Calypso Help - Capturing FX Option Trades

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This document describes how to capture FX Option trades using the FX Option worksheet. Note however, that the recommended tool to capture FX Option trades is the FX Options pricing sheet.

Contents

FX Options Quick Reference

FX Option

| File | Trade | View | Pricing Env | Help |

- Enter the FX Options details in the trade window
- Hit F4 to price the trade, and F5 to save the trade

Market Data Requirements

An FX Option trade requires the following market data:

- Spot FX quotes
- An interest rate curve for the primary currency - An interest rate curve for the secondary currency
- An FX curve between the primary and secondary currencies
- An FX volatility surface between the primary and secondary currencies generated using the FXOptionDelta generator

In the Pricer Configuration, you need to assign the pricers to FX Options based on the FX Option subtype.

Product	ExtendedType	SubType	Pricer
FXOption	ANY	ASIAN	PricerFXOptionAsian
FXOption	ANY	FADER	PricerFXOptionFader
FXOption	ANY	American	PricerFXOptionVanilla
FXOption	ANY	FWDSTART	PricerFXOptionForwardStarting
FXOption	ANY	VOLFWD	PricerFXOptionVolFwd
FXOption	ANY	European	PricerFXOptionVanilla
FXOption	ANY	BARRIER	PricerFXOptionBarrier
FXOption	ANY	DIGITAL	PricerFXOptionDigital
FXOption	ANY	DIGITALWITHBARRIER	PricerFXOptionDigitalWBarriers
FXOption	ANY	RANGEACCRUAL	PricerFXOptionRangeAccrual
FXOption	ANY	LOOKBACK	PricerFXOptionLookBack

For BARRIER options, you can also use PricerFXOptionBarrierMixture, and for DIGITAL options you can also use PricerFXOptionDigitalMixture. To calculate numerical Greeks, the model will not re-calibrate unless the pricing parameter MIXTURE_CALIBRATE_FOR_GREEKS is set to true (default is false).

These pricers use the Mixture Model Calibration: Given a market volatility surface of Black-Scholes volatilities with a delta strike axis, MixtureModelCalibration creates a set of local volatility surfaces and solves for a corresponding set of weights. The weights minimize the errors in the set of equations $C(D_j) = Sum\_i\ w(i) * Cnum(D_j, S_i)$, where:

- $C(D_j)$ is the Black-Scholes call price for the jth Delta, using the market surface

- $Cnum(D_j, S_i)$ is the call price for the jth Delta evaluated with a numerical method that uses the ith local volatility surface

- $w(i)$ is the ith weight, to be solved for, subject to the constraints: $0 <= w(i) <= 1$ and $Sum\_i\ w(i) = 1$.

In evaluating the calls for each delta D_j, the strike is first solved for that reproduces that delta using the market volatility. Then the Black-Scholes and the numerical routine evaluate the call option that has that strike.

Trade Lifecycle

- You can exercise / knock-in / knock-out / expire / mature an option using File > Exercise for vanilla options, or Main Entry > Trade Lifecycle > Expiration & Exercise > Barrier Monitor for exotic options

- You can terminate an option using File > Trade Termination

[NOTE: File > Trade Allocation is not operational for FX Options]

Capturing FX Option Trades

Entering Trade Details

» You can select a template from the Template field (upper right corner) to populate the worksheet with default values. Then modify the fields as applicable. Templates can be saved using File > Save As Template. See Help > Trade Functions for details.
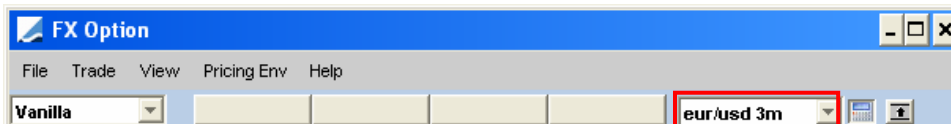
Or you can enter the trade fields directly. The standard fields are described below.

For details on each type of option, see Sample FX Option Trades. You can also capture FX Option trades from the FX Options Pricing Sheet – Help is available from that window.

Note that the Trade Date is entered in the Details panel, File > Trade Details.

» Proceed to the other panels as applicable, File > Trade Details and File > Fee Details. The Details and Fees panels are described under Help > Trade Functions.

Saving a Trade

» Hit F5 to save the trade, or click **Deal F5**.

» You can click **WhatIf** to save a temporary trade. The keyword ScratchPadTrade attaches to the trade.

» You can click **ReSave** to amend the trade.

Pricing a Trade

» Click to display the pricing panel.
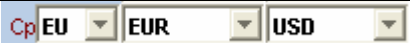
Then click **Price F4** to price the trade. See Help > Trade Functions for details.

You can check the box next to the pricing environment to select another pricing environment, reload the pricing environment, and view the pricing environment.

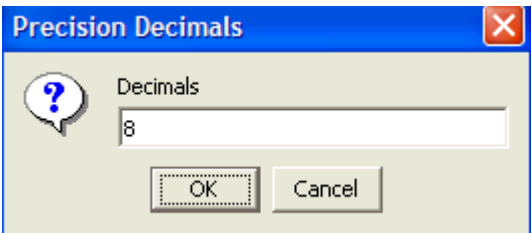| Fields	Description
Option Type	When you open the trade window, it displays the Vanilla type by default. You can select exotics options from the drop-down menu. **Shortcut** - Enter the first letter of an option type to select it.
PUT / CALL	Set the direction of the trade, if applicable. Note that if you change one field, the other field automatically changes. For example, if you change the first field to PUT, the second field changes to CALL. **Shortcut** - To change the direction of the trade: • In the field type "P" or "C." Double-click the P/C label.
Expiration Type	European (default) or American. Depending on option type you select, the system may gray out this field. • European — The option may only be exercised on the expiry date. • American — You may exercise the option anytime between the first exercise date and the expiration date. **Shortcut** - The default is European. Type "A" to select American.

Settlement Type	Select the settlement type at expiry. The system may automatically select it based on the product type. In this case, the settle type field is grayed out.
	• Physical — If you exercise the option, then the underlying product is exchanged.
	• Cash — If you exercise the option, it is against a fee.
	  You can also select the settlement currency for the fee from the drop-down menu.
	
	  After you exercise the option, you can view the fee that attaches to the trade in the Fee Details window (File > Fee Details).
	Shortcut - In the field type "C" or "P."

Cp	Select a currency pair shortcut to automatically display the currency pair. You can double-click the Cp label to set currency pair shortcuts. » Enter shortcuts for the currency pairs. You can then select the shortcut from the Cp field and the currency pair will be displayed in the adjacent fields.

