/2023	[Observation]						
04/18/2023	[Observation]						
04/19/2023	[Observation]						
04/20/2023	[Observation]						
04/21/2023	[Observation, Payment]						
04/24/2023	[Observation]						
04/25/2023	[Observation]						
04/26/2023	[Observation]						
04/27/2023	[Observation]						
04/28/2023	[Observation, Payment]						
05/01/2023	[Observation]						
05/02/2023	[Observation]						
05/03/2023	[Observation]						
05/04/2023	[Observation]						
05/05/2023	[Observation, Payment]						
05/08/2023	[Observation]						
05/09/2023	[Observation]						
05/10/2023	[Observation]						
05/11/2023	[Observation]						
05/12/2023	[Observation, Payment]						
05/15/2023	[Observation]						
05/16/2023	[Observation]						
05/17/2023	[Observation]						
05/18/2023	[Observation]						
05/19/2023	[Observation, Payment]						
05/22/2023	[Observation]						
05/23/2023	[Observation]						
05/24/2023	[Observation]						
05/25/2023	[Observation]						
05/26/2023	[Observation, Payment]						

Payment

04/10/2023 - 05/26/2023 WK NYC 1D

Last Reset	Reference Date	Payment Date
	04/14/2023	04/17/2023
	04/21/2023	04/24/2023
	04/28/2023	05/01/2023
	05/05/2023	05/08/2023
	05/12/2023	05/15/2023
	05/19/2023	05/22/2023
	05/26/2023	05/30/2023

Product.StartDate

Last Reset	Reference Date
04/10/2023	04/10/2023
04/10/2023	04/10/2023 - 05/26/2023 DLY NYC

Observation

Last Reset	Reference Date
04/11/2023	04/11/2023
04/12/2023	04/12/2023
04/13/2023	04/13/2023
04/14/2023	04/14/2023
04/17/2023	04/17/2023
04/18/2023	04/18/2023
04/19/2023	04/19/2023
04/20/2023	04/20/2023
04/21/2023	04/21/2023
04/24/2023	04/24/2023

Script Results

Underlying		Complex Variables	Pricing Script	Event Grid	Script Results	Resets
Measures: 5/29/23 3:43:13.926 AM EDT		Schedule Measures: 5/29/23 3:43:13.926 AM EDT				
Measure	Value	Payment				
OptionPrice	79,135.701119	Event				
		Prob_ITM				
		04/14/2023				
		04/21/2023				
		04/28/2023				
		05/05/2023				
		05/12/2023				
		05/19/2023				
		05/26/2023				

Resets

Underlying		Complex Variables	Pricing Script	Event Grid	Script Results	Resets
All						
Equity						
GOOG						
AAPL						
Date	Value	Idx Term	Name	Type	Reset Name	
04/10/2023	100		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/11/2023	99		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/12/2023	98		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/13/2023	97		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/14/2023	96		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/17/2023	90		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/18/2023	86		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/19/2023	88		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/20/2023	91		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/21/2023	95		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/24/2023	98		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/25/2023	100		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/26/2023	104		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/27/2023	100		EquityReset.GOOG.NA...	Equity	NASDAQ	
04/28/2023	105		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/01/2023	103		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/02/2023	101		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/03/2023	103		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/04/2023	103		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/05/2023	105		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/08/2023	107		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/09/2023	110		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/10/2023	108		EquityReset.GOOG.NA...	Equity	NASDAQ	
05/11/2023			EquityReset.GOOG.NA...	Equity	NASDAQ	
05/12/2023			EquityReset.GOOG.NA...	Equity	NASDAQ	

Underlying		Complex Variables	Pricing Script	Event Grid	Script Results	Resets
All						
Equity						
GOOG						
AAPL						
Date	Value	Idx Term	Name	Type	Reset Name	
04/10/2023	150		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/11/2023	151		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/12/2023	152		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/13/2023	153		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/14/2023	154		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/17/2023	155		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/18/2023	156		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/19/2023	157		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/20/2023	158		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/21/2023	159		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/24/2023	160		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/25/2023	161		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/26/2023	163		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/27/2023	150		EquityReset.AAPL.NAS...	Equity	NASDAQ	
04/28/2023	160		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/01/2023	158		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/02/2023	162		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/03/2023	165		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/04/2023	163		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/05/2023	168		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/08/2023	170		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/09/2023	172		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/10/2023	171		EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/11/2023			EquityReset.AAPL.NAS...	Equity	NASDAQ	
05/12/2023			EquityReset.AAPL.NAS...	Equity	NASDAQ	

Example 3 - FXTARF

Description

A target redemption forward (TARF) is a structured forward contract that allows you to trade at a better rate than a standard forward contract by integrating leverage and a profit cap level.

Termsheet - EURUSD Target Redemption Forward

Buyer	Bank XXX
Seller	Bank YYY
Underlying Currency Pair	EURUSD
Call/Put on Underlying	Call (Buy EURUSD)
Notional Amount	EUR 1,000,000 per fixing date
Enhanced Notional Amount	EUR 2,000,000 per fixing date
Spot Rate	1.0650
Strike	1.0700
Payout Cap	0.0900 EUR/USD
Trade Date	03-Apr-23
Fixing/Settlement Schedule	See Appendix A
Fixing Reference	The EURUSD rate published by the ECB on each Fixing Date
Period Accrued Intrinsic Value	Max (Fixing Reference - Strike, 0)
Total Accrued Intrinsic Value	Sum (Period Accrued Intrinsic Value)
Payout Cap Event	The Payout Cap Event occurs when the Total Accrued Intrinsic Value, including the current fixing, is greater than or equal to the Payout Cap
Fixing Amount	Notional Amount if Fixing Rate > Strike Enhanced Notional Amount if Fixing Rate <= Strike

Final Fixing Amount	Same as Fixing Amount
Final Fixing Strike	Fixing Rate - (Payout Cap - Previous Fixing Total Accrued Intrinsic Value)
Premium	Bank YYY pays EUR 10,000
Premium Value Date	06-Apr-23
Settlement	Physical/Cash

Appendix A: Fixing and Settlement Schedule

Fixing Date	Settlement Date
05-10-2023	05-12-2023
06-12-2023	06-14-2023
07-10-2023	07-12-2023
08-10-2023	08-14-2023
09-11-2023	09-13-2023
10-10-2023	10-12-2023
11-10-2023	11-14-2023

Code

Variables

Script: Variables
+
Keywords
Types
Product Properties
Reserved

```

1 Constant StartDate As ReferenceDate From Product.StartDate
2 Constant AccrualSchedule As PaymentDate[]
3 Constant BuySell As Integer From Product.BuySell
4 Constant FxQuotable As Quotable From Product.Underlying
5 Constant Notional As Double From Product.Notional
6 Constant NotionalCcy As Currency From Product.Currency
7 Constant SettleCcy As Currency
8 Constant LeverageRatio As Double
9 Constant CallPut As Enum 'Call', 'Put'
10 Constant FinalPaymentType As Enum 'Full', 'ExactStrike', 'ExactNotional', 'None'
11 Constant Strike As Double
12 Constant KOLevel As Double
13 Constant SettlementType As Enum 'Cash', 'Physical'
14 CallPutSign As Double
15 KnockedOut As Boolean
16 AccrueAbove As Double
17 AccrueBelow As Double
18 PeriodStrike As Double
19 PeriodAccruedNotional As Double
20 TotalAccruedNotional As Double
21 PeriodAccruedIntrinsicValue As Double
22 TotalAccruedIntrinsicValue As Double
23 AdjustedStrike As Double
24 AdjustedNotional As Double
25 OptionNPV As Measure To NPV
26 m_ProbKo As Measure
27 m_PayoutCap As Measure
28 m_KOLevel As Measure
29 A1_Fixing As ScheduleMeasure From AccrualSchedule
30 A2_PerStrike As ScheduleMeasure From AccrualSchedule
31 A3_PerNotional As ScheduleMeasure From AccrualSchedule
32 A4_PerProfit As ScheduleMeasure From AccrualSchedule
33 A5_AccProfit As ScheduleMeasure From AccrualSchedule

```

Variable Name	Type	Description
StartDate	ReferenceDate	Trade Start Date
AccrualSchedule	PaymentDate[]	Schedule of Fixing and Payment Dates
BuySell	Integer	Buy or Sell

Variable Name	Type	Description
FxQuotable	Quotable	Underlying CCY pair
Notional	Double	Unleveraged Notional
NotionalCcy	Currency	Notional Currency
SettleCcy	Currency	Settlement Currency
LeverageRatio	Double	Leverage Ratio for OTM fixings
CallPut	Enum	Call or Put
FinalPaymentType	Enum	Full Final Payment, Exact Final Payment with Strike Adjustment, Exact Final Payment with Notional Adjustment or No Final Payment
Strike	Double	Strike
KOLevel	Double	Profit cap level in points
SettlementType	Enum	Physical / Cash Settlement
CallPutSign	Double	Call or Put
KnockedOut	Boolean	Indicator of Payout Cap Event
AccrueAbove	Double	Leveraged Notional
AccrueBelow	Double	Leveraged Notional
PeriodAccruedNotional	Double	Amount to settle for the period
TotalAccruedNotional	Double	Total amount to settle (not really used)
PeriodAccruedIntrinsicValue	Double	Accrued ITM intrinsic value for the period
TotalAccruedIntrinsicValue	Double	Total accrued ITM intrinsic value
AdjustedStrike	Double	Adjusted Strike for settling Final Exact fixings
AdjustedNotional	Double	Adjusted Notional for settling Final Exact fixings
OptionNPV	Measure	NPV
m_ProbKo	Measure	Probability of hitting the payout cap
m_PayoutCap	Measure	Profit cap level

MetaData

Script: Variables ▾ <input type="checkbox"/> Swap						
Name ▾	Type ▾	Display Name ▾	Format ▾	Decimals ▾	Default Value ▾	
AccrualSchedule	PaymentDateArray	AccrualSchedule	DEFAULT	2		
BuySell	Integer	BuySell	DEFAULT	2		
CallPut	Enum	CallPut	DEFAULT	2		
FinalPaymentType	Enum	FinalPaymentType	DEFAULT	2		
FxQuotable	Quotable	FxQuotable	DEFAULT	2		
KOLevel	Double	KOLevel	DEFAULT	4		
LeverageRatio	Double	LeverageRatio	DEFAULT	2		
Notional	Double	Notional	DEFAULT	2		
NotionalCcy	Currency	NotionalCcy	DEFAULT	2		
SettleCcy	Currency	SettleCcy	DEFAULT	2		
SettlementType	Enum	SettlementType	DEFAULT	2		
StartDate	ReferenceDate	StartDate	DEFAULT	2		
Strike	Double	Strike	DEFAULT	4		

Note: KOLevel and Strike variables are defined with 4 Decimals so that user can enter till 4 decimal places.

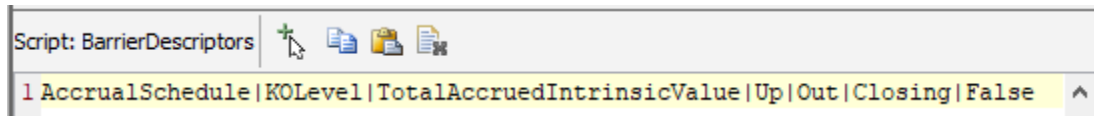
Forward Script

```

Script: Forward * Keywords ▾ Functions ▾ Operators ▾ Reserved ▾
1
2 StartDate:
3 Select Case CallPut
4   Case 'Call'
5     CallPutSign = 1.0
6     AccrueAbove = Notional
7     AccrueBelow = (Notional * LeverageRatio)
8   Case 'Put'
9     CallPutSign = -1.0
10    AccrueAbove = (Notional * LeverageRatio)
11    AccrueBelow = Notional
12
13 EndSelect
14 m_KOLevel = KOLevel
15 m_PayoutCap = (Notional * KOLevel)
16 AccrualSchedule:
17 All_Fixing = FxQuotable
18 If Not (KnockedOut) Then
19   PeriodAccruedNotional = If ((FxQuotable > Strike), AccrueAbove, AccrueBelow)
20   PeriodStrike = Strike
21   Select Case CallPut
22     Case 'Call'
23       PeriodAccruedIntrinsicValue = Max(0, (FxQuotable - PeriodStrike))
24     Case 'Put'
25       PeriodAccruedIntrinsicValue = Max(0, (PeriodStrike - FxQuotable))
26
27 EndSelect
28 If ((TotalAccruedIntrinsicValue + PeriodAccruedIntrinsicValue) >= KOLevel) Then
29   KnockedOut = True
30   m_ProbKo = 1.0
31   Select Case FinalPaymentType
32     Case 'Full'
33     Select Case SettlementType
34       Case 'Physical'
35         OptionNFV += PhysicalFx(NotionalCcy, ((BuySell * CallPutSign) * PeriodAccruedNotional), FxQuotable, PeriodStrike, 1, 'KNOCK_OUT', 1)
36       Case 'Cash'
37         OptionNFV += CashFx(SettleCcy, NotionalCcy, ((BuySell * CallPutSign) * PeriodAccruedNotional), FxQuotable, PeriodStrike, 1, 'KNOCK_OUT', 1)
38
39     EndSelect
40   Case 'ExactStrike'
41     AdjustedStrike = (FxQuotable - (CallPutSign * (KOLevel - TotalAccruedIntrinsicValue)))
42     PeriodStrike = AdjustedStrike
43     Select Case SettlementType
44       Case 'Physical'
45         OptionNFV += PhysicalFx(NotionalCcy, ((BuySell * CallPutSign) * PeriodAccruedNotional), FxQuotable, PeriodStrike, 1, 'KNOCK_OUT', 1)
46       Case 'Cash'
47         OptionNFV += CashFx(SettleCcy, NotionalCcy, ((BuySell * CallPutSign) * PeriodAccruedNotional), FxQuotable, PeriodStrike, 1, 'KNOCK_OUT', 1)
48
49     EndSelect
50   Case 'ExactNotional'

```

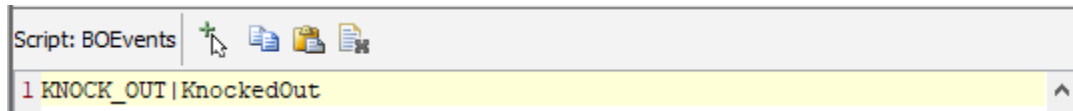
Barrier Descriptors



```
Script: BarrierDescriptors
1 AccrualSchedule | KOLevel | TotalAccruedIntrinsicValue | Up | Out | Closing | False
```

Note: Barrier Descriptors section in script provides information necessary for Barrier Monitoring.

BO Events



```
Script: BOEvents
1 KNOCK_OUT | KnockedOut
```

Note: BO Events is used to monitor if an event has occurred or not using a Boolean variable, without the need to tie the event to a cash flow.