Fields	Description
	Cp EU ▾	EUR ▾	USD ▾ **Shortcut** - Shortcut assigned to the currency pair.
Primary Currency	Select the primary currency. **Shortcut** - You can set the currencies when you click a speed button, or type the first letter of the currency to display it, enter the next letter in the currency if needed.
Secondary Currency	Select the quoting currency. **Shortcut** - You can set the currencies when you click a speed button, or type the first letter of the currency to display it, enter the next letter in the currency if needed.
Auto Exercise	You can select this checkbox in Asian and Lookback options. The AUTOMATIC_EXERCISE scheduled task automatically exercises option marked with this flag if they are in-the-money. TTM_EUR/... ▾ Reset GBP ▾ ☑ Auto Exercise Select the FX Rate Definition and the settlement currency. The settlement currency is the currency used for the exercise fee. **Shortcut** - Use currency direct input for the settlement currency.
NEAREST (Rounding Method)	Select the rounding method. • NEAREST — Rounds the number to the nearest value at the specified decimal place. • UP — The value at the specified decimal place should be raised by one and all subsequent decimals should be truncated. • DOWN — The value at the specified decimal place should be lowered by one and all subsequent decimals should be truncated. The trade keyword ROUNDING stores the rounding method. The rounding applies to: • Quote amount of the underlying FX. • The premium amount. • The margin amount. • Trades generated from exercising the option. **Shortcut** - Double-click the label to toggle to another rounding method.
Expiration Date	Specifies the expiration date of the option. For European options, this is the only date you can exercise the option; for American options, this is the last date you can exercise the option. The date displays according to your locale. For example, 1st of June 2003 is 06/01/2003 in the U.S. and 01/06/2003 in Europe. Note: define your Locale in Main Entry > Help > Locale. To the right of this field, Calypso displays in red the day of the week when the expiry date occurs and the number of days until the expiry. If you entered a date shortcut such as "1M," the system also displays this information. Exp 11/28/2007 PST ▾ WED 92d 3M The expiration date can be a holiday. **Shortcut** - There are several options for entering dates: • Manually enter the date using the format of your locale, for example: 01/14/2004. • Enter a term in the Expiry Date field and press [Enter] or [Tab]. For example, type "1W" to select 7 days; type "3M" to select three months. • Select the date field, and use the mouse to move the wheel up or down to increase or decrease the date, respectively. • Select the date field, and use the up or down arrow keys on your keyboard (↑ or ↓) to

Fields	Description
	increase or decrease the date, respectively • Use the calendar. Double-click in a date field to open the calendar. [**NOTE**: if you enter a date that is a non-business day or holiday, the field appears with a red background.] Exp **01/18/2004**
Delivery Date	If you enter an expiry date, Calypso automatically calculates the delivery date as: Delivery Date = Expiry Date + Business Spot Days The system uses the currency pair calendars and the NYC calendar when calculating the business spot days. You can enter the delivery date, and Calypso automatically calculates the expiry date. However, you can select the holiday calendar(s) to use to calculate the delivery date. 12/09/2004 Del Double-click the Del label to open the Del Holidays window, and select holiday calendars. The Del label now includes the holiday calendars. 12/09/2004 Del NYC,TOK **Shortcut** – See Expiration Date.
Expiration Time Zone	Select the time zone for the expiration next to the Exp field. Expiration time zones are created using Main Entry > Configure > Definitions > Expiry Time Zone. **Shortcut** – Type the first letter of a timezone to select it.
No Recalc exp/del date	Click 🖉 if you do not want to recalculate the delivery date when entering the expiry date and vice versa. **Shortcut** – When the cursor focus in on the Expiry Date or Delivery Date field, press [Ctrl] + Z to press or release the button.
Atm	Select this for an at-the-money trade. When you select this, the strike matches the price from the forward price field. **Shortcut** – If the cursor focus is on the Atm label, you can press the spacebar to select the Atm checkbox.
Stk	Enter the strike for the trade. You may need to enter the decimal point. The strike row contains these three fields: • Primary strike • Quote strike (for example, 1/primary strike) • Percentage in or out-of-the-money Enter a value in one of the fields and the system automatically calculates the values for the other fields. The system uses the decimal precision defined for the currency pair quote rounding. However, you can manually change the decimal precision in the first strike field of the option. Decrease or increase the precision by pressing [F11] or [F12] respectively. **Shortcut** – The following examples show how you can avoid entering the decimal point: • In a USD/JPY trade, type 1051234 and press [Enter]. Calypso displays the number as 105.1234. • For trades where the currency is more like dollars, for example EUR/USD, the decimal point moves four places. So if you enter 8978 and press [Enter], Calypso displays the number as .8978.

Fields	Description
Buy/Sell	Click one of the respective buttons to **Buy** or **Sell** the option. The direction of the trade depends on the setting of the Qt Side Mkt Maker attribute.
Amount	Enter either the primary or secondary amount for the trade. The system automatically calculates the other amount using the forward rate. The default value is 10 million for the primary amount.
Dt	Select the time zone and set the valuation date as needed. You can double-click the Dt label to set the valuation date to the current date. Dt US/Pacific ▾ 08/28/2007 10:16:10 AM You can set the default time zone in the User Defaults.
Spot/Sw/Fwd	Spot rate, swap points, forward rate. The fields display the values from your PE and the feed. However, you can change them and enter your own rates. The system rounds the swap points according to the currency pair point rounding.
Depo	Primary and Secondary deposit rates. The fields display the values from the PE. However, you can change them and enter your own rates.
Vol%	Volatility. • The system grays out the volatility field if it displays the volatility from the PE. Vol % 9.26400 • You can manually enter volatility by clicking ˄ to unlock the field. Vol % 9.27500 The rate used for the volatility depends on the setting of the Qt Side Mkt Maker attribute defined in the User Defaults. The following matrix describes the relationship between the value of the attribute, direction of the trade, and the volatility rate. Note that the volatility surface needs to have the LAST instance defined to accept both BID and ASK rates. (see table below) • Enter two volatility values separated by a backslash "/" and **Price** the option to see the PV using either volatility. (see image below) • Click ˜ to open the Vol Surface Quote Entry window. • Double-click the volatility field to display a table that contains the volatility rates for ATM, Butterfly, Risk Reversal, and Strangle.
% / #	Toggles between viewing the Greek values in either percentage or amount format.

Qt Side Mkt Maker	FX Option Direction	Volatility Rate
TRUE (market maker)	BUY	ASK
TRUE (market maker)	SELL	BID
FALSE (sales trader)	BUY	BID
FALSE (sales trader)	SELL	ASK

Depo 0.61740   0.61632   ?   Vol % 9.27500/9.280(

Greeks	USD	JPY	
IPV	-45,120.54/-45,149.71	-4,862,934	▲

Fields	Description
Change # Decimals	Click ... to open the Precision Decimals window. You can set the decimal precision for the Greeks values. The default value is 5 decimal places. **Precision Decimals** Decimals 8 OK Cancel

Pricing Parameters

The following pricing parameters can be set on the trade when pricing FX options.

Parameters	Description	Value
BARRIER_START_PRIMARY_RATE	*Window Barriers* Enter the deposit rate for the primary currency on the barrier start date.	Deposit rate.
BARRIER_START_QUOTING_RATE	*Window Barriers* Enter the deposit rate for the quoting currency on the barrier start date.	Deposit rate.
BARRIER_START_VOLATILITY	*Window Barriers* Enter the volatility for the barrier start date.	Rate.
BARRIER_END_PRIMARY_RATE	*Window Barriers* Enter the deposit rate for the primary currency on the barrier end date.	Deposit rate.
BARRIER_END_QUOTING_RATE	*Window Barriers* Enter the deposit rate for the quoting currency on the barrier end date.	Deposit rate.
BARRIER_END_VOLATILITY	*Window Barriers* Enter the volatility for the barrier end date.	Rate.
FX_SPOT_RATE	Spot rate for option pricing. The system uses the spot rate entered in the trade window for pricing by default. Enter a hypothetical spot rate in this parameter to get the pricing results.	Numerical amount.
FX_POINTS	The default value true specifies to get forward points from FX curves. Set to false to get forward points from zero curves.	True or False.
VOLATILITY	The system uses the volatility in the Vol% field (either from the PE or entered manually) for pricing. Enter a hypothetical volatility in the parameter to get the pricing results.	Rate.
VOLATILITY1	*Barrier-at-Expiry Options Only* Enter the volatility for the upper barrier. The pricer uses the volatility from the surface if not specified in the pricing parameter.	Rate.

Parameters	Description	Value
VOLATILITY2	**Barrier-at-Expiry Options Only** Enter the volatility for the lower barrier. The pricer uses the volatility from the surface if not specified in the pricing parameter.	Rate.
IS_VOL_OF_AVERAGE	**Asian Options Only** The volatility for average rate options is the volatility of the average. Set to false to use the volatility of the FX rate.	True or False.
PRIMARY_RATE QUOTING_RATE	Interest rates set in the trade window for the primary and secondary currencies according to the expiry date of the option. Enter different interest rates to get the pricing results.	Interest rate.
USE_VOLATILITY_ADJ	Volatility Adjustments such as Skews are taken into account during pricing.	True or False.
INCLUDE_FEES	Specifies whether to include fees attached to the trade in the NPV.	true, false
NPV_INCLUDE_CASH	Specifies whether to include cash flows occurring on the valuation date in the FEES_NPV and NPV.	True or False.
ZD_PRICING	Allows for valuation as of the spot date. Discounting is from the delivery date to the spot date (false, default value). Set to true for discounting from the delivery date to the valuation date.	True or False.
ADJUST_FX_RATE	Specifies whether to adjust the current spot rate to obtain the rate for settlement on the quote date rather than on the spot date. - If True: "Today's Rate" is used for conversion of currency. This rate is obtained from the spot rate by discounting, using the two discount curves for the relevant currencies. The usual no-arbitrage condition is used to obtain the adjusted rate. - If False: Use the spot rate to convert currency. Default is False.	True or False.
OBS_FREQ	Currently used for single barrier European-style options per Broadie Glasserman, Mathematical Finance October '97 pp. 325-348. Number of observations of the barrier per year. Used to adjust continuous barriers.	Numerical amount.

Pricer Measures

The pricer measures display the results from pricing the trade.

Right-click the table and choose Pricer Measures from the shortcut menu to open the Selector window. Select the measures to add to the list and click **OK**.

The following table describes the pricer measures available in FX Options. Refer to the analytics documentation for the formulas.

Measure	Description
BOOK_VALUE	The premium fee attached to the trade.

Measure	Description
CASH	Sum of all the cash flows occurring on the Valuation Date.
CASH_DELTA	Delta of for cash (premium and fees on the option).
DDELTA_DVOL	The cross-derivative (dDelta/dVol) of option price with respect to the spot rate and the volatility; also known as dVega/dSpot, "stability ratio," and "vanna."
DELTA	Change in PV for 1% change in spot. Does not include the premium. DELTA(Quoting Ccy) = (-1) * DELTA(Base Ccy) DELTA can be used to determine how the NPV of the option changes in response to a given change in the FX rate. DELTA * (change in FX rate) = Change in NPV in quoting currency The FX rate is expressed in the usual way as amount of quoting currency per unit of primary currency. Then it follows that the DELTA number itself is "in" units of primary currency (primary * fx rate = quoting). [**NOTE**: In FX Option pricing, you can include the hedge delta in the DELTA pricer measure. In the Pricer Configuration in the Pricing Environment, set the Model Parameter USE_DELTA_TERM_B (on the FX Option pricers like PricerFXOptionVanilla, PricerFXOptionAsian etc.) to true. DELTA returns the following values based on how you define the delta currency in the currency pair definition. Choose Main Entry > Configuration > Definitions > Currency Definitions (`refdata.CurrencyDefaultJFrame`). - If you define the delta currency as the primary currency in the currency pair (Primary Delta Term is selected), then DELTA returns the delta. - If you define the delta currency as the secondary currency in the currency pair (Primary Delta Term is not selected), then DELTA returns the delta including the theoretical premium.]
DELTA_PCT	Percent change of PV for 1% change in spot.
DELTA_W_PREMIUM	Delta including the theoretical premium. DELTA_W_PREMIUM(Quoting Ccy) = (-1) * Spot Rate * DELTA_W_PREMIUM(Base Ccy) DELTA_W_PREMIUM can be used to determine how the NPV of the option changes in response to a given change in the FX rate. DELTA_W_PREMIUM * (change in FX rate) / (Shifted FX rate) = Change in NPV in primary currency
DVEGA_DSPOT	The cross-derivative (dVega/dSpot) of option price with respect to the spot rate and the volatility; also known as dDelta/dVol, "stability ratio," and "vanna." Although in the continuous limit this is theoretically the same as DDELTA_DVOL, numerical implementations can lead to different results.
DVEGA_DSPOT_WB_E	*Window Barriers* The sensitivity to the changes in VEGA_WB_E when the spot shifts.
DVEGA_DSPOT_WB_M	*Window Barriers* The sensitivity to the changes in VEGA_WB_M when the spot shifts.
DVEGA_DSPOT_WB_S	*Window Barriers* The sensitivity to the changes in VEGA_WB_S when the spot shifts.
DVEGA_DVOL	The change of vega with volatility, which is the second derivative of option price with respect to volatility; also known as "vomma" or "kappa."
DVEGA_DVOL_WB_E	*Window Barriers* The sensitivity to the changes in VEGA_WB_E when the barrier end volatility shifts.