Trade Example – FXTARF Physical Settlement

Trade Entry

Market Data

Default Rate Sides	Choice
EUR/USD Spot	1.0800
EUR/USD_ECB	1.080000000000
EUR LIBOR 6M Curve	PS.EUR.LIBOR.CLOSE
EUR/USD Vol	PS_EURUSD_FXOption_der...
USD LIBOR 3M Curve	ZC USD Libor

Pricing

Valuation Date	10/10/2023
Valuation Time	8:00:00 PM
Pricing Env	PS_EQDFX
Output 1 or 2 way	1-way

ODA Shortcuts

Solver

Strip Generator

Rate Delta

Property Shortcut

Fields: Main	Fields: Pricing
Fields: Sales	Fields: Detail
PRICING	GREEKS
GREEKS 2	RISK
DETAILS	

TradeEntry Sheet 1

Strategy Name	FxTARF_physical
Price	Price
Save	Save
Solve	Don't Solve
Trade Id	504567
Trade Version	3
Status	VERIFIED
Action	AMEND
Book	SCOT Barrier
Counterparty Role	CounterParty
Counterparty	CP
Notional	1,000,000.00
Ccy1 Amount	1,000,000.00
Ccy2 Amount	
Product Type	ScriptableOTCProduct
Product Subtype	FxTARFphysical
Ccy Pair	EUR/USD
Notional Ccy	EUR
Buy/Sell	Buy
Settle Type	
Trade Date	04/03/2023
Trade Time	10:00:00.000 AM
Settlement Date	04/05/2023
Start Date	04/10/2023
End Date	11/10/2023
Observation Source	EUR/USD_ECB
Premium Date	04/06/2023
Pricing Model	BlackNFMonteCarlo...
Model Premium	EUR -4,628.39
Customer Premium	EUR -3,336.09
Product ID Type	
Product ID	FX/EUR/USD
Payout	FxTARFphysical
Underlying	FX.EUR.USD
Equity Reset	CLOSE
AccrualSchedule	04/10/2023 - 11/10/...
CallPut	Call
Cash Residual	<input checked="" type="checkbox"/>
FinalPaymentType	ExactStrike
KOLevel	0.0900
LeverageRatio	2.00
Strike	1.0700
NPV	USD 4,998.15
PV	USD 4,998.15

AccrualSchedule	04/10/2023 - 11/10/...
Start Date	04/10/2023
End Date	11/10/2023
Frequency	MTH
Payment Holidays	NYC
Date Roll	FOLLOWING
Period Rule	ADJUSTED
Date Rule	
Specify Roll	<input type="checkbox"/>
Roll Day	0
Payment Lag	2
Reset Lag	0
Reset Holidays	NYC
Bus. Day Lag	<input checked="" type="checkbox"/>
Stub Rule	NONE
Rounding	
Include Start	<input type="checkbox"/>
Quote Usage	
Manual Schedule	<input type="checkbox"/>
Generation Base Date	RESET

Trade Booked in Pricing Sheet

Ccy Pair → EURUSD

Notional → 1M EUR

Final Payment Type → Exact Final Payment with Strike Adjustment

KOLevel → 0.09

Strike → 1.07 EURUSD

Leverage Ratio → 2


Payment Pag → 2 Day

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount	No. of Days	df
1	05/12/2023	Cash Flow	05/10/2023	05/10/2023	CP	FX/EUR/USD	SECURITY	1,000,000	EUR	1,000,000.00	1	1.070000	0.000000	05/10/2023	0	0	0.000000000
1	06/14/2023	Cash Flow	06/12/2023	06/12/2023	CP	FX/EUR/USD	SECURITY	2,000,000	EUR	2,000,000.00	1	1.070000	0.000000	06/12/2023	0	0	0.000000000
1	07/12/2023	Cash Flow	07/10/2023	07/10/2023	CP	FX/EUR/USD	SECURITY	1,000,000	EUR	1,000,000.00	1	1.070000	0.000000	07/10/2023	0	0	0.000000000
1	08/14/2023	Cash Flow	08/10/2023	08/10/2023	CP	FX/EUR/USD	SECURITY	1,000,000	EUR	1,000,000.00	1	1.070000	0.000000	08/10/2023	0	0	0.000000000
1	09/13/2023	Cash Flow	09/11/2023	09/11/2023	CP	FX/EUR/USD	SECURITY	1,000,000	EUR	1,000,000.00	1	1.070000	0.000000	09/11/2023	0	0	0.000000000
1	04/06/2023	Fee	04/06/2023	04/06/2023	CP		PREMIUM		EUR						-3,336.09		


Security Flow for past Physical Delivery event has been created.

Event Grid

Complex Variables Pricing Script Event Grid Script Results Resets		
<div>  </div>		
Date	Events	
04/10/2023	[StartDate]	
05/10/2023	[AccrualSchedule]	
06/12/2023	[AccrualSchedule]	
07/10/2023	[AccrualSchedule]	
08/10/2023	[AccrualSchedule]	
09/11/2023	[AccrualSchedule]	
10/10/2023	[AccrualSchedule]	
11/10/2023	[AccrualSchedule]	


Product.StartDate		
04/10/2023 - 11/10/2023 MTH NYC 2D		
Last Reset	Reference Date	Payment Date
05/10/2023	05/10/2023	05/12/2023
06/12/2023	06/12/2023	06/14/2023
07/10/2023	07/10/2023	07/12/2023
08/10/2023	08/10/2023	08/14/2023
09/11/2023	09/11/2023	09/13/2023
10/10/2023	10/10/2023	10/12/2023
11/10/2023	11/10/2023	11/14/2023

Script Results

Complex Variables Pricing Script Event Grid Script Results Resets		
<div>  </div>		
Measures: 10/10/23 5:29:45.546 AM EDT		
Measure	Value	
ProbabilityOfTARNTTrigger	1.000000	
PayoutCap	90,000.000000	
OptionNPV	4,628.387412	

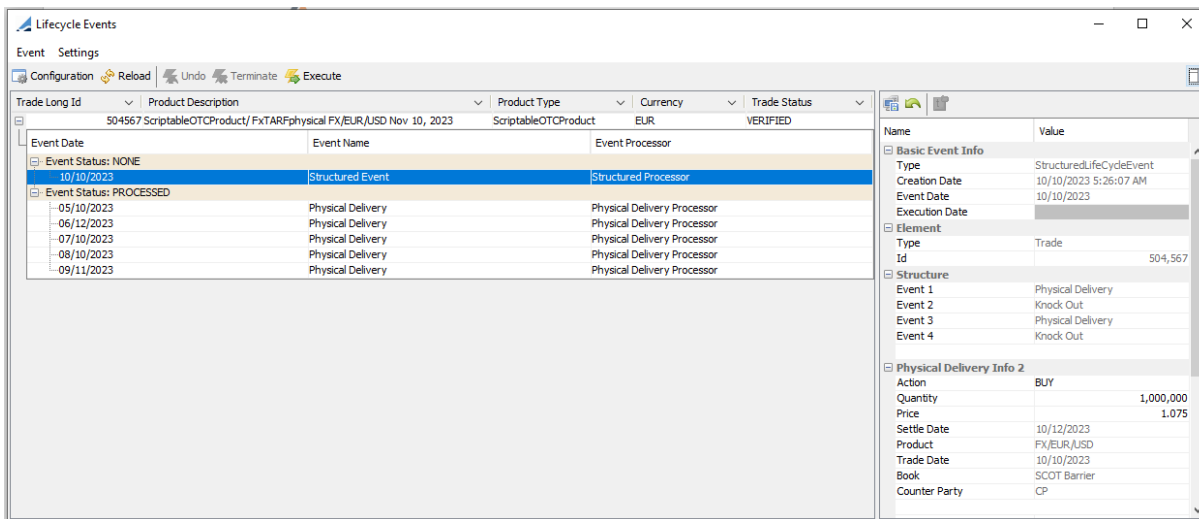
Schedule Measures: 10/10/23 5:29:45.546 AM EDT				
AccrualSchedule				
Event	m_PeriodAccrue...	m_PeriodAccrue...	m_Quotable	m_accPL
05/10/2023	0.030000	1,000,000.000000	1.100000	0.030000
06/12/2023	0.000000	2,000,000.000000	1.065000	0.030000
07/10/2023	0.020000	1,000,000.000000	1.090000	0.050000
08/10/2023	0.030000	1,000,000.000000	1.100000	0.080000
09/11/2023	0.005000	1,000,000.000000	1.075000	0.085000
10/10/2023	0.010000	1,000,000.000000	1.080000	0.095000
11/10/2023	0.010000	1,000,000.000000	1.082477	0.095000

Resets

Complex Variables Pricing Script Event Grid Script Results Resets		
<div>  </div>		
<div> <div>All</div> <div>FX</div> </div>		
Date	Value	Idx Term
05/10/2023	1.1	
06/12/2023	1.065	
07/10/2023	1.09	
08/10/2023	1.1	
09/11/2023	1.075	
10/10/2023	1.08	
11/10/2023		

Name	Type	Reset Name
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE
FX.EUR.USD.EUR/USD...	FX	CLOSE

Lifecycle Events Window



The screenshot shows the 'Lifecycle Events' window. The main table lists events with columns for Event Date, Event Name, and Event Processor. The event dated 10/10/2023 is selected, showing a 'Structured Event' processed by a 'Structured Processor'. Below this, a list of 'Physical Delivery' events is shown, all processed by a 'Physical Delivery Processor'.

The right-hand pane provides details for the selected event:

- Basic Event Info:**
 - Type: StructuredLifeCycleEvent
 - Creation Date: 10/10/2023 5:26:07 AM
 - Event Date: 10/10/2023
 - Execution Date: 10/10/2023
- Element:**
 - Type: Trade
 - Id: 504,567
- Structure:**
 - Event 1: Physical Delivery
 - Event 2: Knock Out
 - Event 3: Physical Delivery
 - Event 4: Knock Out
- Physical Delivery Info 2:**
 - Action: BUY
 - Quantity: 1,000,000
 - Price: 1.075
 - Settle Date: 10/12/2023
 - Product: FX(EUR,USD)
 - Trade Date: 10/10/2023
 - Book: SCOT Barrier
 - Counter Party: CP

After executing Structured Event (Knock Out Event and Physical Delivery Event)

Market Data		TradeEntry Sheet 1 x TradeEntry Sheet 2 x TradeEntry Sheet 3 x			
Default Rate Sides	Choice	Totals	1	2	3
EUR/USD Spot	1.0800	Strategy Name	FxTARF_physical	FX	En
EUR/USD_ECB	1.08000000000000	Price	Price	Price	
EUR LIBOR 6M Curve	PS.EUR.LIBOR.CLOSE	Save	Save	Save	
EUR/USD Vol	PS_EURUSD_FXOption_der...	Solve	Don't Solve	Don't Solve	
USD LIBOR 3M Curve	ZC USD Libor	Trade Id	504567	505077	
Pricing		Trade Version	10	0	
Valuation Date	10/10/2023	Status	KNOCKED_OUT	VERIFIED	
Valuation Time	8:00:00 PM	Action	AMEND	AMEND	
Pricing Env	PS_EQDFX	Book	SCOT Barrier	SCOT Barrier	
Output 1 or 2 way	1-way	Counterpart Role	CounterParty	CounterParty	
ODA Shortcuts		Counterparty	CP	CP	
Solver		Notional	1,000,000.00	-1,075,000.00	
Strip Generator		Ccy1 Amount	1,000,000.00	1,000,000.00	
Rate Delta		Ccy2 Amount		-1,075,000.00	
Property Shortcut		Product Type	ScriptableOTCProduct	FX	
Fields: Main	Fields: Pricing	Product Subtype	FxTARFphysical	FX	
Fields: Sales	Fields: Detail	Ccy Pair	EUR/USD	EUR/USD	
PRICING	GREEKS	Notional Ccy	EUR	USD	
GREEKS 2	RISK	Buy/Sell	Buy	Buy	
DETAILS		Settle Type		Physical	
		Trade Date	04/03/2023	10/10/2023	
		Trade Time	10:00:00.000 AM	05:26:07.113 AM	
		Settlement Date	04/05/2023		
		Start Date	04/10/2023		
		End Date	11/10/2023		
		Strike		1.0750000	
		Observation Source	EUR/USD_ECB		
		Premium Date	04/06/2023		
		Pricing Model	BlackNFMonteCarlo...	FX	
		Model Premium	EUR 0.00	0.00	
		Customer Premium	EUR -3,336.09	-3,336.09	
		Product ID Type			
		Product ID	FX/EUR/USD		
		Payout	FxTARFphysical		
		Underlying	FX.EUR.USD		
		Equity Reset	CLOSE		
		Delivery Date		10/12/2023	
		Trade Term	2D	SPOT	
		AccrualSchedule	04/10/2023 - 11/10/...		
		CallPut	Call		
		Cash Residual	<input checked="" type="checkbox"/>		
		FinalPaymentType	ExactStrike		
		NPV	USD 4,998.66	0.00	4,998.66
		PV	USD 4,998.66	0.00	4,998.66

Parent Trade is Knocked Out and NPV is Zero.

New FX Trade is created out of Physical Delivery Event with Adjusted Strike.

Adjusted Strike = Fixing Rate - (Payout Cap - Previous Fixing Total Accrued Intrinsic Value) = 1.08 – (0.090 – 0.085)
= 1.075

Option Lifecycle Analysis - Exercise

OLA Analysis

OptionLifecycle: ESO_Exercise

Type	Exercise
Include Activity Up To	1Y
Day Start At	
Time Zone	America/Los_Angeles
Output	
Trade Attributes	Trade Id,Book,Nominal,Currency,Maturity Date,Product,Product Description,P...
Pricing Measures	
Strike Bucket Units	Pips
Strike Buckets	
Bucket Moneyness	
Bucket Next Exercise	0D, 1D, 1W, 1M, 2M, 3M, 6M, 1Y
Display American Option based on	First Exercise Date
Flip inverse options	<input type="checkbox"/>
Explode Swaption Straddles	<input type="checkbox"/>

Variable Mapping

Mapping for PricingScript report

File Selection

PUT_CALL Domain...

Script Name	Variable Name	Align in PricingSheet
<input checked="" type="checkbox"/> FxTARFphysical	CallPut	<input checked="" type="checkbox"/>

Mapping for PricingScript report

File Selection

STRIKE Domain...

Script Name	Variable Name	Align in PricingSheet
<input type="checkbox"/> FxTARFphysical	Strike	<input checked="" type="checkbox"/>

Mapping for PricingScript report

File Selection

REFERENCE_PRICE Domain...

Script Name	Variable Name	Align in PricingSheet
<input type="checkbox"/> FxTARFphysical	FxQuotable	<input checked="" type="checkbox"/>

CWS OLA Exercise

Calypso Workstation [17239001/EQDB17/calypso_user]

Workstation Edit Panel Reports Window Plan Trade Help

OLA Exercise SCOT_Banner

Next Exercise Date	Trade Id	Product Description	First Exercise Date	Last Exercise Date	Spot	Strike	Spot Moneyness	Delivery Information	Reference Underlying	Reference Rate	Reference
10/06/2023	502078	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 26, 2023	9/29/23 2:59:00 AM EDT	10/27/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/06/2023	FXUSDJPY	141.00000	FXUSDJPY
10/06/2023	502081	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 6, 2023	9/29/23 2:59:00 AM EDT	10/1/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/06/2023	FXUSDJPY	139.50000	FXUSDJPY
10/06/2023	502087	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 26, 2023	9/29/23 2:59:00 AM EDT	10/27/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/06/2023	FXUSDJPY	141.00000	FXUSDJPY
10/06/2023	502078	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 27, 2023	9/29/23 2:59:00 AM EDT	10/28/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/10/2023	FXUSDJPY	139.50000	FXUSDJPY

Exercise Trade using Exercise Option

Calypso Workstation (17230001/EQDB17/calypso_user)

Workstation Edit Panel Reports Window Plan Trade Help

Report Collection

OLA Exercise SCOT_Barrier

Type here to filter reports

CWS

Risk

FML

FML RT

Risk (HOLD file)

Risk (P2_FXOPN_HST)

FML POWS Book

Next Exercise Date	Trade Id	Product Description	First Exercise Date	Last Exercise Date	Spot	Strike	Spot Maturity	Delivery Information	Reference Underlying	Reference Rate	Reference
10/05/2023	501570	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 26, 2023	9/29/23 2:59:00 AM EDT	10/27/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/09/2023	FXUSDJPY	141.00000	FXUSDJPY
10/06/2023	502081	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 6, 2023	9/30/23 2:59:00 AM EDT	10/07/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/10/2023	FXUSDJPY	139.59000	FXUSDJPY
10/05/2023	502079	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 5, 2023	9/29/23 2:59:00 AM EDT	10/27/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/09/2023	FXUSDJPY	139.59000	FXUSDJPY
10/06/2023	502078	ScriptableOTCProduct/FxTARFphysical/FXUSDJPY Oct 6, 2023	9/30/23 2:59:00 AM EDT	10/07/23 2:59:00 AM EDT	141.00000	130.00000	ITM	10/10/2023	FXUSDJPY	139.59000	FXUSDJPY

Unexercise

Exercise

Open Trade

Resulting Trades - New Fx Trade is created out of Physical Exercise

Market Data		TradeEntry Sheet 1 x TradeEntry Sheet 2 x TradeEntry Sheet 3 x TradeEntry Sheet 4 x Tr			
Default Rate Sides	Choice	Totals	1	2	3
USD/JPY FX	140.000000000000	Strategy Name	FxTARF_physical	FX	Ent
USD/JPY Spot	140.0000	Price	Price	Price	
JPY LIBOR 6M Curve	PS.JPY.LIBOR	Save	Save	Save	
USD LIBOR 3M Curve	ZC USD Libor	Solve	Don't Solve	Don't Solve	
USD/JPY Vol	PS_USDJPY_flat10	Trade Id	501567	502085	
		Trade Version	2	0	
		Status	VERIFIED	VERIFIED	
		Action	AMEND	AMEND	
		Book	SCOT Barrier	SCOT Barrier	
		Counterparty Role	CounterParty	CounterParty	
		Counterparty	CP	CP	
		Notional	1,000,000.00	-130,000,000.00	
		Ccy1 Amount	1,000,000.00	1,000,000.00	
		Ccy2 Amount		-130,000,000.00	
		Product Type	ScriptableOTCProd...	FX	
		Product Subtype	FxTARFphysical	FX	
		Ccy Pair	USD/JPY	USD/JPY	
		Notional Ccy	USD	JPY	
		Buy/Sell	Buy	Buy	
		Settle Type		Physical	
		Trade Date	09/26/2023	10/05/2023	
		Trade Time	10:00:00.000 AM	02:34:55.174 AM	
		Settlement Date	09/28/2023		
		Start Date	09/28/2023		
		End Date	10/26/2023		
		Strike		130.0000	
		Observation Source	USD/JPY FX		
		Premium Date	09/28/2023		
		Pricing Model	BlackNFMonteCarlo...	FX	
		Model Premium	USD 61,605.45	61,605.45	
		Customer Premium	USD -85,915.85	-85,915.85	
		Product ID Type			
		Product ID	FX/USD/JPY		
		Payout	FxTARFphysical		
		Underlying	FX.USD.JPY		
		Equity Reset	CLOSE		
		Delivery Date		10/09/2023	
		Trade Term	2D	SPOT	
		AccrualSchedule	09/28/2023 - 10/26/...		
		CallPut	Call		
		Cash Residual			
		NPV	JPY 1,389,394.14	-8,629,392.91	10,018,787.05
		PV	JPY 1,389,394.14	-8,629,392.91	10,018,787.05
		NPV_PAYLEG	JPY		-130,000,002.15
		NPV_RECLEG	JPY		140,018,789.20

Sample Trades with Barrier Levels

OptionLifecycle: ESO_Barrier

Type	Barrier
Include Activity Up To	1M
Day Start At	12:00:01 AM
Time Zone	America/New_York
<input checked="" type="checkbox"/> Output	
Trade Attributes	Trade Id,Book,Notional,Currency,Maturity Date,Product,Product Description,B...
Pricer Measures	
Bucket Barrier %	Range: -5.0,5.0,1.0
Bucket Barrier Active	0D, 1D, 2D, 3D, 1W, 1M
Flip inverse options	<input type="checkbox"/>
Explode Swaption Straddles	<input type="checkbox"/>

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Mapping for PricingScript report

File Selection

CALCULATED_VARIABLE

Domain...