Measure	Description
DVEGA_DVOL_WB_M	*Window Barriers* The sensitivity to the changes in VEGA_WB_M when the option maturity volatility shifts.
DVEGA_DVOL_WB_S	*Window Barriers* The sensitivity to the changes in VEGA_WB_S when the barrier start volatility shifts.
FEES_NPV	Displays the net present value of the fees attached to the trade. The value before the premium payment date is the discounted premium less margin. The value on the premium payment date and after is zero.
FUNDING_COST	The cost of funding the position. For FX Options, only the premium (fee attached to the trade) contributes to the funding cost. PV * df * day factor * funding rate * spot rate Note: The funding rate is required in order to calculate the funding cost. Refer to "Cost of Carry" in the *Calypso Position Management User Guide* for details.
FUNDING_RATE	Based on the funding rate definition, returns the funding rate value (interest rate quote + spread specified in the funding rate definition). See Main Entry > Configuration > Definitions > Funding Rate Definitions (refdata.FundingRateFrame) to define the funding rate definition. Refer to "Cost of Carry" in the *Calypso Position Management User Guide* for details.
FWD_DELTA	Change in PV for 1% change in forward rate. Based on the expiry date. FWD_DELTA(Quoting Ccy) = (-1) * Forward Rate * FWD_DELTA(Base Ccy)
GAMMA	Change of monetary delta for 1% change in spot. [NOTE: In FX Option pricing, you can include the hedge gamma in the GAMMA pricer measure. In the Pricer Configuration in the Pricing Environment, set the Model Parameter USE_DELTA_TERM_B (on the FX Option pricers like PricerFXOptionVanilla, PricerFXOptionAsian etc.) to true. GAMMA returns the following values based on how you define the delta currency in the currency pair definition. Choose Main Entry > Configuration > Definitions > Currency Definitions (refdata.CurrencyDefaultJFrame). - If you define the delta currency as the primary currency in the currency pair (Primary Delta Term is selected), then GAMMA returns the gamma. - If you define the delta currency as the secondary currency in the currency pair (Primary Delta Term is not selected), then GAMMA returns the gamma including the theoretical premium.]
GAMMA_PCT	Percent change of DELTA_PCT for 1% change in spot.
IMPLIED_TRADING_VOL	Implied trading day volatility. Adjust IMPLIEDVOLATILITY by TRADING_DAYS.
IMPLIEDVOLATILITY	The volatility implied by the price quoted. Used to calculate the option price.
MARGIN_CALL	Calculates the NPV based measure used in the Margin Call process.
MOD_DELTA	The total derivative of option price with respect to the spot rate, taking into account dependence of volatility on the spot rate. Calculated numerically as a two-sided delta by shifting the spot rate by a relative factor of 1.00001.
MOD_GAMMA	The total derivative of MOD_DELTA with respect to the spot rate, taking into account dependence of volatility on the spot rate. Computed in a similar way to MOD_DELTA.

Measure	Description
MOD_VEGA	The total derivative of price with respect to at-the-money volatility, taking into account shifts of the volatility surface as the ATM volatility changes, assuming the skew remains unchanged.
NOTIONAL	Notional in primary and secondary amounts.
NPV	Present value of the option. This pricer measure can display a different value than PV. It can include fees, depending on the settings of the INCLUDE_FEES and NPV_INCLUDE_CASH pricing parameters, as described below. The value before the premium payment date is FEE_NPV + PV (theoretical value of the option). The value on the premium payment date and after is PV (theoretical value of the option). An option with an EXERCISED or other termination status has a value equal to the NPV of any remaining fees on the trade. • Cash-Settled Options — the fees include the exercise payout of the option, which is due on the delivery date. Therefore, NPV and some other measures have non-zero values until all fees are paid. • Physical-Settled Options — there is no payout fee. When exercised, assuming no broker fees remain, its value goes to zero. The system generates another FX trade, with the trade date equal to the expiration date of the option, whose value replaces that of the option.

NPV_INCLUDE_CASH	INCLUDE_FEES	If Fee Payment Date = Value Date	If Fee Payment Date > Value Date
Y	Y	NPV Includes Fees	NPV Includes Fees
Y	N	NPV Includes Fees	NPV Excludes Fees
N	Y	NPV Excludes Fees	NPV Includes Fees
N	N	NPV Excludes Fees	NPV Excludes Fees

Measure	Description
PRICE	The price the buyer pays, and the seller earns, in exchange for the right to exercise and be delivered the underlying security, or the obligation to be assigned and deliver the underlying security, respectively. This value is expressed as a percentage. The Prem% multiplied by the Amount determines the Premium. • If you are buying the option, the Prem% will be a negative number because you are paying the premium. • If you are selling the option, the Prem% will be a positive number because you are receiving the premium.
PV	Present value of the option, not including the fees and premium. You can also use this measure for solving for the strike or volatility. See "Using Solvers" below.
REAL_THETA	The change of option price with time including the effect on the volatility surface and interest curves. Note that if there is one day or less to expiry, REAL_THETA is set equal to THETA. This is because volatility after expiry is not needed, so the volatility simulation component of REAL_THETA would give anomalous results; in addition the fees from exercise are ambiguous to handle for theta purposes.
RHO	Change in NPV for absolute 1% (100 bp) change in primary rate.
RHO2	Change in NPV for absolute 1% (100 bp) change in quoting rate. (Also known as Phi.)

Measure	Description
RHO_WB_E	*Window Barriers* Rho primary rate at the barrier end date.
RHO_WB_M	*Window Barriers* Rho primary rate at the option maturity date.
RHO_WB_S	*Window Barriers* Rho primary rate at the barrier start date.
RHO2_WB_E	*Window Barriers* Rho quoting rate at the barrier end date.
RHO2_WB_M	*Window Barriers* Rho quoting rate at the option maturity date.
RHO2_WB_S	*Window Barriers* Rho quoting rate at the barrier start date.
SALES_NPV	The value before the premium payment date is the discounted sales margin. The value on the premium payment date and after is zero. If you specify the sales margin in a third currency, the system converts the Sales NPV into the primary and secondary currency using the last available quote. Sales margin is always positive.
THETA	Change in PV for moving 1 calendar day forward.
THETA2	Time decay with forward rate held constant; numerically computed for one day.
TOTAL_DELTA	DELTA + CASH_DELTA
TRADER_NPV	The value before the premium payment date is the NPV (including fees) – SALES_NPV. The value on the premium payment date and after is the PV.
TRADING_DAYS	Number of trading days from current date time to FX Option expiry date time.
TRANSLATION_RISK	When the PL is in a different currency than the base currency, the translation risk displays the PL converted to the base currency using the spot rate. The base currency is the Base Currency defined in the pricing environment.
VEGA	Change in PV for 1% change in volatility.
VEGA_WB_E	*Window Barriers* Vega at the barrier end date.
VEGA_WB_M	*Window Barriers* Vega at the option maturity date.
VEGA_WB_S	*Window Barriers* Vega at the barrier start date.

Using Solvers

Use the solver to solve for the strike or volatility given the premium or delta.