Script Name	Variable Name	Aling in PricingSheet
<input checked="" type="checkbox"/> FxTARFphysical	TotalAccruedIntrinsicValue	<input checked="" type="checkbox"/>

Mapping for PricingScript report

File Selection

KNOCKED_OUT

Domain...

Script Name	Variable Name	Aling in PricingSheet
<input type="checkbox"/> FxTARFphysical	KnockedOut	<input checked="" type="checkbox"/>

Mapping for PricingScript report

File Selection

KO Schedule

Domain...

Script Name	Variable Name	Aling in PricingSheet
<input type="checkbox"/> FxTARFphysical	AccrualSchedule	<input checked="" type="checkbox"/>
<input type="checkbox"/> FxTARFv1		<input checked="" type="checkbox"/>

Mapping for PricingScript report

File Selection

KO_LEVEL

Domain...

Script Name	Variable Name	Aling in PricingSheet
<input type="checkbox"/> FxTARFphysical	KOLevel	<input checked="" type="checkbox"/>

CWS - OLA Barrie

Trade Id	TradeStatus	System Marking	Option Style	Barrier Active	Barrier Active Date	Barrier Level	Reference Rate	Reference	High	Low	Product Description
501572	VERIFIED	Level HI	Up and Out	Active	10/05/2023	5.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501571	VERIFIED	Level HI	Up and Out	Active	10/05/2023	10.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501570	VERIFIED	Level Not HI	Up and Out	Active	10/05/2023	15.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501567	VERIFIED	Level Not HI	Up and Out	Active	10/05/2023	20.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023

Trigger Barrier

Trade Id	TradeStatus	System Marking	Option Style	Barrier Active	Barrier Active Date	Barrier Level	Reference Rate	Reference	High	Low	Product Description
501572	VERIFIED	Level HI	Up and Out	Trigger	05/02/23	5.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501571	VERIFIED	Level HI	Up and Out	Unexercise	05/02/23	10.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501570	VERIFIED	Level Not HI	Up and Out	Open Trade	05/02/23	15.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023
501567	VERIFIED	Level Not HI	Up and Out			20.00000	12.41000	FXUSDUPY	139.59000	139.59000	ScriptableOTCProduct/ FxTARFphysical FXUSDUPY Oct 26, 2023

Resulting Trades

<div> <div>Market Data</div> <div> <div>Default Rate Sides</div> <div>Choice</div> <div>USD/JPY FX</div> <div>141.000000000000</div> <div>USD/JPY Spot</div> <div>141.0000</div> <div>JPY LIBOR 6M Curve</div> <div>PS_JPY_LIBOR</div> <div>USD LIBOR 3M Curve</div> <div>ZC USD Libor</div> <div>USD/JPY Vol</div> <div>PS_USDJPY_flat10</div> </div> </div>		<div> <div>TradeEntry Sheet 1</div> <div>TradeEntry Sheet 2</div> </div>					
<div> <div>Pricing</div> <div> <div>Valuation Date</div> <div>10/05/2023</div> <div>Valuation Time</div> <div>8:00:00 PM</div> <div>Pricing Env</div> <div>PS_EQDFX</div> <div>Output 1 or 2 way</div> <div>1-way</div> </div> </div>		<div> <div>Totals</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> </div>					
<div> <div>ODA Shortcuts</div> <div> <div>Solver</div> <div>Strip Generator</div> <div>Rate Delta</div> <div>Property Shortcut</div> <div> <div>Fields: Main</div> <div>Fields: Pricing</div> <div>Fields: Sales</div> <div>Fields: Detail</div> <div>PRICING</div> <div>GREEKS</div> <div>GREEKS 2</div> <div>RISK</div> <div>DETAILS</div> </div> </div> </div>		<div> <div>Strategy Name</div> <div>FxTARF_physical</div> <div>FxTARF_physical</div> <div>FxTARF_physical</div> <div>FxTARF_physical</div> <div>FX</div> <div>Ente</div> </div>					
		<div> <div>Price</div> <div>Price</div> <div>Price</div> <div>Price</div> <div>Price</div> <div>Price</div> </div>					
		<div> <div>Save</div> <div>Save</div> <div>Save</div> <div>Save</div> <div>Save</div> <div>Save</div> </div>					
		<div> <div>Solve</div> <div>Don't Solve</div> <div>Don't Solve</div> <div>Don't Solve</div> <div>Don't Solve</div> <div>Don't Solve</div> </div>					
		<div> <div>Trade Id</div> <div>501567</div> <div>501570</div> <div>501571</div> <div>501572</div> <div>501573</div> </div>					
		<div> <div>Trade Version</div> <div>1</div> <div>0</div> <div>0</div> <div>2</div> <div>0</div> </div>					
		<div> <div>Status</div> <div>VERIFIED</div> <div>VERIFIED</div> <div>VERIFIED</div> <div>KNOCKED_OUT</div> <div>VERIFIED</div> </div>					
		<div> <div>Action</div> <div>AMEND</div> <div>AMEND</div> <div>AMEND</div> <div>AMEND</div> <div>AMEND</div> </div>					
		<div> <div>Book</div> <div>SCOT Barrier</div> <div>SCOT Barrier</div> <div>SCOT Barrier</div> <div>SCOT Barrier</div> <div>SCOT Barrier</div> </div>					
		<div> <div>Counterparty Role</div> <div>CounterParty</div> <div>CounterParty</div> <div>CounterParty</div> <div>CounterParty</div> <div>CounterParty</div> </div>					
		<div> <div>Counterparty</div> <div>CP</div> <div>CP</div> <div>CP</div> <div>CP</div> <div>CP</div> </div>					
		<div> <div>Notional</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>-130,000,000.00</div> </div>					
		<div> <div>Ccy1 Amount</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>1,000,000.00</div> <div>1,000,000.00</div> </div>					
		<div> <div>Ccy2 Amount</div> <div></div> <div></div> <div></div> <div></div> <div>-130,000,000.00</div> </div>					
		<div> <div>Product Type</div> <div>ScriptableOTCProduct</div> <div>ScriptableOTCProduct</div> <div>ScriptableOTCProduct</div> <div>ScriptableOTCProduct</div> <div>FX</div> </div>					
		<div> <div>Product Subtype</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div>FX</div> </div>					
		<div> <div>Ccy Pair</div> <div>USD/JPY</div> <div>USD/JPY</div> <div>USD/JPY</div> <div>USD/JPY</div> <div>USD/JPY</div> </div>					
		<div> <div>Notional Ccy</div> <div>USD</div> <div>USD</div> <div>USD</div> <div>USD</div> <div>JPY</div> </div>					
		<div> <div>Buy/Sell</div> <div>Buy</div> <div>Buy</div> <div>Buy</div> <div>Buy</div> <div>Buy</div> </div>					
		<div> <div>Settle Type</div> <div></div> <div></div> <div></div> <div></div> <div>Physical</div> </div>					
		<div> <div>Trade Date</div> <div>09/26/2023</div> <div>09/26/2023</div> <div>09/26/2023</div> <div>09/26/2023</div> <div>10/05/2023</div> </div>					
		<div> <div>Trade Time</div> <div>10:00:00.000 AM</div> <div>10:00:00.000 AM</div> <div>10:00:00.000 AM</div> <div>10:00:00.000 AM</div> <div>09:14:17.958 AM</div> </div>					
		<div> <div>Settlement Date</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div></div> </div>					
		<div> <div>Start Date</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div></div> </div>					
		<div> <div>End Date</div> <div>10/26/2023</div> <div>10/26/2023</div> <div>10/26/2023</div> <div>10/26/2023</div> <div></div> </div>					
		<div> <div>Strike</div> <div></div> <div></div> <div></div> <div></div> <div>130.0000</div> </div>					
		<div> <div>Observation Source</div> <div>USD/JPY FX</div> <div>USD/JPY FX</div> <div>USD/JPY FX</div> <div>USD/JPY FX</div> <div></div> </div>					
		<div> <div>Premium Date</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div>09/28/2023</div> <div></div> </div>					
		<div> <div>Pricing Model</div> <div>BlackNFMonteCarlo...</div> <div>BlackNFMonteCarlo...</div> <div>BlackNFMonteCarlo...</div> <div>BlackNFMonteCarlo...</div> <div>FX</div> </div>					
		<div> <div>Model Premium</div> <div>USD -397,765.84</div> <div>-164,658.33</div> <div>-155,093.32</div> <div>-78,014.19</div> <div>0.00</div> </div>					
		<div> <div>Customer Premium</div> <div>USD -343,663.40</div> <div>-85,915.85</div> <div>-85,915.85</div> <div>-85,915.85</div> <div>-85,915.85</div> </div>					
		<div> <div>Product ID Type</div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>					
		<div> <div>Product ID</div> <div>FXUSD/JPY</div> <div>FXUSD/JPY</div> <div>FXUSD/JPY</div> <div>FXUSD/JPY</div> <div></div> </div>					
		<div> <div>Payout</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div>FxTARFphysical</div> <div></div> </div>					
		<div> <div>Underlying</div> <div>FX.USD.JPY</div> <div>FX.USD.JPY</div> <div>FX.USD.JPY</div> <div>FX.USD.JPY</div> <div></div> </div>					
		<div> <div>Equity Reset</div> <div>CLOSE</div> <div>CLOSE</div> <div>CLOSE</div> <div>CLOSE</div> <div></div> </div>					
		<div> <div>Delivery Date</div> <div></div> <div></div> <div></div> <div></div> <div>10/09/2023</div> </div>					
		<div> <div>Trade Term</div> <div>2D</div> <div>2D</div> <div>2D</div> <div>2D</div> <div>SPOT</div> </div>					
		<div> <div>AccrualSchedule</div> <div>09/28/2023 - 10/26/...</div> <div>09/28/2023 - 10/26/...</div> <div>09/28/2023 - 10/26/...</div> <div>09/28/2023 - 10/26/...</div> <div></div> </div>					
		<div> <div>CallPut</div> <div>Call</div> <div>Call</div> <div>Call</div> <div>Call</div> <div></div> </div>					
		<div> <div>NPV</div> <div>JPY</div> <div>67,115,091.69</div> <div>23,229,288.11</div> <div>21,879,897.46</div> <div>11,005,905.88</div> <div>0.00</div> <div>11,000,000.24</div> </div>					
		<div> <div>PV</div> <div>JPY</div> <div>67,115,091.69</div> <div>23,229,288.11</div> <div>21,879,897.46</div> <div>11,005,905.88</div> <div>0.00</div> <div>11,000,000.24</div> </div>					
		<div> <div>NPV_PAYLEG</div> <div>JPY</div> <div></div> <div></div> <div></div> <div></div> <div></div> <div>-130,000,002.89</div> </div>					
		<div> <div>NPV_RECLEG</div> <div>JPY</div> <div></div> <div></div> <div></div> <div></div> <div></div> <div>141,000,003.14</div> </div>					

Parent Trade is Knocked Out and NPV is Zero - New FX Trade is created out of Physical Delivery Event.

New FX Trade is created out of Physical Delivery Event.

Trade Example - FXTARF Cash Settlement

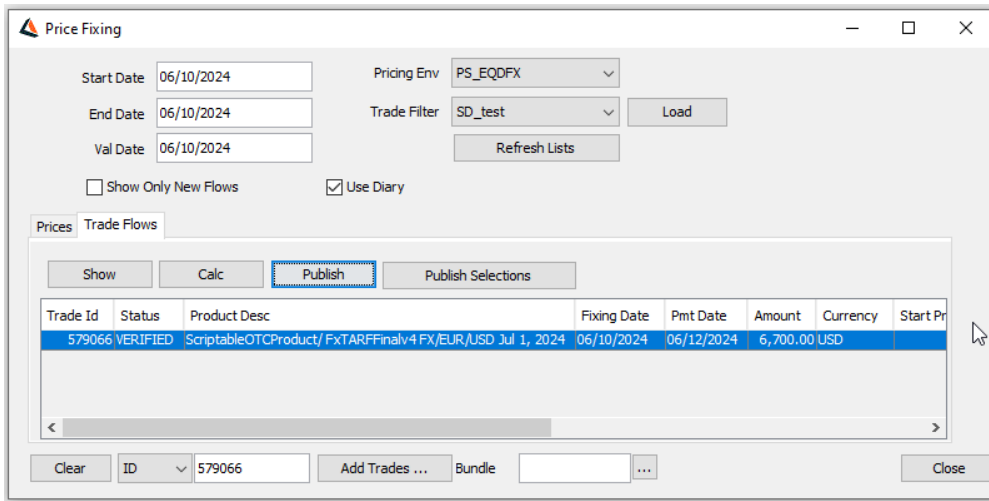
Trade Entry

Market Data		Strategy Name	
Default Rate Sides	Choice	1	2
EUR/USD Spot	1.0905	Strategy Name	FxTARFFinalv4
EUR/USD_ECB	1.090500000000	Price	Price
EUR LIBOR 6M Curve	PS.EUR.LIBOR.CLOSE	Save	Save
EUR/USD Vol	PS_EURUSD_FXOption_der...	Solve	Don't Solve
USD LIBOR 3M Curve	ZC USD Libor	Template	
		Trade Id	579066
		Status	VERIFIED
		Action	AMEND
		Book	SD_test
		Counterparty	CP
		Product Type	ScriptableOTCProduct
		Product Subtype	FxTARFFinalv4
		Trade Date	06/03/2024
		Trade Time	10:00:00.000 AM
		Start Date	06/03/2024
		End Date	07/01/2024
		Settlement Date	06/05/2024
		Buy/Sell	Buy
		Notional Ccy	EUR
		Notional	1,000,000.00
		Ccy1 Amount	1,000,000.00
		Ccy2 Amount	
		Ccy Pair	EUR/USD
		Underlying	FX.EUR.USD
		Observation Source	EUR/USD_ECB
		Pricing Model	BlackNFMonteCarloExotic
		Premium Date	06/05/2024
		Customer Premium	EUR 5,000.00
		AccrualSchedule	06/03/2024 - 07/01/2024 WK NYC 2D
		CallPut	Call
		Cash Residual	<input checked="" type="checkbox"/>
		FinalPaymentType	Full
		KOLevel	0.0120
		LeverageRatio	2.00
		SettleCcy	USD
		SettlementType	Cash
		Strike	1.0700
		NPV	USD 17,934.77
		PV	USD 12,483.73

Cashflows

Leg	Even Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount
1	06/05/2024	Fee	06/05/2024	06/05/2024	CP		PREMIUM		EUR						5,000.00
1	06/12/2024	Cash Flow	06/10/2024	06/10/2024	CP		PAYOUT		USD					06/10/2024	6,700.00
1	06/19/2024	Cash Flow	06/17/2024	06/17/2024	CP		PAYOUT		USD					06/17/2024	3,500.00
1	06/26/2024	KNOCK_OUT	06/24/2024	06/24/2024	CP		PAYOUT		USD					06/24/2024	3,600.00

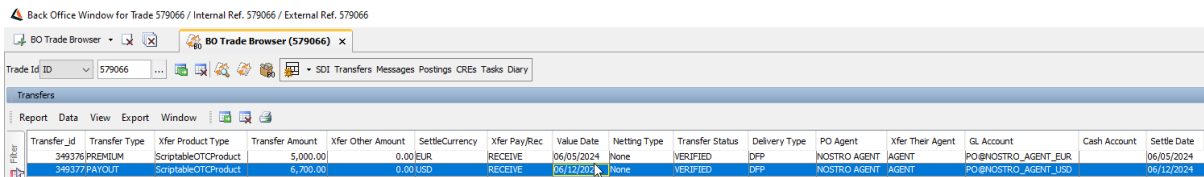
Price Fixing



Price Fixing window showing trade details for Trade ID 579066. The window includes fields for Start Date, End Date, Val Date, Pricing Env, Trade Filter, and buttons for Load, Refresh Lists, Show, Calc, Publish, and Publish Selections. The main table displays trade details.