Solving for Strike

Click ꞊ next to the Atm checkbox to solve for strike.

| = | Atm | ☐ | Stk | 107 |

Then enter a value for any of the following pricer measures:

Greeks	USD	JPY
PV	0.50433	54.47294
DELTA	-49.73013	49.73013
DELTA_W_PREMIUM	-5,023,446.38348	542,582,443.87977

- PV - The premium in primary currency or quoting currency. This is the percentage of primary amount or quoting amount.
- DELTA - The delta in primary currency or quoting currency.
- DELTA_W_PREMIUM - The delta with premium in primary currency or quoting currency.

The strike will be computed accordingly.

Solving for Volatility

Click ꞊ next to the Vol% checkbox to solve for volatility.

| ~ | = | ^ | Vol % | 9.66824 |

Then enter a value for any of the following pricer measures:

Greeks	USD	JPY
PV	0.50433	54.47294
DELTA	-49.73013	49.73013
DELTA_W_PREMIUM	-5,023,446.38348	542,582,443.87977

- PV - The premium in primary currency or quoting currency. This is the percentage of primary amount or quoting amount.
- DELTA - The delta in primary currency or quoting currency.
- DELTA_W_PREMIUM - The delta with premium in primary currency or quoting currency.

The volatility will be computed accordingly.

Viewing Inception PL

Choose View > View PL Inception in the trade window to display the Inception PL panel.

| Recalc ☐ | Inception PL | 192,338.01 | PV | 445,372.01 | Prem | -253,034.00 | Hedge PV | 0.00 |

After you save the trade, the trade window displays the Inception PL:

Inception PL = PV trade + PV fees + PV hedge trade

By default, the system does not update the Inception PL when you amend or resave the trade. Check Recalc to update the Inception PL value when amending the trade.

The inception PL uses spot rates from the real-time feed; it uses the latest quote displayed in the trade window.

The following trade keywords attach to the trade and store the Inception PL values:

You may need to add the keywords to the domain.

Entering Premium Details

You can enter a premium in the trade window that attaches to the trade.

Note that the premium requires the PREMIUM fee definition.

When entering the premium details, select the premium currency. The system displays the appropriate fields to enter the premium details.

The fields are described below.

Fields	Description
Premium	Enter the premium according to the currency that you select: • Primary Currency — Enter the premium percentage or amount. The default premium percentage is the value displayed in the Price row in the Greeks. The system uses the following equation to calculate the premium amount: **Premium Amount = Premium% * Primary Amount** Note that the premium percentage uses the rounding from the Greeks Price measure. • Secondary Currency — Enter the premium pips or amount. The system uses the following equation to calculate the premium amount: **Premium Amount = (Premium Pips * Primary Amount) / Point Factor** The Point Factor is the format of the Forward Points (difference between Spot FX Rate and Forward FX Rate), defined in the Main Entry > Configuration > Definitions > Currency Definitions. • Third Currency — Enter the premium amount in a currency not in the currency pair.
Premium Date	Displays the premium delivery date. The system uses the spot date by default. You can change this to a forward date. If you use a forward date, the system adjusts the premium using the discount curve from the selected PE.
Trader Margin	The Trader Margin is the Premium Amount - Sales Margin. It uses the Currency Default Decimal rounding. You can view the fees in the Trade Fees Details window. Press [Ctrl] + F.

The premium fee attaches to the trade. Choose File > Fee Details to view the fees.

Type	Date	Start Date	End Date	Currency	Amount	Legal Entity	Pay/Rec	Known Date
FXOPT_MARGIN	08/30/2007	08/30/2007	08/30/2007	EUR	-100,000.00	AMERICAS	PAY	08/28/2007
PREMIUM	08/30/2007	08/30/2007	08/30/2007	EUR	-140,289.00	NONE	PAY	08/28/2007

Entering Sales Margin

You can enter a sales margin in the trade window that attaches to the trade.
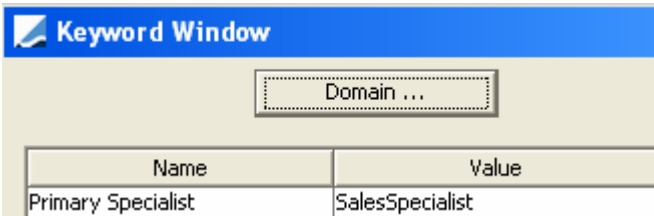
Note that the sales margin requires the FXOPT_MARGIN fee definition.

Click the View Sales Margin button ⬆ at the top of the trade window to display the sales margin panel, or press [Alt] + M.

[NOTE: When the legal entity attribute FX_MARGIN is set to No on the counterparty, the Sales Margin panel is not displayed]

The fields are described below.

Fields	Description
Sales Margin	Enter the margin as a percentage of the Primary Amount, or enter the margin amount in the adjacent field.
Sales	Select the sales representative. To add sales representatives, double-click the Sales label and add a sales representative. They are added to salesPerson domain.
Sales Loc	Select the sales location. It is a legal entity of role SalesLocation. If no sales location is setup, the system uses the trade counterparty as the default fee LE. This is only activated if the value UseTradeCptyAsDefault is added to the domain DefaultSalesMarginFeeLE. *Primary Specialist* On the counterparty, you can specify the attribute Primary Specialist - it is case sensitive. For example Primary Specialist = SalesSpecialist. The primary specialist will be stored in the trade keyword Primary Specialist - Note that you need to add it in the Keywords window in order to see it.
Cur	Select the margin currency. The margin currency can be a different currency than the premium currency. For example, the premium currency is the primary currency; the margin currency is the base currency as defined in the pricing environment.
Rt	If the premium and margin currencies differ, you can enter the FX rate between both currencies. The MarginFXRate trade keyword stores the rate used in the conversion.
Amt	This is the margin fee that attaches to the trade. It is the fee amount converted by the FX rate.
Margin Date	Displays the margin date. The system uses the spot date by default. You can modify this date.

The margin fee attaches to the trade. Choose File > Fee Details to view the fees.

Generating Hedge Trade Automatically

The system can automatically generate a hedge trade when you save the option trade. However, this is not the default behavior. Check Hedge to enable this feature.

[NOTE: The trade window does not display the Hedge panel when you set the TP_DISABLE_FXOPT_HEDGE_PANEL environment property to true]

Entering Hedge Details

The following table describes the hedge details to complete.

Field	Description
Hedge	If you have this checked when you save the trade, Calypso automatically generates the hedge trade and displays the hedge trade id in the Hg Id field.
Spot/Fwd	Click **Spot** for a spot hedge. The system automatically sets the settle date to spot. Or click **Fwd** for a forward hedge. The settle date of the hedge trade changes to the expiration date of the option. You can change the settle date as needed. The hedge details include these fields: • Hedge FX Rate — For a spot hedge trade, displays the spot rate set in the trade window. For a forward hedge trade, displays the forward rate set in the trade window. You can manually change the rates. • Hedge Amount — The primary and secondary amounts of the hedge trade. If the Delta Currency and the Premium Currency are the same, then the Hedge Amount is the Hedge Delta – Real Premium. If the Delta Currency and the Premium Currency are different, then the Hedge Amount is the Hedge Delta. Following are some examples. <table><tr><th>Delta Ccy</th><th>Ccy Pair</th><th>Premium</th><th>Hedge Amt</th></tr><tr><td>JPY</td><td>USD/JPY</td><td>USD</td><td>Hedge = Delta_W_PREMIUM= Hedge Delta</td></tr><tr><td>JPY</td><td>USD/JPY</td><td>JPY</td><td>Hedge = Hedge Delta (JPY) - Real Premium (JPY)</td></tr><tr><td>USD</td><td>USD/JPY</td><td>USD</td><td>Hedge = Delta (USD) - Real Premium (USD)</td></tr><tr><td>USD</td><td>USD/JPY</td><td>JPY</td><td>Hedge = Delta_W_PREMIUM= Hedge Delta</td></tr><tr><td>USD</td><td>AUD/USD</td><td>AUD</td><td>Hedge = Delta_W_PREMIUM= Hedge Delta</td></tr><tr><td>USD</td><td>AUD/USD</td><td>USD</td><td>Hedge = Hedge Delta (USD) - Real Premium (USD)</td></tr><tr><td>AUD</td><td>AUD/USD</td><td>AUD</td><td>Hedge = Delta (AUD) - Real Premium (AUD)</td></tr><tr><td>AUD</td><td>AUD/USD</td><td>USD</td><td>Hedge = Delta_W_PREMIUM= Hedge Delta</td></tr></table> See "Calculating Forward Hedge" below for details about how the pricer calculates the amount of forward hedges. • Hedge Settle Date — The settle date for the hedge trade. • Spot — The system automatically displays the spot date. • Forward — The system uses the expiration date of the option as the settle date. You can manually change the forward date. Changing the forward date changes the hedge amounts and the hedge FX rate.

Field	Description
Hg Id	No entry required. Calypso assigns an id number to the hedge trade. Note that before you save the trade, this field is blank. The FXOpt_Hedge_TradeId trade keyword attaches to the option trade and contains the Hedge Trade Id. Click ... to open the hedge trade window and define additional details. For example: • Select an internal counterparty. • Set the split rates for a cross-currency pair. The hedge trade uses the real-time rates for the split pairs if they are available and you have not set the split rates manually. Note that the hedge trade requires a pre-defined configuration when the option trade includes a cross-currency pair such as EUR/JPY. Use one of the following configuration types to set the cross-currency pair and currency split books: • Cross-Currency Split — Choose Main Entry > Configuration > Automated Operations > Currency Splits (`tradingPadNew.fx.CurSplitConfigJPanel`). • Back-to-Back — Choose Main Entry > Configuration > Automated Operations > Back-to-Back Trades (`tradingPadNew.fx.SalesB2BConfigJPanel`). In the option trade, if you select a currency pair and book that are defined in one of the configurations, the system automatically selects and uses the configuration to generate internal trades to the split books.

The following table describes the relationship between put and call, buy and sell, and hedge.

Buy or Sell	Put or Call	Hedge
Buy	Put	Buy Underlying
Sell	Put	Sell Underlying
Buy	Call	Sell Underlying
Sell	Call	Buy Underlying

Calculating Forward Hedge

The goal of a forward hedge is to enter into a FX Forward contract to reduce the exposure to FX rate risk caused by an option position. Forward hedge is:

• Based on the hedge date.

• Uses rates drawn from the interest rate curves.

• Calculates when the premium is in either primary or quoting currency.

Premium in Quoting Currency

Let VQ(t0) be the option theoretical net present value at trade date t0 in the quoting currency. The premium paid on purchasing the option is PremQ in quoting currency. If paid on the value date at the theoretical value, PremQ= −VQ(t0). In general, the premium can be any quantity paid on a premium date tPrem.

A forward deal settles on forward date tF at forward rate F0 to receive a notional amount NB of base (primary) currency in exchange for paying NB*F0. (NB can have a sign; if it is less than zero, then the pay/receive directions are reversed.) The present value of the option and forward FX portfolio in quoting currency is:

$$VQ(t0) - PremQ*DQ(t0, tPrem) - NB*F0*DQ(t0,tF) + NB * DB(t0,tF) * S0$$

To make this value at t0 insensitive to spot rate movements, it requires the derivative d/dS of this value to be zero: d(VQ)/dS + NB * DB(t0,tF) = 0 thus NB = -DELTA / DB(t0,tF) — where DELTA == d(VQ)/dS.

is the spot delta. The notional used to hedge forward is the "forward delta."

Note the sign. If Delta is positive, the option position is long in the primary currency, and NB is negative, meaning

Premium in Quoting Currency
primary currency will be paid in the forward deal. Thus a forward trade that is short in the primary currency offsets an option that is long in that currency. One can readily verify that if the computation is repeated in base currency portfolio value, or the forward deal expressed in terms of the amount of quoting currency, the result is the same. Only the premium currency has an effect on the amount of the hedge, as seen in the following section.
Premium in Primary Currency
The premium paid on purchasing the option is PremQ = −VQ / S if paid on the value date. A forward deal settles on forward date tF at forward rate F0 to receive a notional amount NB2 of base (primary) currency in exchange for receiving NB2*F0. (Again, NB2 can have a sign; if it is less than zero, then the pay/receive directions are reversed.) The present value of the option and forward FX in quoting currency is: VQ(t)− PremB*DB(t, tPrem) * S(t) - NB2*F0*DQ(t,tF) + NB2 * DB(t,tF) * S(t). Taking d/dS gives DELTA(t0) − PremB*DB(t, tPrem) + NB2 * DB(t,tF) = 0. So NB2 = -(DELTA(t0) − PremB*DB(t, tPrem)) / DB(t,tF). One sees the delta is adjusted by the premium in order to hedge the option.

Viewing Trade Keywords

Keywords attach to trades and store information such as the trade id of an automatically generated trade.

Click ![key icon] to open the Keyword Window.
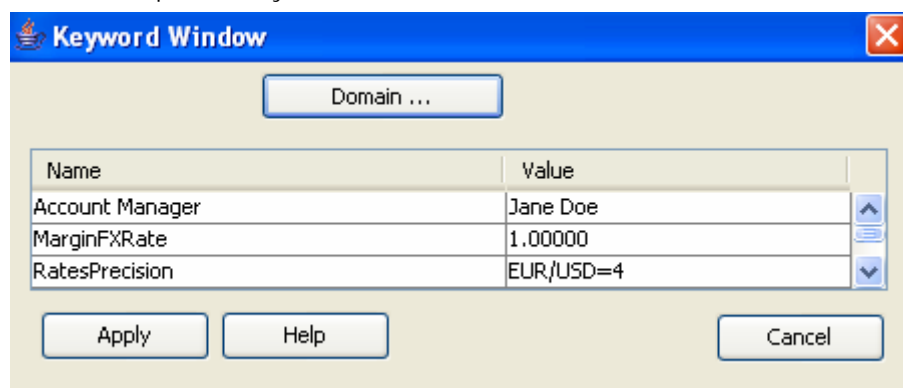
» Click **Help** for a description of the trade keywords.