Trade Id	Status	Product Desc	Fixing Date	Pmt Date	Amount	Currency	Start Pr
579066	VERIFIED	ScriptableOTCProduct/ FxTARFFinalv4 FX/EUR/USD Jul 1, 2024	06/10/2024	06/12/2024	6,700.00	USD	

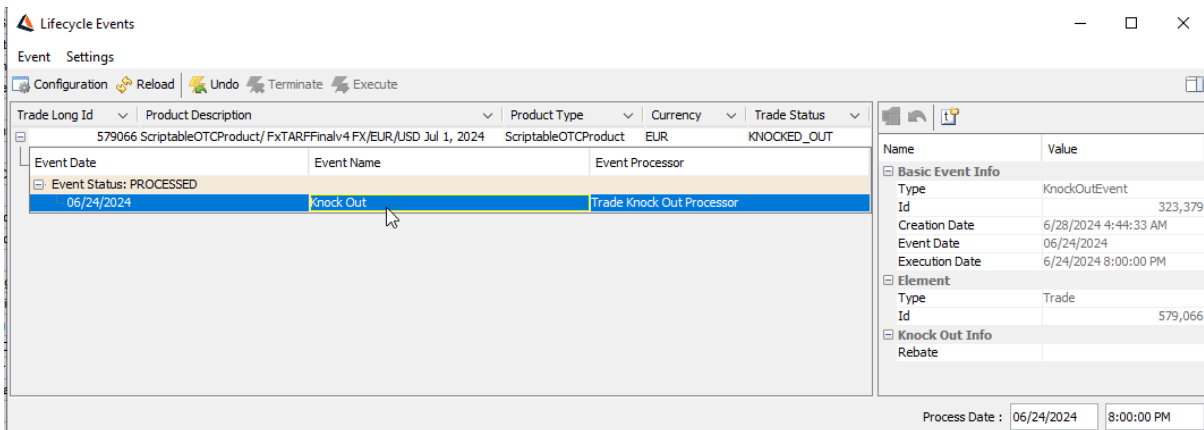
Transfer is generated after Price Fixing



BO Trade Browser window showing trade details for Trade ID 579066. The window displays a table of transfers with columns for Transfer Id, Transfer Type, Xfer Product Type, Transfer Amount, Xfer Other Amount, Settle Currency, Xfer Pay/Rec, Value Date, Netting Type, Transfer Status, Delivery Type, PO Agent, Xfer Their Agent, GL Account, Cash Account, and Settle Date.

Transfer Id	Transfer Type	Xfer Product Type	Transfer Amount	Xfer Other Amount	Settle Currency	Xfer Pay/Rec	Value Date	Netting Type	Transfer Status	Delivery Type	PO Agent	Xfer Their Agent	GL Account	Cash Account	Settle Date
349376	PREMIUM	ScriptableOTCProduct	5,000.00	0.00	EUR	RECEIVE	06/05/2024	None	VERIFIED	DFP	NOSTRO AGENT	AGENT	PO@NOSTRO_AGENT_EUR		06/05/2024
349377	PAYOUT	ScriptableOTCProduct	6,700.00	0.00	USD	RECEIVE	06/12/2024	None	VERIFIED	DFP	NOSTRO AGENT	AGENT	PO@NOSTRO_AGENT_USD		06/12/2024

Lifecycle Event – KnockOut



Lifecycle Events window showing event details for Trade Long ID 579066. The window displays a table of events with columns for Event Date, Event Name, and Event Processor. The right pane shows event details for the selected event.

Event Date	Event Name	Event Processor
06/24/2024	Knock Out	Trade Knock Out Processor

Basic Event Info:

- Type: KnockOutEvent
- Id: 323,379
- Creation Date: 6/28/2024 4:44:33 AM
- Event Date: 06/24/2024
- Execution Date: 6/24/2024 8:00:00 PM

Element:

- Type: Trade
- Id: 579,066

Knock Out Info:




- Rebate:

Process Date: 06/24/2024 8:00:00 PM

Resulting Trade after Knock Out

Strategy Name	FxTARFFinalv4	Enter Strategy...
Price	Price	
Save	Save	
Solve	Don't Solve	
Template		
Trade Id	579066	
Status	KNOCKED_OUT	
Action	AMEND	
Book	SD_test	
Counterparty	CP	
Product Type	ScriptableOTCProduct	
Product Subtype	FxTARFFinalv4	
Trade Date	06/03/2024	
Trade Time	10:00:00.000 AM	
Start Date	06/03/2024	
End Date	07/01/2024	
Settlement Date	06/05/2024	
Buy/Sell	Buy	
Notional Ccy	EUR	
Notional	1,000,000.00	
Ccy1 Amount	1,000,000.00	
Ccy2 Amount		
Ccy Pair	EUR/USD	
Underlying	FX.EUR.USD	
Observation Source	EUR/USD_ECB	
Pricing Model	BlackNFMonteCarlo...	
Premium Date	06/05/2024	
Customer Premium	EUR 5,000.00	
AccrualSchedule	06/03/2024 - 07/01/...	
CallPut	Call	
Cash Residual	<input checked="" type="checkbox"/>	
FinalPaymentType	Full	
KOLevel	0.0120	
LeverageRatio	2.00	
SettleCcy	USD	
SettlementType	Cash	
Strike	1.0700	

Trade Attributes

Setup    ☐ Editable

Name	Value
CurrencyPair	EUR/USD
DealPricingModel	BlackNFMonteCarloExotic
EXERCISED_DATETIME	6/24/24 8:00:00.000 PM EDT
LifeCycleEventId	323379
NegotiatedCurrency	EUR
PremRate	=0.5
PriceCcy	EUR
PSSstrategyName	FxTARFFinalv4
RateSide	Choice
TerminationTradeDate	6/24/24 8:00:00.000 PM EDT
TerminationType	KNOCK_OUT
TerminationDate	

OK Cancel


Example 4 - Basket Worst M

Description

Payment of worst performance of Equity Basket

Code

Variables

```
Script: Variables |  Keywords | Types | Product Properties | Re
1 Constant Strike As ReferenceDate From Product.StartDate
2 Constant Exercise As PaymentDate From Product.Maturity
3 Constant Basket As Quotable[] From Product.Basket
4 Constant N As Integer From Product.BasketSize
5 Constant Weight As Double[] From Product.Basket
6 Constant PayRec As Integer From Product.BuySell
7 Constant Notional As Double From Product.Notional
8 Constant PaymentCurrency As Currency From Product.Currency
9 Constant M As Integer
10 StrikePrice As Double[] From N
11 Return As Double[] From N
12 ReturnRank As Integer[] From N
13 BasketReturn As Measure
14 TotalWeight As Double
15 i As Integer
16 Option As Measure To NPV
```

Variable Name	Type	Description
M	Integer	M worst performance from all constituents of Basket
Weight	Double Array	weight of each constituent of basket

Forward Script

```

Script: Forward
1
2 Strike:
3   For i = 1 To N
4     StrikePrice[i] = Basket[i]
5   Next
6 Exercise:
7   For i = 1 To N
8     Return[i] = (Basket[i] / StrikePrice[i])
9   Next
10  Rank(Return, ReturnRank)
11  For i = 1 To N
12    If (ReturnRank[i] > (N - M)) Then
13      BasketReturn += (Weight[i] * Return[i])
14      TotalWeight += Weight[i]
15    EndIf
16  Next
17  BasketReturn = (BasketReturn / TotalWeight)
18  Option = Cash((PayRec * (Notional * BasketReturn)), PaymentCurrency)

```

Strike

Sample the underlying basket quotes

1. Sample the underlying performances
2. Rank the performances and store the results in ReturnRank

Exercise

3. For all performances that rank among the M worst, calculate the weighted average.
4. Pay out the weighted average performance multiplied by notional

Trade Example

Trade Entry

Pricing Sheet 1 [18240601/EQDB18New/calypso_user]

PricingSheet View MarketData Tools Analysis Processing Configuration Help

Cash Flows Payoff Fields: Fields: Fields: PRICING GREEKS GREEKS RISK DETAILS Properties Measures Copy Add Reverse Copy Add Reverse - BTB Refresh Quotes Refresh Mkt Data Refresh All And Reprice Search Trade/Bund

Market Data		Totals		1	2	3
Default Rate Sides	Choice	Strategy Name		EquityBasketWorstMv4	EquityBasketWorstMv4	Enter S
AAPL	194.350000000000	Price		Price	Price	
AAPL.NASDAQ	194.350000000000	Save		Save	Save	
GOOG	175.130000000000	Solve		Don't Solve	Don't Solve	
GOOG.NASDAQ	175.130000000000	Template				
MSFT	416.070000000000	Trade Id		578566	578567	
MSFT.NASDAQ	416.070000000000	Status		VERIFIED	VERIFIED	
AAPL Div Curve	S_AAPL_Div	Action		AMEND	AMEND	
AAPL USD Vol	Aapl_Vol	Book		SD_test	SD_test	
Correlation CorrelationMatrix	PS_EQEQ	Counterparty		CP	CP	
GOOG Div Curve	S_GOOG_Div_Yield	Product Type		ScriptableOTCProduct	ScriptableOTCProduct	
GOOG USD Vol	Goog_Vol	Product Subtype		EquityBasketWorstMv4	EquityBasketWorstMv4	
MSFT Div Curve	S_MSFT_Div_Yield	Trade Date		05/01/2024	05/01/2024	
MSFT USD Vol	Msft_Vol	Trade Time		10:00:00.000 AM	10:00:00.000 AM	
USD LIBOR 3M Curve	ZC USD Libor	Start Date		05/01/2024	05/01/2024	
		End Date		05/31/2024	05/31/2024	
		Settlement Date		05/03/2024	05/03/2024	
		Buy/Sell		Buy	Buy	
		Notional Ccy		USD	USD	
		Notional		1,000,000.00	1,000,000.00	
		Underlying		Basket AAPL.GOOG.MSFT_Wts	Basket AAPL.GOOG.MSFT_Wts	
		Pricing Model		BlackNFMonteCarloExotic	BlackNFMonteCarloExotic	
		Premium Date		05/03/2024	05/03/2024	
		Customer Premium		USD 2,000,000.00	1,000,000.00	1,000,000.00
		M		1	2	
		Weight				
		NPV	USD	2,101,590.20	1,050,673.43	1,050,916.77
		PV	USD	2,101,590.20	1,050,673.43	1,050,916.77

Fields: Main Fields: Pricing

Underlying Basket

Underlying							
Complex Variables Pricing Script Event Grid Script Results Resets							
Weight Type: Weight Apply equal weights							
Asset	Quotable	Asset Ccy	Size/Weight(%)	FX Pair	Quanto/Compo	FX Reset	Fixed FX Rate
Equity.AAPL	AAPL.NASDAQ	USD	40.00	USD/USD	NONE		
Equity.GOOG	GOOG.NASDAQ	USD	35.00	USD/USD	NONE		
Equity.MSFT	MSFT.NASDAQ	USD	25.00	USD/USD	NONE		

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount	1 of
1	06/04/2024	Cash Flow	05/31/2024	05/31/2024	CP		PAYOUT		USD					05/31/2024	1,050,673.44	
2	06/04/2024	Cash Flow	05/31/2024	05/31/2024	CP		PAYOUT		USD					05/31/2024	1,050,916.78	
1	05/03/2024	Fee	05/03/2024	05/03/2024	CP		PREMIUM		USD						1,000,000.00	
2	05/03/2024	Fee	05/03/2024	05/03/2024	CP		PREMIUM		USD						1,000,000.00	

Event Grid

Underlying				Complex Variables				Pricing Script				Event Grid				Script Results				Resets			
Date		Events																					
05/01/2024		[Strike]																					
05/31/2024		[Exercise]																					

Script Results

Underlying				Complex Variables				Pricing Script				Event Grid				Script Results				Resets			
Measures: 6/27/24 8:55:39.054 AM EDT																							
Measure		Value																					
Option		1,050,673.431177																					
BasketReturn		1.050673																					

Resets

Underlying				Complex Variables				Pricing Script				Event Grid				Script Results				Resets			
All		Equity																					
Date		Value		Idx Term		Name																	
05/01/2024		169.3				EquityReset.AAPL.NASDAQ																	
05/01/2024		165.57				EquityReset.GOOG.NASDAQ																	
05/01/2024		394.94				EquityReset.MSFT.NASDAQ																	
05/31/2024		192.25				EquityReset.AAPL.NASDAQ																	
05/31/2024		173.96				EquityReset.GOOG.NASDAQ																	
05/31/2024		415.13				EquityReset.MSFT.NASDAQ																	


Example 5 - Hybrid Dual Digital

Description

Payment of Coupon if Equity/Index performance is above a certain strike level and FX performance is below a certain strike level.

Code

Variables





```
Script: Variables ▾ |  Keywords ▾ Types ▾ Product Properties ▾

1 Constant Start As ReferenceDate From Product.StartDate
2 Constant Exercise As PaymentDate From Product.Maturity
3 Constant BuySell As Integer From Product.BuySell
4 Constant PaymentCcy As Currency From Product.Currency
5 Constant Notional As Double From Product.Notional
6 Constant Index As Quotable From Product.Underlying
7 Constant IndexStrike As Double From 1
8 IndexInitialLevel As Double
9 IndexPerf As Double
10 mIndexPerf As Measure
11 Constant FX As Quotable
12 Constant FXStrike As Double From 1
13 FXInitialLevel As Double
14 FXPerf As Double
15 mFXPerf As Measure
16 Payoff As Double
17 mPayoff As Measure
18 Constant CouponRate As Double From 0.05
19 Option As Measure To NPV
```

Variable Name	Type	Description
IndexStrike	Double	Index Strike above which coupon should be paid
FXStrike	Double	FX Strike above which coupon should be paid
CouponRate	Double	Coupon that should be paid

Forward Script

Script: Forward

Keywords

Functions

Operators

Reserved

```

1
2  Start:
3     IndexInitialLevel = Index
4     FXInitialLevel = FX
5  Exercise:
6     IndexPerf = (Index / IndexInitialLevel)
7     FXPerf = (FX / FXInitialLevel)
8     If ((IndexPerf > IndexStrike) AND (FXPerf < FXStrike)) Then
9         Payoff = (CouponRate * Notional)
10    Else
11        Payoff = 0
12    EndIf
13    Option += Cash((BuySell * Payoff), PaymentCcy, 'EXERCISE')
14    mIndexPerf = IndexPerf
15    mFXPerf = FXPerf
16    mPayoff = Payoff

```

Start	Calculate the initial index level and FX level
Exercise	1. Calculate the index performance
	2. Calculate the FX performance
	3. Check if Index performance is greater than index Strike and FX Performance is lower than FX Strike
	4. Pay an amount equivalent to Coupon * Notional if the above is true or else 0.