Sample FX Option Trades

Vanilla Options

A Vanilla option is a usual option with no special features. The option can be either European or Vanilla.

In the Structure panel there is one strike for one option. If you select Atm, the option strike price is the same as the forward rate; there is a 50 delta.

Use [Tab] to quickly enter the details of your trade.

The following table describes the types of Vanilla Options that you can enter in the FX Option trade window.

Type	If Strike Hit	Physical Delivery	Cash Delivery
European Vanilla	At expiry: • For calls, payout = spot – strike. • For puts, payout = strike – spot.	Payout is an FX Spot deal.	Rebate is a Fee.
American Vanilla	At exercise date: • For calls, payout = spot – strike. • For puts, payout = strike – spot.	Payout is an FX Spot deal.	Rebate is a Fee.

Asian Options

In Asian Options, the payout is based on the average price of the underlying currency during the specified period.

The trade worksheet displays the following fields to enter the averaging details. The table below describes them.

[**NOTE**: Set the USE_SGL_AVG_MM_METHOD environment property to "true" to enable the new Matching Moments Method for single averages in Asian options]

Fields	Description
Avg Type	Select from one of the following average types: • AVERAGE RATE — At the end of the period the system calculates the average of all the fixings and compares it with the strike. The payment depends on the difference between the average rate and the strike multiplied by the option amount. • AVERAGE STRIKE — Enter either a primary or secondary amount, but not both; do not enter a strike. The system calculates the strike from the average of FX rates for the sample dates that you define. • GEOM AVERAGE RATE — At the end of the period the system calculates the geometric average of all the fixings and compares it with the strike. The payment depends on the difference between the geometric average rate and the strike multiplied by the option amount. • GEOM AVERAGE STRIKE — Enter either a primary or secondary amount, but not both; do not enter a strike. The system calculates the strike from the geometric average of FX rates for the sample dates that you define. [**NOTE**: Asian average rate options have a pricing parameter IS_VOL_OF_AVERAGE that specifies whether the volatility that you enter is the volatility of the average (true, default value) or the volatility of the FX rate (false). You can modify the value of the transient parameter at the trade level in the Params panel, or globally in the Pricer Configuration Window, Model Parameters panel]

Fields	Description
Frequency	Select the calculation frequency for the sample dates. MTH ▼ [...] 10/05/2006 - 04/04/2007 (6 fixings) The trade screen displays the first sample date, last sample date, and number of fixings. This is based on the trade date, the option expiry date, and the frequency that you selected. Click ▪▪▪ to view and customize the sample dates.
Custom Values	Click ▪▪▪ to open the Custom Values window. Here you can define custom sample dates. Complete the following details to generate the sample dates: • FX Reset — Select the FX Rate Definition from the drop-down menu. This is the source that provides the rates for the sample dates. See Main Entry > Configuration > Foreign Exchange > FX Rate Definitions (`refdata.FXResetFrame`) to setup definitions. • Asian Type — This field should display the type that you selected in the trade worksheet. • Dates — Enter the start and end date of the calculation period. By default, the system uses the trade date and expiry date entered in the trade window for the start and end dates, respectively. • Frequency — Select the calculation frequency. For the weekly frequency, check the Roll Day checkbox as applicable to specify the sample day from the adjacent field. ☑ Roll Day SUN ▼ The default sample day is Sunday. • Holidays — Click ▪▪▪ next to the Holidays field to add and remove holiday calendars as applicable. By default, the holiday calendars of each currency are selected. • Roll On End Date — Select to specify that the frequency is applied from the end date. • Adjusted — Select to adjust the sample dates for holidays based on the selected holiday calendars. • **Generate** — Click to generate the sample dates. If you change any of the above fields, click **Generate** again to update the sample dates accordingly. The sample dates are displayed with the FX rate reset values and weights. • **Add Dates** — To enter custom dates, enter the date in the text field, and click **Add Dates** to add the date in the table below. The system automatically selects Custom Samples.

Fields	Description
	• **Remove** — Select a date in the table below, and click **Remove** to remove it. Note the following about the rate resets: • The FX rate reset values come from Main Entry > Trade Lifecycle > Reset > FX Rate Reset (reporting.FXRateResetFrame). They are saved as quote values for the quote value name of the FX rate definition. • You can also enter the reset values using Main Entry > Market Data > Market Quotes > Quotes (marketdata.QuoteJFrame) for the quote value name of the FX rate definition. • The values are displayed as the resets are known as of the valuation date. • The weights are applied to the values when calculating an average rate value, or an average strike value. You can edit the weights as applicable. • The Current Value field displays the actual value of the average rate, average strike, maximum, or minimum based on the selected type of Asian option, as of the valuation date.
Double Average	Select the Dbl Avg checkbox to enter a second set of averaging details, so that you can average both the rate and the strike. You can weight the fixing dates in the Custom Values window; click ··· to open the window. Avg Type **AVERAGE STRIKE** DLY ··· 08/28/2007 - 09/04/2007 (5 fixings) Dbl Avg ☑ AVERAGE RATE DLY ··· 08/28/2007 - 09/04/2007 (8 fixings) Max payout (average rate - average strike) The payout is the average strike - average rate.

The following table is a summary of the Asian Options that you can enter in the FX Option trade window.

Type	Expiry	Physical Delivery	Cash Delivery
Average Rate (Arithmatic)	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.
Average Strike (Arithmatic)	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.
Average Rate (Geometric)	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.
Average Strike (Geometric)	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.

Barrier Options

A Barrier Option is similar to Vanilla, but it has one or two trigger prices:

• Single Barrier — Greater than or less than the strike.

• Double Barrier — One price is greater than the strike; the other is less.
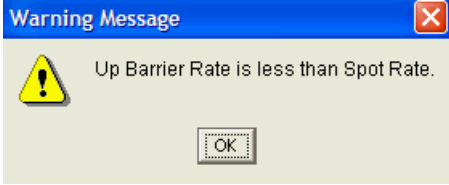
There are two types of barriers:

• Knock-In — The price of the underlying currency reaching the barrier activates this option.

• Knock-Out — Starts as a Vanilla option, but terminates at any time during the option period if the price of the underlying currency reaches the barrier. Payout is an FX Spot deal.

The following table describes the barrier details to enter in the Barrier option.