Trade Example

Trade Entry

Pricing Sheet 2 [18240601/EQDCMD/calypso_user]

PricingSheet View MarketData Tools Analysis Processing Configuration Help

Hide Sidebar Transpose Cash Flows Payoff Chart Fields: Main Fields: Pricing Fields: Sales Fields: Detail PRICING GREEKS GREEKS 2 RISK DETAILS Fields:None Properties Mei

Market Data

Default Rate Sides	Closing Price
USD/INR Spot	83.0000
AAPL Div Curve	AAPL div
AAPL USD Vol	AAPL_SVJ_VOL_Derived
Correlation CorrelationMatrix	PS_EQFX
INR MIBOR 1D Curve	MIBOR 3M
USD LIBOR 3M Curve	HS_USD LIBOR 3M
USD/INR Vol	USD/INR_PRICEVOL

Pricing

Valuation Date	07/03/2023
Valuation Time	10:16:04 AM
Pricing Env	S_EQD
Output 1 or 2 way	1-way

ODA Shortcuts

EQ DELTA	FX DELTA
EQ Spot slide	FX Spot Slide
EQ Spot Slide GREEKS	FX Spot Slide GREEKS
EQ VEGA (tents)	FX VEGA
EQ VEGA (UL)	RHO
EQD VEGA (pt, seq)	FWD Ladder
EQ VEGA (pt, cumul)	RESET 2M
EQ X-GAMMA	TimeHorizon
EQFX X-GAMMA	OLA Barrier
2D Div / Borrow	OLA Exercise
EQ 2D Spot / Vol	

Solver

Strip Generator

Leg Links

Leg 1 Details

Leg 1 Comments

Strategy Name	HybridEQFXDualDi...
Price	Price
Save	Save
Solve	Don't Solve
Template	
Trade Comment	
Action	AMEND
Status	VERIFIED
Counterparty	NONE
Counterpart Role	CounterParty
Book	GS_EQDCMD
Rate Side	Closing Price
Underlying	Equity AAPL
Product ID	AAPL
Bundle ID	
Notional	1,000,000.00
Buy/Sell	Buy
Settle Type	
Product Type	ScriptableOTCProd...
Notional Ccy	USD
Ccy Pair	USD/INR
Trade Date	06/01/2023
Trade Time	03:00:53.000 AM
Settlement Date	06/03/2023
Start Date	06/01/2023
End Date	07/03/2023
Ccy1 Amount	
Ccy2 Amount	
Payout	HybridEQFXDualDigi...
Pricing Model	BlackNFMonteCarlo...
CouponRate	5.00
FX	USD/INR
FXStrike	1.50
IndexStrike	1.00

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount	No. of Days	df	PV Amt	Rat Inde
1	07/05/2023	Cash Flow	07/03/2023	07/03/2023	NONE		PAYOUT		USD						07/03/2023	50,000.00		0.00000000	0.00

Event Grid

Complex Variables Pricing Script **Event Grid** Script Results Resets

Date	Events
06/01/2023	[Start]
07/03/2023	[Exercise]

Product.Maturity

Last Reset	Reference Date	Payment Date
07/03/2023	07/03/2023	07/05/2023

Product.StartDate

Last Reset	Reference Date
06/01/2023	06/01/2023

Script Results

Complex Variables	Pricing Script	Event Grid	Script Results	Resets
Measures: 7/29/24 10:20:26.478 AM EDT			Schedule Measures: 7/29/24 10:20:26.478 AM EDT	
Measure		Value		
mFXPerf		1.076923		
Option		49,998.357423		
mIndexPerf		1.059322		
mPayoff		50,000.000000		

Resets

Complex Variables | Pricing Script | Event Grid | Script Results | Resets

All

FX

Equity

Date	Value	Idx Term	Name	Type	Reset Name
06/01/2023	118		EquityReset.A...	Equity	NASDAQ
06/01/2023	80		FX.USD.INR.IN...	FX	CLOSE
07/03/2023	125		EquityReset.A...	Equity	NASDAQ
07/03/2023	86.15		FX.USD.INR.IN...	FX	CLOSE

Example 6 - Basket Reverse Convertible

This example shows Worst of Basket Barrier Monitoring and Bond Exotic Note features.

Description

- At Final Redemption Date, the payment amount is determined based on three scenarios.
 1. In the money- if all the basket components trade above strike price on final valuation date, then Note is redeemed at Notional Amount.
 2. Out of the money- if one or more basket components trade below strike price.
 - a) If KI event occurred, Note is redeemed physical delivery, paying out Notional/Strike shares. Any residual is paid in cash.
 - b) If KI event did not occur, Note is redeemed at Notional Amount.
- Knock In Event → KnockIn event is monitored daily. Any basket component trades below the KI level then KI event has occurred.
- Digital Coupon → Coupons paid monthly, if any basket component trades below the coupon strike level, the lower coupon amount is paid. Otherwise, a higher coupon amount is paid.
- Knock Out Event → If on any coupon reset date, all basket component trade above the KO barrier, the note is redeemed at notional, and the period coupon is still paid.

Code

Variables

```
Script: Variables ▾ * 📄 📁 📊 Keywords ▾ Types ▾ Product Properties ▾ Reserved ▾
1 Constant Start As ReferenceDate From Product.StartDate
2 Constant CouponPeriod As AccrualPeriod[]
3 Constant Maturity As PaymentDate From Product.Maturity
4 Constant Settlement As Enum 'Physical', 'Cash'
5 Constant KI As ReferenceDate[]
6 Constant KO As AccrualPeriod[]
7 Constant PrincipalProtection As Double From 1
8 Constant ITMParticipation As Double From 1
9 Constant StrikePct As Double From 1
10 Constant KI_BarrierPct As Double From 0.5
11 Constant KO_BarrierPct As Double From 1.5
12 Constant KO_Curr As Currency
13 Constant KO_FX As Double From 1
14 Constant KO_Rebate As Double From 0.1
15 Constant KO_PeriodDivisor As Double From 4
16 Constant KO_RebateType As Enum 'Absolute', 'Period'
17 Constant CouponRateStrikePct As Double From 1
18 Constant FinalCouponRate As Double From 0.0
19 Constant PayRec As Integer From Product.BuySell
20 Constant Curr As Currency From Product.Currency
21 Constant Notional As Double From Product.Notional
22 Constant Basket As Quotable[] From Product.Basket
23 Constant N As Integer From Product.BasketSize
24 Constant CouponRateHigh As Double From 0.1
25 Constant CouponRateLow As Double From 0
26 ValuationDate As ReferenceDate From Context.ValuationDate
27 KO_RebateAccrued As Double
28 AboveKO As Boolean
29 AboveCP As Boolean
30 DelivQty As Double
31 RealizedCoupon As Double
32 FlowValue As Double
33 i As Integer
34 KNOCKED_IN As Boolean
35 KNOCKED_OUT As Boolean
36 WorstLevel As Double
37 WorstLevelIndex As Integer
38 WorstLevelBarrierKO As Double
39 WorstLevelBarrierKI As Double
40 Strike As Double[] From Basket
41 CouponRateStrike As Double[] From Basket
42 KI_Barrier As Double[] From Basket
43 KO_Barrier As Double[] From Basket
44 Performance As Double[] From Basket
45 Option As Measure to NPV
46 Prob_KO As Measure
47 Prob_KI As Measure
```

Variable Name	Type	Description
CouponRate_High	Double	digital coupon amount
CouponRate_Low	Double	digital coupon amount
CouponStrikePct	Double	digital coupon strike
KI_BarrierPct	Double	KI level, as % of initial fixing
KO_BarrierPct	Double	KO level, as % of initial fixing
ValuationDate	ReferenceDate	This date is used by the barrier monitoring feature
WorstLevel	Double	internal variable
WorstLevelIndex	Integer	this is used for barrier monitoring as well as an internal variable
WorstLevelBarrierKO	Double	barrier monitoring
WorstLevelBarrierKI	Double	barrier monitoring

Forward Script

```

Script: Forward
1
2 Start:
3 For i = 1 To N
4   Strike[i] = (StrikePct * Basket[i])
5   KO_Barrier[i] = (KO_BarrierPct * Basket[i])
6   KI_Barrier[i] = (KI_BarrierPct * Basket[i])
7   CouponRateStrike[i] = (CouponRateStrikePct * Basket[i])
8 Next
9 ValuationDate:
10 WorstLevel = Infinity
11 WorstLevelIndex = 1
12 For i = 1 To N
13   Performance[i] = (Basket[i] / Strike[i])
14   If (Performance[i] < WorstLevel) Then
15     WorstLevelIndex = i
16     WorstLevel = Performance[i]
17     WorstLevelBarrierKO = KO_Barrier[i]
18     WorstLevelBarrierKI = KI_Barrier[i]
19   EndIf
20 Next
21 KI:
22 m_Prob_KI = 0
23 If Not (KNOCKED_IN) Then
24   For i = 1 To N
25     If (Basket[i] <= KI_Barrier[i]) Then
26       m_Prob_KI = 1
27       KNOCKED_IN = True
28     EndIf
29   Next
30 EndIf
31 CouponPeriod:
32 If Not (KNOCKED_OUT) Then
33   AboveCP = True
34   For i = 1 To N
35     If (Basket[i] < CouponRateStrike[i]) Then
36       AboveCP = False
37     EndIf
38   Next
39   RealizedCoupon = If (AboveCP, CouponRateHigh, CouponRateLow)
40   FlowValue = Interest(Notional, (PayRec * RealizedCoupon), Curr, 'DGT_COUPON')
41   Option += FlowValue
42 EndIf
43 KO:
44 KO_RebateAccrued += (KO_Rebate / KO_PeriodDivisor)
45 If Not (KNOCKED_OUT) Then
46   AboveKO = True
47   For i = 1 To N
48     If (Basket[i] < KO_Barrier[i]) Then
49       AboveKO = False
50     EndIf
51 Next
52 If AboveKO Then
53   KNOCKED_OUT = True
54   Prob_KO = 1
55   Select Case KO_RebateType
56     Case 'Absolute'
57       FlowValue = Principal((((PayRec * Notional) * KO_FX) * (PrincipalProtection + KO_Rebate)), KO_Curr, 'KNOCK_OUT')
58     Case 'Period'
59       FlowValue = Principal((((PayRec * Notional) * KO_FX) * (PrincipalProtection + KO_RebateAccrued)), KO_Curr, 'KNOCK_OUT')
60   EndSelect
61   Option += FlowValue
62 EndIf
63 EndIf
64 Maturity:
65 If Not (KNOCKED_OUT) Then
66   WorstLevel = Infinity
67   WorstLevelIndex = 1
68   For i = 1 To N
69     Performance[i] = (Basket[i] / Strike[i])
70     If (Performance[i] < WorstLevel) Then
71       WorstLevelIndex = i
72       WorstLevel = Performance[i]
73     EndIf
74 Next
75 If Not (KNOCKED_IN) Then
76   FlowValue = Principal((((PayRec * Notional) * ((PrincipalProtection + (ITMParticipation * Max((Performance[WorstLevelIndex] - 1), 0))) + FinalCouponRate)), Curr, 'REDEMPTION')
77   Option += FlowValue
78 Else
79   Prob_KI = 1.0
80   If (Basket[WorstLevelIndex] >= Strike[WorstLevelIndex]) Then
81     FlowValue = Principal((((PayRec * Notional) * PrincipalProtection), Curr, 'REDEMPTION')
82     Option += FlowValue
83   Else
84     Select Case Settlement
85       Case 'Physical'
86         DelivQty = (Notional / Strike[WorstLevelIndex])
87         FlowValue = Physical(PayRec * DelivQty, Basket[WorstLevelIndex], 0.0, 1, 'REDEMPTION', 1)
88         Option += FlowValue
89       Case 'Cash'
90         FlowValue = Principal((((PayRec * Notional) * Performance[WorstLevelIndex]), Curr, 'REDEMPTION')
91         Option += FlowValue
92     EndSelect
93   EndIf
94 EndIf
95 EndIf
96 EndIf
97 EndIf

```

Trade Example – Scriptable OTC Product

Trade Entry

Market Data		1		2	
Default Rate Sides	Choice	Strategy Name	EquityReverseConvertiblev1		En
AAPL	220.270000000000	Price	Price		
AAPL.NASDAQ	220.270000000000	Save	Save		
GOOG	186.610000000000	Solve	Don't Solve		
GOOG.NASDAQ	186.610000000000	Template			
MSFT	459.280000000000	Trade Id	\$81570		
MSFT.NASDAQ	459.280000000000	Status	VERIFIED		
AAPL Div Curve	S_AAPL_Div	Action	AMEND		
AAPL USD Vol	Aapl_Vol	Book	ScriptDemo		
Correlation CorrelationMatrix	PS_EQEQ	Counterparty	CP		
GOOG Div Curve	S_GOOG_Div_Yield	Product Type	ScriptableOTCProduct		
GOOG USD Vol	Goog_Vol	Product Subtype	EquityReverseConvertiblev1		
MSFT Div Curve	S_MSFT_Div_Yield	Trade Date	05/01/2024		
MSFT USD Vol	Msft_Vol	Trade Time	10:00:00.000 AM		
USD LIBOR 3M Curve	ZC USD Libor	Start Date	05/01/2024		
		End Date	04/30/2025		
		Settlement Date	05/03/2024		
		Buy/Sell	Buy		
		Notional Ccy	USD		
		Notional	1,000,000.00		
		Underlying	Basket.AAPL.GOOG.MSFT_Wts		
		Pricing Model	BlackNFMonteCarloExotic		
		Premium Date	05/01/2024		
		Customer Premium	USD 1,000,000.00		
		Cash Residual	<input checked="" type="checkbox"/>		
		CouponPeriod	05/01/2024 - 04/30/2025 QTR NYC ACT/360		
		CouponRateHigh	10.00		
		CouponRateLow	0.00		
		CouponRateStrikePct	100.00		
		FinalCouponRate	0.00		
		ITMParticipation	100.00		
		KI	05/01/2024 - 04/30/2025 MTH NYC		
		KI_BarrierPct	50.00		
		KO	05/01/2024 - 04/30/2025 QTR NYC ACT/360		
		KO_BarrierPct	150.00		
		KO_Curr	USD		
		KO_FX	1.00		
		KO_PeriodDivisor	4.00		
		KO_Rebate	10.00		
		KO_RebateType	Absolute		
		PrincipalProtection	100.00		
		Settlement	Physical		
		StrikePct	100.00		
		NPV	USD 1,129,441.01		
		PV	USD 1,129,441.01		

Underlying Basket

Underlying Complex Variables Pricing Script Event Grid Script Results Resets							
Weight Type: Weight Apply equal weights							
Asset	Quotable	Asset Ccy	Size/Weight(%)	FX Pair	Quanto/Compo	FX Reset	Fixed FX Rate
Equity.AAPL	AAPL.NASDAQ	USD	40.00	USD/USD	NONE		
Equity.GOOG	GOOG.NASDAQ	USD	35.00	USD/USD	NONE		
Equity.MSFT	MSFT.NASDAQ	USD	25.00	USD/USD	NONE		

Event Grid

Underlying

Complex Variables

Pricing Script

Event Grid

Script Results

Resets

Date	Events
05/01/2024	[Start]
05/31/2024	[KI]
06/28/2024	[KI]
07/03/2024	[ValuationDate]
07/31/2024	[KI, CouponPeriod, KO]
08/30/2024	[KI]
09/30/2024	[KI]
10/31/2024	[KI, CouponPeriod, KO]
11/29/2024	[KI]
12/31/2024	[KI]
01/31/2025	[KI, CouponPeriod, KO]
02/28/2025	[KI]
03/31/2025	[KI]
04/30/2025	[KI, CouponPeriod, KO, Maturity]

Context.ValuationDate

Last Reset	Reference Date
07/03/2024	07/03/2024

KO

05/01/2024 - 04/30/2025 QTR NYC ACT...

Last Reset	Event Date	Start Date	End Date	Pmt Date
07/31/2024	07/31/2024	05/01/2024	07/31/2024	07/31/2024
10/31/2024	10/31/2024	07/31/2024	10/31/2024	10/31/2024
01/31/2025	01/31/2025	10/31/2024	01/31/2025	01/31/2025
04/30/2025	04/30/2025	01/31/2025	04/30/2025	04/30/2025

Product.StartDate

Last Reset	Reference Date
05/01/2024	05/01/2024

CouponPeriod

05/01/2024 - 04/30/2025 QTR NYC ACT...

Last Reset	Event Date	Start Date	End Date	Pmt Date
07/31/2024	07/31/2024	05/01/2024	07/31/2024	07/31/2024
10/31/2024	10/31/2024	07/31/2024	10/31/2024	10/31/2024
01/31/2025	01/31/2025	10/31/2024	01/31/2025	01/31/2025
04/30/2025	04/30/2025	01/31/2025	04/30/2025	04/30/2025

KI

05/01/2024 - 04/30/2025 MTH NYC

Last Reset	Reference Date
05/31/2024	05/31/2024
06/28/2024	06/28/2024
07/31/2024	07/31/2024
08/30/2024	08/30/2024
09/30/2024	09/30/2024
10/31/2024	10/31/2024
11/29/2024	11/29/2024
12/31/2024	12/31/2024
01/31/2025	01/31/2025
02/28/2025	02/28/2025

Product.Maturity

Last Reset	Reference Date	Payment Date
04/30/2025	04/30/2025	05/02/2025

Resets

Underlying Complex Variables Pricing Script Event Grid Script Results Resets							
All Equity							
Date	Value	Idx Term	Name	Type	Reset Name		
05/01/2024	169.3		EquityReset.AAPL.NASDAQ	Equity	NASDAQ		
05/01/2024	165.57		EquityReset.GOOG.NASDAQ	Equity	NASDAQ		
05/01/2024	394.94		EquityReset.MSFT.NASDAQ	Equity	NASDAQ		
05/31/2024	192.25		EquityReset.AAPL.NASDAQ	Equity	NASDAQ		
05/31/2024	173.96		EquityReset.GOOG.NASDAQ	Equity	NASDAQ		
05/31/2024	415.13		EquityReset.MSFT.NASDAQ	Equity	NASDAQ		
06/28/2024	210.62		EquityReset.AAPL.NASDAQ	Equity	NASDAQ		
06/28/2024	183.42		EquityReset.GOOG.NASDAQ	Equity	NASDAQ		
06/28/2024	446.95		EquityReset.MSFT.NASDAQ	Equity	NASDAQ		
07/31/2024			EquityReset.AAPL.NASDAQ	Equity	NASDAQ		
07/31/2024			EquityReset.GOOG.NASDAQ	Equity	NASDAQ		
07/31/2024			EquityReset.MSFT.NASDAQ	Equity	NASDAQ		

Worst of Basket Barrier Monitoring

- Context.ValuationDate is used for getting the valuation date from the product at the time of pricing.
- The block 'ValuationDate' needs to be in the script for worst-of basket.
- The barrier levels for the worst performer are computed as per valuation date. This is needed for both KI and KO and the levels are stored in variables WorstLevelBarrierKO and WorstLevelBarrierKI.
- The index for the worst performer is stored in the variable WorstLevelIndex.

Script Variables

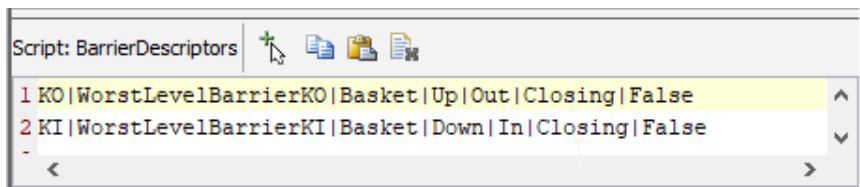
```
26 ValuationDate As ReferenceDate From Context.ValuationDate
```

Script Forward

```
9 ValuationDate:
10 WorstLevel = Infinity
11 WorstLevelIndex = 1
12 For i = 1 To N
13     Performance[i] = (Basket[i] / Strike[i])
14     If (Performance[i] < WorstLevel) Then
15         WorstLevelIndex = i
16         WorstLevel = Performance[i]
17         WorstLevelBarrierKO = KO_Barrier[i]
18         WorstLevelBarrierKI = KI_Barrier[i]
19     EndIf
20 Next
```

Barrier Descriptor

In the case of worst-of basket we can monitor the worst of component and tell the barrier monitoring the index of the same.



Variable Mapping

Mapping for PricingScript report	
File Selection	
WORST_LEVEL_INDEX	
Domain...	
Script Name	Variable Name
<input type="checkbox"/> EquityReverseConvertibleCash	
<input type="checkbox"/> EquityReverseConvertibleSwap	WorstLevelIndex
<input type="checkbox"/> EquityReverseConvertible1	WorstLevelIndex

Option Lifecycle Analysis

OptionLifecycle: OLA_Barrier

Type	Barrier
Include Activity Up To	1M
Day Start At	12:00:01 AM
Time Zone	America/New_York
Output	Trade Id,TradeStatus,Trade Currency,Product Type,Book,Product Description,Buy/Sell,Sub Type,Maturity Date
Trade Attributes	
Pricer Measures	
Bucket Barrier %	Range: -5.0,5.0,1.0
Bucket Barrier Active	0D,1D,2D,3D,1W,1M
Flip inverse options	<input type="checkbox"/>
Explode Swapion Straddles	<input type="checkbox"/>

CWS - OLA Barrier (Live Report)

Trade Id	TradeStatus	System Marking	Option Style	Reference Underlying	Reference Rate	Barrier Level	Barrier Percent from Spot	Absolute Distance from Spot
581570	VERIFIED	Level Not Hit	Up and Out	GOOG	184.74390	248.35500	34.43204	63.61110
581570	VERIFIED	Level Not Hit	Down and In	GOOG	184.74390	82.78500	-55.18932	101.95890

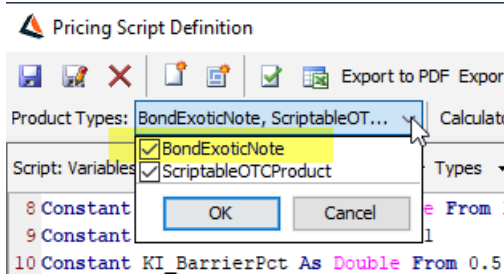
Basket Constituent	05-01-2024	07-03-2024	Performance	Up Barrier (150%)	Down Barrier (50%)
Equity.AAPL	169.3	220.27	30.11%	253.95	84.65
Equity.GOOG	165.57	186.61	12.71%	248.355	82.785
Equity.MSFT	394.94	459.28	16.29%	592.41	197.47

Google has worst performance as of valuation date hence showing GooG as reference underlying.

Trade Example – Bond Exotic Note

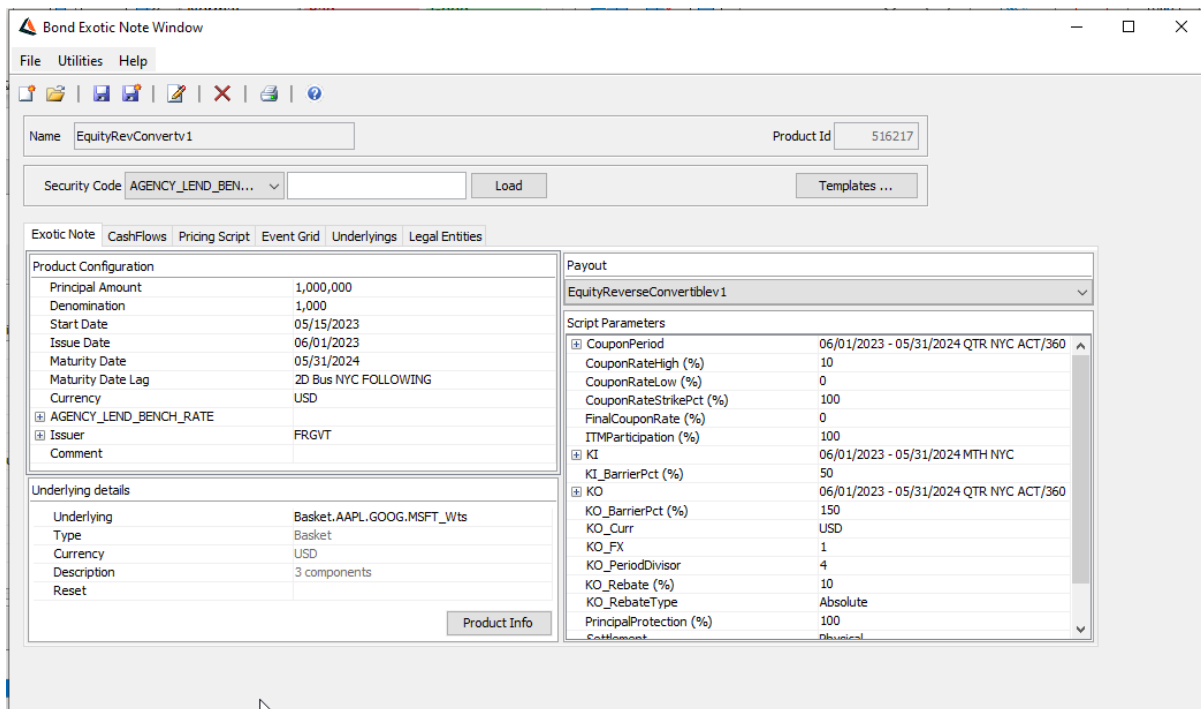
The Bond Exotic Note or BEN is a Bond product that uses Pricing Script in its product definition. It is like a standard Bond, position based.

Script can be configured as Bond Exotic Note if BondExoticNote Product Types is selected.



Product Definition

Exotic Note



Cashflows

Bond Exotic Note Window

File Utilities Help

Name: EquityRevConvertv1 Product Id: 516217

Security Code: AGENCY_LEND_BEN... Load Templates ...

Exotic Note CashFlows Pricing Script Event Grid Underlyings Legal Entities

Val Date: 07/03/2024 Pricing Env: PS_EQDFX Generate Check Past Resets

Pmt Begin	Pmt End	Pmt Dt	Pmt Amt	Manual Amt	Notional	Rate	Day Ct	Spread	Reset	Event	Type	Security
		05/15/2023	-1,000,000.00									
06/01/2023	08/31/2023	08/31/2023	25,280.00		1,000,000.00	10.000000	ACT/360		08/31/2023		INTEREST	
08/31/2023	11/30/2023	11/30/2023	25,280.00		1,000,000.00	10.000000	ACT/360		11/30/2023		INTEREST	
11/30/2023	02/29/2024	02/29/2024	25,280.00		1,000,000.00	10.000000	ACT/360		02/29/2024		INTEREST	
02/29/2024	05/31/2024	05/31/2024	25,560.00		1,000,000.00	10.000000	ACT/360		05/31/2024		INTEREST	
05/31/2024	05/31/2024	06/04/2024	1,117,740.00						05/31/2024	REDEMPTION	PRINCIPAL	

Event Grid

Bond Exotic Note Window

File Utilities Help

Name: EquityRevConvertv1 Product Id: 516217

Security Code: AGENCY_LEND_BEN... Load Templates ...

Exotic Note CashFlows Pricing Script Event Grid Underlyings Legal Entities

Date	Events
05/15/2023	[Start]
06/30/2023	[KI]
07/31/2023	[KI]
08/31/2023	[KI, CouponPeriod, KO]
09/29/2023	[KI]
10/31/2023	[KI]
11/30/2023	[KI, CouponPeriod, KO]
12/29/2023	[KI]
01/31/2024	[KI]
02/29/2024	[KI, CouponPeriod, KO]
03/28/2024	[KI]
04/30/2024	[KI]
05/31/2024	[KI, CouponPeriod, KO, Maturity]
07/03/2024	[ValuationDate]

Context	ValuationDate
KO	06/01/2023 - 05/31/2024 QTR NYC ACT/360
CouponPeriod	06/01/2023 - 05/31/2024 QTR NYC ACT/360
KI	06/01/2023 - 05/31/2024 MTH NYC
	Product.Maturity

Underlying

Bond Exotic Note Window

File Utilities Help

Name: EquityRevConvertv1 Product Id: 516217

Security Code: AGENCY_LEND_BEN... Load Templates ...

Exotic Note CashFlows Pricing Script Event Grid Underlyings Legal Entities

Asset	Quotable	Asset Ccy	Size/Weight(%)
Equity.AAPL	AAPL.NASDAQ	USD	40.00
Equity.GOOG	GOOG.NASDAQ	USD	35.00
Equity.MSFT	MSFT.NASDAQ	USD	25.00

Trade Entry

Trade 1

ExoticNoteEquityRevConvertv1/0D/05/31/2024/0% -PO is Default Processing Organisation (585066) - Version : 0 Mod User:(...)

Trade Back Office BondExoticNote Cashflows Analytics Pricing Env Market Data View Utilities Help

Trade Details Fees Cashflows Script Results Inv Attributes Resets Pricing Script Event Grid

Cpty: CP CounterParty Delete during implementation Book: BENtest

Template: NONE Status: VERIFIED Trade ID: 585066

Structured Note Trade

Direction	Buy
Nominal	2,000
Dirty Price (%)	99
Clean Price (%)	99
Override Accrual	<input type="checkbox"/>
Accrual	0
Accrual Days	0
Settle Date	07/12/2023

Note Details

Note	ExoticNoteEquityRevConvertv1/0D/05/31/2024/0%
Type	BondExoticNote
Currency	USD
Description	EquityRevConvertv1

Product Info

MarketData Pricer Params Results

	ACCRUAL	PV	NPV	DELTA	GAMMA	VEGA	THETA
Trade results	22.78	2,126.33	146.33	2,243.29547	-80.20601	-13.68482	0.57323

Val Date: 07/12/2023 11:59:59 PM Pricing Env: PS_EQDFX Price Close

Trade 2

ExoticNoteEquityRevConvertv1/0D/05/31/2024/0% -PO is Default Processing Organisation (585067) - Version : 0 Mod User :{...}

Trade Back Office BondExoticNote Cashflows Analytics Pricing Env Market Data View Utilities Help

Trade Details Fees Cashflows Script Results Inv Attributes Resets Pricing Script Event Grid

Cpty CounterParty Delete during implementation Book BENTest

Template NONE Status VERIFIED Trade ID 585067

Structured Note Trade

Direction	Buy
Nominal	3,000
Dirty Price (%)	99
Clean Price (%)	99
Override Accrual	<input type="checkbox"/>
Accrual	0
Accrual Days	0
Settle Date	07/19/2023

Note Details

Note	ExoticNoteEquityRevConvertv1/0D/05/31/2024/0%
Type	BondExoticNote
Currency	USD
Description	EquityRevConvertv1

Product Info

MarketData Pricer Params Results

	ACCRUAL	PV	NPV	DELTA	GAMMA	VEGA	THETA
Trade results	40.00	3,302.39	332.39	3,244.42561	-39.89656	-22.64837	0.82014

Val Date 07/19/2023 11:59:59 PM Pricing Env PS_EQDFX

Price Close

Position

Position Keeper Window

Tools Market Data Help

Val Date 07/20/2023 2:33:53 AM Product Hierarchy Position By Settle Date ☐ Liquidity Keys

Trade Filter BENTest Pricing Env PS_EQDFX Aggregation BookName Ind. Fees in Position ☐ Display Precision

Zero Positions Include Tolerance 0.00

Trade Open quantity

Position Id	Product Id	Description	Realized	Nominal	Currency	Average Price	Buy Accrual	Sell Accrual	Amount	Accrual	Reposable Position	Quantity	Dly Realized	Dly Unrealized	Dly P&L	Aggregation	Liq. Config	Liq. Aggregation
580568	516213	ExoticNoteEquityRevConvertv1/0D/05/31/2024/0%	0.00	20,000.00	USD	99.25000000	0.00	0.00	-19,850.00	0.00	20,000.00	20.00	0.00	3,412.44	3,412.44	BENTest	0/DEFAULT	
585068	516217	ExoticNoteEquityRevConvertv1/0D/05/31/2024/0%	0.00	5,000.00	USD	99.00000000	0.00	0.00	-4,950.00	0.00	5,000.00	5.00	0.00	445.45	445.45	BENTest	0/DEFAULT	

Liquidated Positions

Classical Report

First Trade Id	Second Trade Id	Type	Quantity	Nominal	First Price	First Accrual	Second Price	Second Accrual	Date	Realized	Effective Date	Clean Realized	Accrual Res

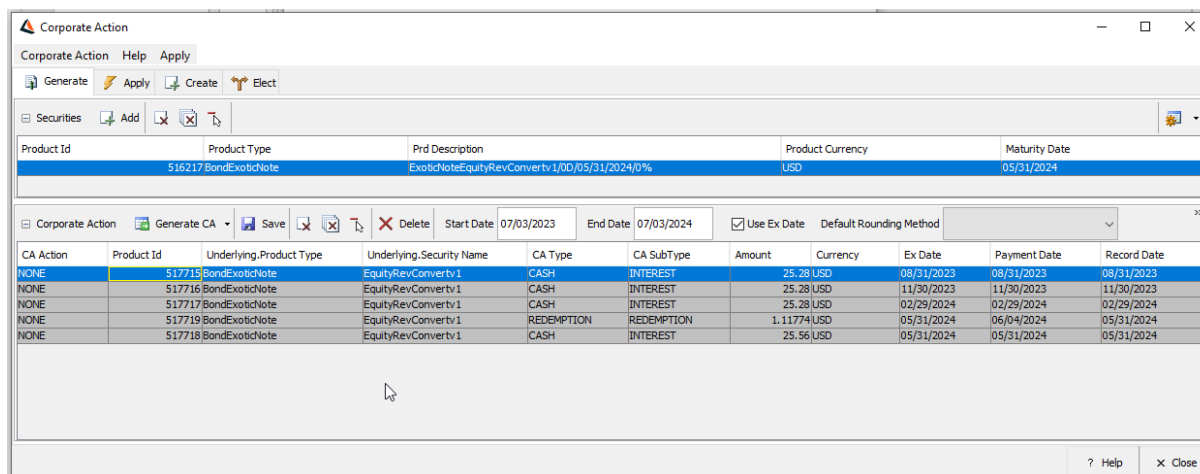
Open Positions

Trade Id	Product Id	Trade Date	Settle Date	Cash Settle Date	Open Quantity	Open Nominal	Quantity	Price	Accrual	Open Repo Quantity	Book
585066	516217	7/10/23 10:00:00.000 AM EDT	07/12/2023	07/12/2023	2.00	2,000.00	2.00	99.00000000	0.00000000	2.00	BENTest
585067	516217	7/10/23 10:00:00.000 AM EDT	07/19/2023	07/19/2023	3.00	3,000.00	3.00	99.00000000	0.00000000	3.00	BENTest

Update Freq 600 seconds ☐ Quote ☐ Market data ☐

Real Time ☒ Connected Load Clear Print Close

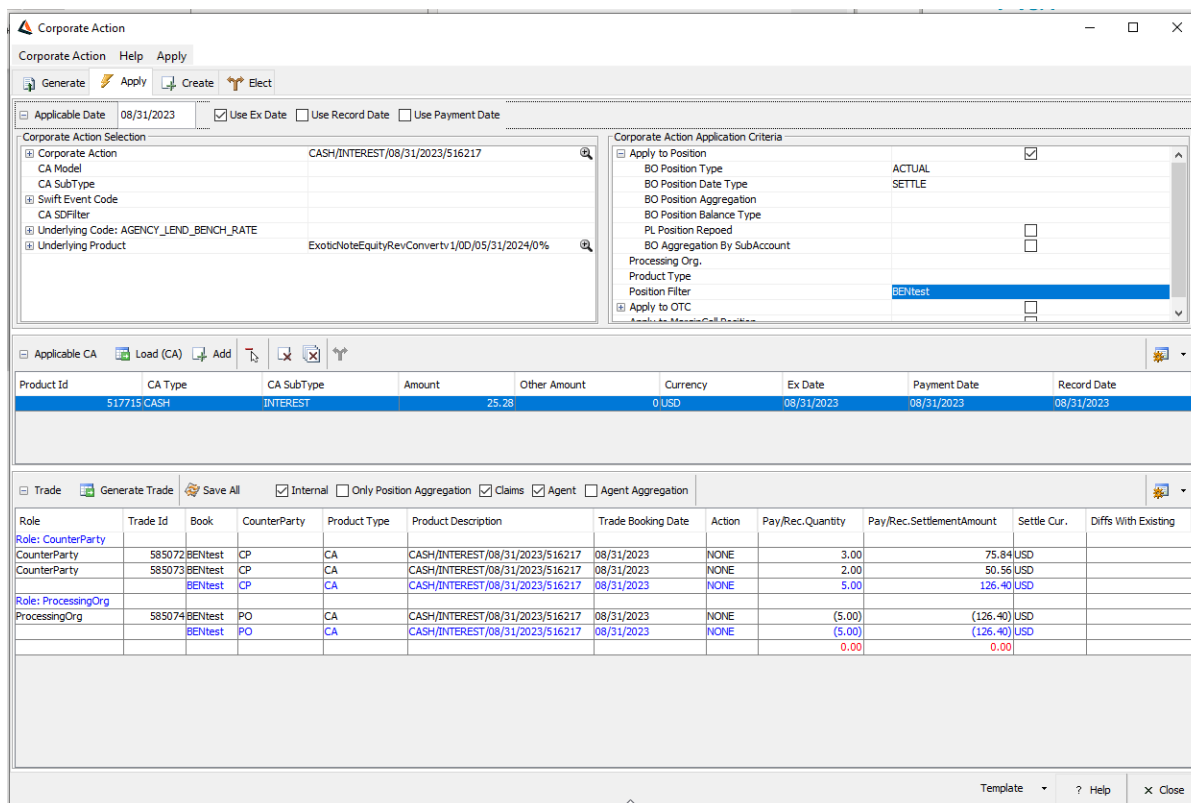
Corporate Action



Corporate Action window showing details for Product Id 516217, Product Type BondExoticNote, and Product Description ExoticNoteEquityRevConvertv1/0D/05/31/2024/0%. The window includes a table of Corporate Actions with columns: CA Action, Product Id, Underlying Product Type, Underlying Security Name, CA Type, CA SubType, Amount, Currency, Ex Date, Payment Date, and Record Date.

CA Action	Product Id	Underlying Product Type	Underlying Security Name	CA Type	CA SubType	Amount	Currency	Ex Date	Payment Date	Record Date
NONE	517715	BondExoticNote	EquityRevConvertv1	CASH	INTEREST	25.28	USD	08/31/2023	08/31/2023	08/31/2023
NONE	517716	BondExoticNote	EquityRevConvertv1	CASH	INTEREST	25.28	USD	11/30/2023	11/30/2023	11/30/2023
NONE	517717	BondExoticNote	EquityRevConvertv1	CASH	INTEREST	25.28	USD	02/29/2024	02/29/2024	02/29/2024
NONE	517719	BondExoticNote	EquityRevConvertv1	REDEMPTION	REDEMPTION	1.11774	USD	05/31/2024	06/04/2024	05/31/2024
NONE	517718	BondExoticNote	EquityRevConvertv1	CASH	INTEREST	25.56	USD	05/31/2024	05/31/2024	05/31/2024

Apply Interest CA



Apply Interest CA window showing Corporate Action Selection and Corporate Action Application Criteria. The Corporate Action Selection table includes columns: Product Id, CA Type, CA SubType, Amount, Other Amount, Currency, Ex Date, Payment Date, and Record Date.

Product Id	CA Type	CA SubType	Amount	Other Amount	Currency	Ex Date	Payment Date	Record Date
517715	CASH	INTEREST	25.28		0 USD	08/31/2023	08/31/2023	08/31/2023

The Corporate Action Application Criteria table includes columns: Apply to Position, BO Position Type, BO Position Date Type, BO Position Aggregation, BO Position Balance Type, PL Position Reposed, BO Aggregation By SubAccount, Processing Org, Product Type, Position Filter, and Apply to OTC.

Apply to Position	BO Position Type	BO Position Date Type	BO Position Aggregation	BO Position Balance Type	PL Position Reposed	BO Aggregation By SubAccount	Processing Org	Product Type	Position Filter	Apply to OTC
<input checked="" type="checkbox"/>	ACTUAL								BENtest	

The Trade table includes columns: Role, Trade Id, Book, CounterParty, Product Type, Product Description, Trade Booking Date, Action, Pay/Rec.Quantity, Pay/Rec.SettlementAmount, Settle Cur., and Diff's With Existing.

Role	Trade Id	Book	CounterParty	Product Type	Product Description	Trade Booking Date	Action	Pay/Rec.Quantity	Pay/Rec.SettlementAmount	Settle Cur.	Diff's With Existing
CounterParty	585072	BENtest	CP	CA	CASH/INTEREST/08/31/2023/516217	08/31/2023	NONE	3.00	75.84	USD	
CounterParty	585073	BENtest	CP	CA	CASH/INTEREST/08/31/2023/516217	08/31/2023	NONE	2.00	50.56	USD	
CounterParty		BENtest	CP	CA	CASH/INTEREST/08/31/2023/516217	08/31/2023	NONE	5.00	126.40	USD	
ProcessingOrg	585074	BENtest	PO	CA	CASH/INTEREST/08/31/2023/516217	08/31/2023	NONE	(5.00)	(126.40)	USD	
ProcessingOrg		BENtest	PO	CA	CASH/INTEREST/08/31/2023/516217	08/31/2023	NONE	(5.00)	(126.40)	USD	
								0.00	0.00		

- 2 Cash Interest CA Trades created to generate transfer
- 1 Internal Cash Interest CA Trade created to update P&L. Internal Trade is CA Trade between the book and the processing org to update P&L.

Example 7 - Single Equity Reverse Convertible

This example is the same as Basket Reverse Convertible but with Single Equity Underlying instead of Basket.

Description

- At Final Redemption Date, the payment amount is determined based on three scenarios.
 1. In the money → If the single underlying trades above strike price on final valuation date, Note is redeemed at Notional Amount.
 2. Out of the money → If the single underlying trades below strike price.
 - a) If KI event occurred, Note is redeemed physical delivery, paying out Notional/Strike shares. Any residual is paid in cash.
 - b) If KI event did not occur, Note is redeemed at Notional Amount.
- Knock In Event → KnockIn event is monitored daily. If the single underlying trades below the KI level then KI event has occurred.
- Digital Coupon → Coupons paid monthly, If the single underlying trades below the coupon strike level, the lower coupon amount is paid. Otherwise, a higher coupon amount is paid.
- Knock Out Event → If on any coupon reset date, the single underlying trades above the KO barrier, the note is redeemed at notional, and the period coupon is still paid.

Code

Variables

Script: Variables
+
Keywords
Types
Product Properties

```

1 Constant Start As ReferenceDate From Product.StartDate
2 Constant CouponPeriod As AccrualPeriod[]
3 Constant Maturity As PaymentDate From Product.Maturity
4 Constant Settlement As Enum 'Physical', 'Cash'
5 Constant KI As ReferenceDate[]
6 Constant KO As AccrualPeriod[]
7 Constant PrincipalProtection As Double From 1
8 Constant ITMParticipation As Double From 1
9 Constant StrikePct As Double From 1
10 Constant KI_BarrierPct As Double From 0.5
11 Constant KO_BarrierPct As Double From 1.5
12 Constant KO_Curr As Currency
13 Constant KO_FX As Double From 1
14 Constant KO_Rebate As Double From 0.1
15 Constant CouponRateStrikePct As Double From 1
16 Constant FinalCouponRate As Double From 0.0
17 Constant CouponRateHigh As Double From 0.1
18 Constant CouponRateLow As Double From 0
19 Constant Notional As Double From Product.Notional
20 Constant PayRec As Integer From Product.BuySell
21 Constant Curr As Currency From Product.Currency
22 Constant Index As Quotable From Product.Underlying
23 AboveKO As Boolean
24 AboveCP As Boolean
25 DelivQty As Double
26 RealizedCoupon As Double
27 FlowValue As Double
28 KNOCKED_IN As Boolean
29 KNOCKED_OUT As Boolean
30 Strike As Double
31 CouponRateStrike As Double
32 KI_Barrier As Double
33 KO_Barrier As Double
34 Performance As Double
35 Prob_KI As Measure
36 Prob_KO As Measure
37 Option As Measure to NPV

```


Forward Script

```

Script: Forward
2 Start:
3   Strike = (StrikePct * Index)
4   KO_Barrier = (KO_BarrierPct * Index)
5   KI_Barrier = (KI_BarrierPct * Index)
6   CouponRateStrike = (CouponRateStrikePct * Index)
7 KI:
8   If Not(KNOCKED_IN) Then
9     If (Index <= KI_Barrier) Then
10      KNOCKED_IN = True
11    EndIf
12  EndIf
13 CouponPeriod:
14   If Not(KNOCKED_OUT) Then
15     AboveCP = True
16     If (Index < CouponRateStrike) Then
17       AboveCP = False
18     EndIf
19     RealizedCoupon = If(AboveCP, CouponRateHigh, CouponRateLow)
20     FlowValue = Interest(Notional, (PayRec * RealizedCoupon), Curr, 'DGT_COUPON')
21     Option += FlowValue
22   EndIf
23 KO:
24   If Not(KNOCKED_OUT) Then
25     If (Index >= KO_Barrier) Then
26       KNOCKED_OUT = True
27       Prob_KO = 1
28       FlowValue = Principal((((PayRec * Notional) * KO_FX) * (PrincipalProtection + KO_Rebate)), KO_Curr, 'KNOCK_OUT')
29       Option += FlowValue
30     EndIf
31   EndIf
32 Maturity:
33   If Not(KNOCKED_OUT) Then
34     Performance = (Index / Strike)
35     If Not(KNOCKED_IN) Then
36       FlowValue = Principal(((PayRec * Notional) * ((PrincipalProtection + (IIMPparticipation * Max((Performance - 1), 0))) + FinalCouponRate)), Curr, 'REDEMPTION')
37       Option += FlowValue
38     Else
39       Prob_KI = 1.0
40       If (Index >= Strike) Then
41         FlowValue = Principal(((PayRec * Notional) * PrincipalProtection), Curr, 'REDEMPTION')
42         Option += FlowValue
43       Else
44         Select Case Settlement
45           Case 'Physical'
46             DelivQty = (Notional / Strike)
47             FlowValue = Physical((PayRec * DelivQty), Index, 0.0, 1, 'REDEMPTION', 1)
48             Option += FlowValue
49           Case 'Cash'
50             FlowValue = Principal(((PayRec * Notional) * Performance), Curr, 'REDEMPTION')
51             Option += FlowValue
52         EndSelect
53       EndIf
54     EndIf
55   EndIf

```

Trade Example

Trade Entry – Physical Delivery

Pricing Sheet 1 [18240601/EQDB18New/calypso_user]

PricingSheet View MarketData Tools Analysis Processing Configuration Help

Cash Flows Payoff Chart Fields: Main Pricing Sales Fields: PRICING GREEKS RISK DETAILS Properties Measures Copy Add Reverse Copy Add Reverse - BTB Refresh Quotes Refresh Mkt Data Refresh All And Reprice Search Trade/BundId

Market Data

Default Rate Sides	Choice
AAPL	220.270000000000
AAPL NASDAQ	220.270000000000
AAPL Div Curve	S_AAPL_Div
AAPL USD Vol	Aapl_Vol
USD LIBOR 3M Curve	ZC USD Libor

Pricing

Valuation Date: 07/03/2024
Valuation Time: 11:00:00 PM
Pricing Env: PS_EQDFX
Output 1 or 2 way: 1-way

ODA Shortcuts

Solver

Strip Generator

Rate Delta

Property Shortcut

Fields: Main	Fields: Pricing
PRICING	GREEKS
GREEKS 2	RISK
DETAILS	

TradeEntry Sheet 1 x TradeEntry Sheet 2 x

Totals	1	2	3
Strategy Name	EquitySingleReverseConvertible1	Equity	Enter Strategy...
Price	Price	Price	
Save	Save	Save	
Solve	Don't Solve	Don't Solve	
Template			
Trade Id	586572	586575	
Status	EXERCISED	VERIFIED	
Action	AMEND	AMEND	
Book	SD_test	SD_test	
Counterparty	CP	CP	
Product Type	ScriptableOTCProduct	Equity	
Product Subtype	EquitySingleReverseConvertible1	Standard	
Trade Date	06/30/2023	07/03/2024	
Trade Time	10:00:00.000 AM	06:00:00.000 PM	
Start Date	07/03/2023		
End Date	07/03/2024		
Settlement Date	07/03/2023	07/05/2024	
Buy/Sell	Buy	Buy	
Notional Ccy	USD	USD	
Notional	1,000,000.00		
Underlying	Equity AAPL	Equity AAPL	
Quantity		3,711	
Pricing Model	BlackNFMonteCarloExotic	Equity	
Premium Date	06/30/2023		
Price Format	USD %	USD	
Customer Premium	USD 1,000,000.00	1,000,000.00	
Product ID	AAPL	AAPL	
Settle Ccy		USD	
Settle Amount		0	
Cash Residual			
CouponPeriod	07/03/2023 - 07/03/2024 MTH NYC ACT/360		
CouponRateHigh	8.00		
CouponRateLow	2.00		
CouponRateStrikePct	100.00		
FinalCouponRate	0.00		
ITMParticipation	100.00		
KI	07/03/2023 - 07/03/2024 DLY NYC		
KI_BarrierPct	95.00		
KO	07/03/2023 - 07/03/2024 MTH NYC ACT/360		
KO_BarrierPct	150.00		
KO_Curr	USD		
KO_FX	1.00		
KO_Rebate	10.00		
NPV	USD 816,764.20	0.00	816,764.20
PV	USD 816,764.20	0.00	816,764.20

Trade Attributes

Name	Value
DealPricingModel	BlackNFMonteCarloExotic
EXERCISED_DATETIME	7/3/24 6:00:00.000 PM EDT
ExercisedUnder	586575
LATEST_EXERCISED_TRADE_DATET...	7/3/2024 10:00:00 PM
LifeCycleEventId	326382
PremRate	%=100
PriceCcy	USD
PSStrategyName	EquitySingleReverseConvertible1
RateSide	Choice
TerminationDate	

Parent Trade and Equity Trade created through Physical Delivery with quantity 3711 and remaining residual amount 76.29 paid in cash.

Notional	1000000
Initial Fixing	192.46
StrikePct	140%
Strike	269.444
Qty	3711.346
Qty Rounded	3711
Cash Residual	0.346328
Spot price	220.27

Cash Residual	76.29
---------------	-------

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount
1	06/30/2023	Fee	06/30/2023	06/30/2023	CP		PREMIUM		USD						1,000,000.00
1	08/03/2023	Cash Flow	07/03/2023	08/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		08/03/2023	1,722.23
1	09/05/2023	Cash Flow	08/03/2023	09/05/2023	CP		INTEREST		USD	1,000,000.00		2.000000		09/05/2023	1,833.34
1	10/03/2023	Cash Flow	09/05/2023	10/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		10/03/2023	1,555.56
1	11/03/2023	Cash Flow	10/03/2023	11/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		11/03/2023	1,722.23
1	12/04/2023	Cash Flow	11/03/2023	12/04/2023	CP		INTEREST		USD	1,000,000.00		2.000000		12/04/2023	1,722.23
1	01/03/2024	Cash Flow	12/04/2023	01/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		01/03/2024	1,666.67
1	02/05/2024	Cash Flow	01/03/2024	02/05/2024	CP		INTEREST		USD	1,000,000.00		2.000000		02/05/2024	1,833.34
1	03/04/2024	Cash Flow	02/05/2024	03/04/2024	CP		INTEREST		USD	1,000,000.00		2.000000		03/04/2024	1,555.56
1	04/03/2024	Cash Flow	03/04/2024	04/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		04/03/2024	1,666.67
1	05/03/2024	Cash Flow	04/03/2024	05/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		05/03/2024	1,666.67
1	06/03/2024	Cash Flow	05/03/2024	06/03/2024	CP		INTEREST		USD	1,000,000.00		8.000000		06/03/2024	6,888.89
1	07/03/2024	Cash Flow	06/03/2024	07/03/2024	CP		INTEREST		USD	1,000,000.00		8.000000		07/03/2024	6,666.67
1	07/05/2024	REDEMPTION	07/03/2024	07/03/2024	CP	Equity.AAPL	PAYOUT		USD					07/03/2024	76.29
1	07/05/2024	REDEMPTION	07/03/2024	07/03/2024	CP	Equity.AAPL	SECURITY	3,711	USD	0.00	1	0.000000		07/03/2024	0

Event Grid

Complex Variables | Pricing Script | Event Grid | Script Results | Resets

Date	Events
07/03/2023	[Start]
07/05/2023	[KI]
07/06/2023	[KI]
07/07/2023	[KI]
07/10/2023	[KI]
07/11/2023	[KI]
07/12/2023	[KI]
07/13/2023	[KI]
07/14/2023	[KI]
07/17/2023	[KI]
07/18/2023	[KI]
07/19/2023	[KI]
07/20/2023	[KI]
07/21/2023	[KI]
07/24/2023	[KI]
07/25/2023	[KI]
07/26/2023	[KI]
07/27/2023	[KI]
07/28/2023	[KI]
07/31/2023	[KI]
08/01/2023	[KI]
08/02/2023	[KI]
08/03/2023	[KI, CouponPeriod, KO]
08/04/2023	[KI]
08/07/2023	[KI]
08/08/2023	[KI]
08/09/2023	[KI]
08/10/2023	[KI]
08/11/2023	[KI]
08/14/2023	[KI]
08/15/2023	[KI]
08/16/2023	[KI]
08/17/2023	[KI]
08/18/2023	[KI]
08/21/2023	[KI]
08/22/2023	[KI]
08/23/2023	[KI]
08/24/2023	[KI]
08/25/2023	[KI]
08/28/2023	[KI]
08/29/2023	[KI]
08/30/2023	[KI]
08/31/2023	[KI]

KO					07/03/2023 - 07/03/2024 MTH NYC ACT/360
Last Reset	Event Date	Start Date	End Date	Pmt Date	
08/03/2023	08/03/2023	07/03/2023	08/03/2023	08/03/2023	
09/05/2023	09/05/2023	08/03/2023	09/05/2023	09/05/2023	
10/03/2023	10/03/2023	09/05/2023	10/03/2023	10/03/2023	
11/03/2023	11/03/2023	10/03/2023	11/03/2023	11/03/2023	
12/04/2023	12/04/2023	11/03/2023	12/04/2023	12/04/2023	
01/03/2024	01/03/2024	12/04/2023	01/03/2024	01/03/2024	
02/05/2024	02/05/2024	01/03/2024	02/05/2024	02/05/2024	
03/04/2024	03/04/2024	02/05/2024	03/04/2024	03/04/2024	
04/03/2024	04/03/2024	03/04/2024	04/03/2024	04/03/2024	
05/03/2024	05/03/2024	04/03/2024	05/03/2024	05/03/2024	
Product.StartDate					
Last Reset		Reference Date			
07/03/2023		07/03/2023			
CouponPeriod					07/03/2023 - 07/03/2024 MTH NYC ACT/360
Last Reset	Event Date	Start Date	End Date	Pmt Date	
08/03/2023	08/03/2023	07/03/2023	08/03/2023	08/03/2023	
09/05/2023	09/05/2023	08/03/2023	09/05/2023	09/05/2023	
10/03/2023	10/03/2023	09/05/2023	10/03/2023	10/03/2023	
11/03/2023	11/03/2023	10/03/2023	11/03/2023	11/03/2023	
12/04/2023	12/04/2023	11/03/2023	12/04/2023	12/04/2023	
01/03/2024	01/03/2024	12/04/2023	01/03/2024	01/03/2024	
02/05/2024	02/05/2024	01/03/2024	02/05/2024	02/05/2024	
03/04/2024	03/04/2024	02/05/2024	03/04/2024	03/04/2024	
04/03/2024	04/03/2024	03/04/2024	04/03/2024	04/03/2024	
05/03/2024	05/03/2024	04/03/2024	05/03/2024	05/03/2024	
KI					07/03/2023 - 07/03/2024 DLY NYC
Last Reset		Reference Date			
07/05/2023		07/05/2023			
07/06/2023		07/06/2023			
07/07/2023		07/07/2023			
07/10/2023		07/10/2023			
07/11/2023		07/11/2023			
07/12/2023		07/12/2023			
07/13/2023		07/13/2023			
07/14/2023		07/14/2023			
07/17/2023		07/17/2023			
07/18/2023		07/18/2023			
Product.Maturity					
Last Reset		Reference Date		Payment Date	
07/03/2024		07/03/2024		07/05/2024	

Resets

Complex Variables		Pricing Script	Event Grid	Script Results	Resets		
<div> <div>All</div> <div>Equity</div> </div>							
Date	Value	Idx Term	Name	Type	Reset Name		
07/03/2023	192.46		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/05/2023	191.33		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/06/2023	191.81		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/07/2023	190.68		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/10/2023	188.61		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/11/2023	188.08		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/12/2023	189.77		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/13/2023	190.54		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/14/2023	190.69		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/17/2023	193.99		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/18/2023	193.73		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/19/2023	195.1		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/20/2023	193.13		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/21/2023	191.94		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/24/2023	192.75		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/25/2023	193.62		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/26/2023	194.5		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/27/2023	193.22		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/28/2023	195.83		EquityReset.AAPL.NAS...	Equity	NASDAQ		
07/31/2023	196.45		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/01/2023	195.61		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/02/2023	192.58		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/03/2023	191.17		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/04/2023	181.99		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/07/2023	178.85		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/08/2023	179.8		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/09/2023	178.19		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/10/2023	177.97		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/11/2023	177.79		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/14/2023	179.46		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/15/2023	177.45		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/16/2023	176.57		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/17/2023	174		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/18/2023	174.49		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/21/2023	175.84		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/22/2023	177.23		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/23/2023	181.12		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/24/2023	176.38		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/25/2023	178.61		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/28/2023	180.19		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/29/2023	184.12		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/30/2023	187.65		EquityReset.AAPL.NAS...	Equity	NASDAQ		
08/31/2023	187.87		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/01/2023	189.46		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/05/2023	189.7		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/06/2023	182.91		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/07/2023	177.56		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/08/2023	178.18		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/11/2023	179.36		EquityReset.AAPL.NAS...	Equity	NASDAQ		
09/12/2023	176.3		EquityReset.AAPL.NAS...	Equity	NASDAQ		

Example 8 - Single Equity Reverse Convertible Swap

This example is the same as Single Equity Reverse Convertible but with funding leg.

Code

Only code differences from 'ReverseConvertible' are explained

- Two measures - One represents the performance leg and the other the rate leg.
- For each cash flow, we assign the value to either performance leg or Rate leg.
- There is an additional event 'IR_CouponPeriod' which pays the interest. This schedule will be mapped to leg 2

Variables

```
37 Option As Measure to NPV
38 Constant IR_CouponPeriod As AccrualPeriod[]
39 Constant IR_CouponRate As Quotable
40 Constant IR_Spread As Double
41 EQLeg As Measure
42 IRLeg As Measure
```

Mata Data

Name	Type	Display N...	Format	Decimals	Leg	Default V...
CouponPeriod	AccrualPeriodA...	CouponPeriod	DEFAULT	2	Leg 1	
CouponRateHigh	Double	CouponRateHigh	RATE	2	Leg 1	
CouponRateLow	Double	CouponRateLow	RATE	2	Leg 1	
CouponRateSt...	Double	CouponRateSt...	RATE	2	Leg 1	
Curr	Currency	Curr	DEFAULT	2	Leg 1	
FinalCouponRate	Double	FinalCouponRate	RATE	2	Leg 1	
ITMParticipation	Double	ITMParticipation	RATE	2	Leg 1	
Index	Quotable	Index	DEFAULT	2	Leg 1	
KI	ReferenceDat...	KI	DEFAULT	2	Leg 1	
KI_BarrierPct	Double	KI_BarrierPct	RATE	2	Leg 1	
KO	AccrualPeriodA...	KO	DEFAULT	2	Leg 1	
KO_BarrierPct	Double	KO_BarrierPct	RATE	2	Leg 1	
KO_Curr	Currency	KO_Curr	DEFAULT	2	Leg 1	
KO_FX	Double	KO_FX	DEFAULT	2	Leg 1	
KO_Rebate	Double	KO_Rebate	RATE	2	Leg 1	
Maturity	PaymentsDate	Maturity	DEFAULT	2	Leg 1	
Notional	Double	Notional	DEFAULT	2	Leg 1	
PayRec	Integer	PayRec	DEFAULT	2	Leg 1	
Principa Protec...	Double	Principal Protec...	RATE	2	Leg 1	
Settlement	Enum	Settlement	DEFAULT	2	Leg 1	
Start	ReferenceDate	Start	DEFAULT	2	Leg 1	
StrikePct	Double	StrikePct	RATE	2	Leg 1	
IR_CouponPeriod	AccrualPeriodA...	IR_CouponPeriod	DEFAULT	2	Leg 2	
IR_CouponRate	Quotable	IR_CouponRate	DEFAULT	2	Leg 2	
IR_Spread	Double	IR_Spread	DEFAULT	2	Leg 2	

Forward Script

```

13 CouponPeriod:
14   If Not (KNOCKED_OUT) Then
15     AboveCP = True
16     If (Index < CouponRateStrike) Then
17       AboveCP = False
18     EndIf
19     RealizedCoupon = If (AboveCP, CouponRateHigh, CouponRateLow)
20     FlowValue = Interest(Notional, (PayRec * RealizedCoupon), Curr, 1, 'DGI_COUPON', 1)
21     EQLeg += FlowValue
22     Option += FlowValue
23   EndIf
24 IR_CouponPeriod:
25   If Not (KNOCKED_OUT) Then
26     FlowValue = Interest(Notional, (-PayRec * (IR_CouponRate + IR_Spread)), Curr, 1, '', 2)
27     IRLeg += FlowValue
28     Option += FlowValue
29   EndIf

```

Trade Example

Trade Entry

Market Data		Totals	1	2	3
Default Rate Sides	Choice	Strategy Name	EquitySingleRevConvertSwapv1		
AAPL	220.270000000000	Price	Price		
AAPL NASDAQ	220.270000000000	Save	Save		
MM USD LIBOR 3M LIBOR01	4.00000000	Solve	Don't Solve		
AAPL Div Curve	S_AAPL_Div	Trade Id	587066		
AAPL USD Vol	Aapl_Vol	Status	VERIFIED		
USD LIBOR 3M Curve	ZC USD Libor	Action	AMEND		
Pricing		Book	SD_test		
Valuation Date	07/03/2024	Counterparty	CP		
Valuation Time	11:00:00 PM	Product Type	ScriptableOTCProduct		
Pricing Env	PS_EQDFX	Product Subtype	EquitySingleReverseConvertibleSwapv1		
Output 1 or 2 way	1-way	Trade Date	06/30/2023		
ODA Shortcuts		Trade Time	10:00:00.000 AM		
Solver		Start Date	07/03/2023		
Strip Generator		End Date	07/03/2024		
Rate Delta		Settlement Date	07/03/2023		
Property Shortcut		Buy/Sell	Buy		
Fields: Main	Fields: Pricing	Notional Ccy	USD		
Fields: Sales	Fields: Detail	Notional	1,000,000.00		
PRICING	GREEKS	Underlying	Equity AAPL		
GREEKS 2	RISK	Pricing Model	BlackNFMonteCarloExotic		
DETAILS		Premium Date	07/05/2023		
		Customer Premium	USD 60,000.00		
		Cash Residual	<input checked="" type="checkbox"/>		
		CouponPeriod	07/03/2023 - 07/03/2024 MTH NYC ACT/360		
		CouponRateHigh	8.00		
		CouponRateLow	2.00		
		CouponRateStrikePct	100.00		
		FinalCouponRate	0.00		
		ITMParticipation	100.00		
		KI	07/03/2023 - 07/03/2024 DLY NYC		
		KI_BarrierPct	50.00		
		KO	07/03/2023 - 07/03/2024 MTH NYC ACT/360		
		KO_BarrierPct	150.00		
		KO_Curr	USD		
		KO_FX	1.00		
		KO_Rebate	10.00		
		PrincipalProtection	100.00		
		Settlement	Physical		
		StrikePct	100.00		
		IR_CouponPeriod	07/03/2023 - 07/03/2024 MTH NYC ACT/360		
		IR_CouponRate	LIBOR3M		
		IR_Spread	0.01		
		NPV	USD	146,292.12	146,292.12
		PV	USD	146,292.12	146,292.12

Cashflows

Leg	Event Date	Event	Start Date	End Date	Legal Entity	Underlying	Type	Quantity	Currency	Notional	Index Factor	Rate	Spread	Reset Date	Amount	of
1	07/05/2023	Fee	07/05/2023	07/05/2023	CP		PREMIUM		USD						-25,000.00	
1	08/03/2023	Cash Flow	07/03/2023	08/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		08/03/2023	1,722.23	
2	08/03/2023	Cash Flow	07/03/2023	08/03/2023	CP		INTEREST		USD	1,000,000.00		-5.000000		07/03/2023	-4,305.56	
1	09/05/2023	Cash Flow	08/03/2023	09/05/2023	CP		INTEREST		USD	1,000,000.00		2.000000		09/05/2023	1,833.34	
2	09/05/2023	Cash Flow	08/03/2023	09/05/2023	CP		INTEREST		USD	1,000,000.00		-5.000000		08/03/2023	-4,583.34	
1	10/03/2023	Cash Flow	09/05/2023	10/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		10/03/2023	1,555.56	
2	10/03/2023	Cash Flow	09/05/2023	10/03/2023	CP		INTEREST		USD	1,000,000.00		-5.200000		09/05/2023	-4,044.45	
1	11/03/2023	Cash Flow	10/03/2023	11/03/2023	CP		INTEREST		USD	1,000,000.00		2.000000		11/03/2023	1,722.23	
2	11/03/2023	Cash Flow	10/03/2023	11/03/2023	CP		INTEREST		USD	1,000,000.00		-6.000000		10/03/2023	-5,166.67	
1	12/04/2023	Cash Flow	11/03/2023	12/04/2023	CP		INTEREST		USD	1,000,000.00		2.000000		12/04/2023	1,722.23	
2	12/04/2023	Cash Flow	11/03/2023	12/04/2023	CP		INTEREST		USD	1,000,000.00		-6.195645		11/03/2023	-5,335.14	
1	01/03/2024	Cash Flow	12/04/2023	01/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		01/03/2024	1,666.67	
2	01/03/2024	Cash Flow	12/04/2023	01/03/2024	CP		INTEREST		USD	1,000,000.00		-5.400000		12/04/2023	-4,500.00	
1	02/05/2024	Cash Flow	01/03/2024	02/05/2024	CP		INTEREST		USD	1,000,000.00		2.000000		02/05/2024	1,833.34	
2	02/05/2024	Cash Flow	01/03/2024	02/05/2024	CP		INTEREST		USD	1,000,000.00		-5.500000		01/03/2024	-5,041.67	
1	03/04/2024	Cash Flow	02/05/2024	03/04/2024	CP		INTEREST		USD	1,000,000.00		2.000000		03/04/2024	1,555.56	
2	03/04/2024	Cash Flow	02/05/2024	03/04/2024	CP		INTEREST		USD	1,000,000.00		-5.000000		02/05/2024	-3,888.89	
1	04/03/2024	Cash Flow	03/04/2024	04/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		04/03/2024	1,666.67	
2	04/03/2024	Cash Flow	03/04/2024	04/03/2024	CP		INTEREST		USD	1,000,000.00		-5.300000		03/04/2024	-4,416.67	
1	05/03/2024	Cash Flow	04/03/2024	05/03/2024	CP		INTEREST		USD	1,000,000.00		2.000000		05/03/2024	1,666.67	
2	05/03/2024	Cash Flow	04/03/2024	05/03/2024	CP		INTEREST		USD	1,000,000.00		-5.600000		04/03/2024	-4,666.67	
1	06/03/2024	Cash Flow	05/03/2024	06/03/2024	CP		INTEREST		USD	1,000,000.00		8.000000		06/03/2024	6,888.89	
2	06/03/2024	Cash Flow	05/03/2024	06/03/2024	CP		INTEREST		USD	1,000,000.00		-5.700000		05/03/2024	-4,908.34	
1	07/03/2024	Cash Flow	06/03/2024	07/03/2024	CP		INTEREST		USD	1,000,000.00		8.000000		07/03/2024	6,666.67	
2	07/03/2024	Cash Flow	06/03/2024	07/03/2024	CP		INTEREST		USD	1,000,000.00		-5.800000		06/03/2024	-4,833.34	
1	07/05/2024	REDEMPTION	07/03/2024	07/03/2024	CP		PRINCIPAL		USD					07/03/2024	1,144,497.56	
1	07/05/2024	REDEMPTION	07/03/2024	07/03/2024	CP		PRINCIPAL		USD					07/03/2024	-1,000,000.00	

Script Results

Complex VariablesPricing ScriptEvent GridScript ResultsResets

Measures: 7/16/24 6:47:42.104 AM EDT

Measure	Value
EQLeg	1,150,857.154698
Option	146,292.122420
Prob_KO	0.000000
Prob_KI	0.000000
IRLeg	-1,004,565.032277