Fields	Description
Up	Select the type of Up barrier from the drop-down menu: • NO (default) — No barrier applies. • IN — Knock-in barrier. • OUT — Knock-out barrier.
Up Barrier Strike	Enter the strike for the up barrier, if applicable. If you enter a strike that is less than the current spot rate, you get a warning message.
Barrier Duration	Select one of the following duration types from the drop-down menu: • CONTINUOUS — The barrier is observed throughout the life of the option. The start date of the barrier is the trade date; the end date of the barrier is the expiry date. • EXPIRY — The barrier is only observed on the expiry date. You can define multiple volatilities. The Vol % field corresponds to the strike. The Params panel contains the VOLATILITY1 and VOLATILITY2 pricing parameters that correspond to the volatilities for the upper and lower barriers, respectively. Enter the volatility for the barrier if desired. Otherwise, the pricer uses the volatility from the surface if you do not specify one in the pricing parameter. To use the same volatility as the strike, manually enter that value in the pricing parameter(s). *Window Barriers* • PARTIAL — Select for Window Barriers. The system displays additional fields where you can enter the start and end dates for the barrier and specify the time zone for each. The barrier can be less than the life of the option. The window displays an additional panel for the deposit rates, forward points, and volatilities for the barrier start and end dates.

Fields	Description
	Note that you can modify the barrier deposit and volatility rates in the transient pricing parameters, and then price the option to see what the results would be. Refer to the following transient pricing parameters in the Params panel: BARRIER_START_PRIMARY_RATE, BARRIER_START_QUOTING_RATE, BARRIER_START_VOLATILITY, BARRIER_END_PRIMARY_RATE, BARRIER_END_QUOTING_RATE, and BARRIER_END_VOLATILITY. Window Barriers have the following product-specific pricer measures: DVEGA_DSPOT_WB_E, DVEGA_DSPOT_WB_M, DVEGA_DSPOT_WB_S, DVEGA_DVOL_WB_E, DVEGA_DVOL_WB_M, DVEGA_DVOL_WB_S, RHO_WB_E, RHO_WB_M, RHO_WB_S, RHO2_WB_E, RHO2_WB_M, RHO2_WB_S, VEGA_WB_E, VEGA_WB_M, and VEGA_WB_S. To add these measures in the Greeks table, right-click and choose Pricer Measures from the shortcut menu. Add the measures using the Selector window.
Down	Select the type of Down barrier from the drop-down menu: • NO (default) — No barrier applies. • IN — Knock-in barrier. • OUT — Knock-out barrier.
Down Barrier Strike	Enter the strike for the down barrier, if applicable. If you enter a strike that is greater than the current spot rate, you get a warning message.
Type	The system only displays this field when you select a Double In-and-Out Option. Select what type of underlying trade the system should generate if the spot rate touches the knock-in barrier first: • TYPE_A — Vanilla option. Same expiry date as the original barrier contract. • TYPE_B — A single knock-out option for the remaining barrier period. The following scenarios are possible with Type B. | Lower Barrier	Upper Barrier	Trade Spot Rate Starts	 |---|---|---| | IN	OUT	Below Lower Barrier	 | IN	OUT	Between Barriers	 | OUT	IN	Between Barriers	

Fields	Description			
	OUT	IN	Above Upper Barrier	

When the option is IN/IN or OUT/OUT, you can select whether or not to have a rebate premium.

Select YES for a 100% rebate.

The system automatically selects:

- The primary currency as the rebate currency.
- Barrier hit or Barrier not hit based on whether the rebate condition is IN or OUT, respectively.
- REC or PAY based on whether the option is BUY or SELL (if SELL set to PAY, if BUY set to REC).
- Timing is EXPIRY.

Select NO for a 0% rebate.

The system disables the box when it is not applicable (IN and OUT combination, partial barriers).

Digital Options

In Digital Options, the payout is pre-determined at the beginning of the contract, and is paid according to whether the spot rate touches (or does not touch) the trigger level.

The trade window displays the following fields to enter the payout details.

Enter the strike for the first and second triggers in the T1 and T2 fields, respectively. You can select one of the following options for the triggers:

- NO — No trigger applies.
- IN — Trigger-in.
- OUT — Trigger-out.

The trigger duration is CONTINUOUS by default, meaning that the trigger condition applies during the life of the option.

The following table describes the payout details.

Fields	Description
Pay Out	Enter the payout amount. It is paid according to the term and timing values you select. See Term and Timing below.
Currency	Select the currency for the payout. • Primary Currency — Asset-or-Nothing • Secondary Currency — Cash-or-Nothing

Fields	Description
Term	Select the option outcome: • EXPIRY — If the trigger(s) is reached on the expiration date, the option pays out. • NO TOUCH — If the trigger(s) is not touched on the expiry date, the option pays out. • ONE TOUCH — If either trigger is reached prior to maturity, the option expires and pays the payout amount based on the specified timing. Otherwise, there is no payout.
Timing	Select one of the following options: • INSTANT — Payout occurs on the spot date after touching the trigger. • EXPIRY — Payout occurs at option expiration.

The following table describes the types of Digital Options that you can capture in the FX Option trade window.

Type	T1	T2	Pay Out Term	Pay Out Timing	Description
Digital One Touch at Expiry	NO or IN	NO or IN	ONE TOUCH	EXPIRY	If the FX rate during the life of the option at any time touches the trigger, pays out at expiry; otherwise zero. • T1 — the FX rate begins below the trigger on the start date of the option. • T2 — the FX rate begins above the trigger on the start date of the option.
Digital One Touch Instant	NO or IN	NO or IN	ONE TOUCH	INSTANT	If the FX rate during the life of the option touches the trigger, pays out immediately; otherwise zero.
Digital Single No Touch	NO or OUT	NO or OUT	NO TOUCH	EXPIRY	Pays out the specified amount at expiry if the FX rate does not touch the barrier; otherwise zero.
Digital Double One Touch at Expiry	IN	IN	ONE TOUCH	EXPIRY	Pays out the specified amount at expiry if the FX rate touches either trigger; otherwise zero.
Digital Double One Touch Instant	IN	IN	ONE TOUCH	INSTANT	Pays out the specified amount instantly if the FX rate touches either trigger; otherwise zero.
Digital Double No Touch	OUT	OUT	NO TOUCH	EXPIRY	Pays out the specified amount at expiry if the FX rate does not touch either trigger during the life of the option; otherwise zero. The FX Rate begins between the triggers.

Digital with Barriers Options

In Digital Options, the payout is pre-determined at the beginning of the contract, and is paid according to whether the spot rate touches (or does not touch) the barriers.

The trade window displays the following fields to enter the payout details and barriers.

See Barrier Options for barrier details, and Digital Options for payout details.

European Range Binary Options

In European Range Binary Options, there is one strike that you can enter in the strike fields.

The payout occurs as follows:

- Call on the Primary currency — Pays out the specified amount if the FX rate on the expiry date is at or greater than the strike; otherwise zero.

- Put on the Primary currency — Pays out the specified amount if the FX rate on the expiry date is less than or equal to the strike; otherwise zero.

Fader Options

A fader is a regular vanilla option where the notional of the vanilla is determined on the expiry date rather than by a predefined value.

The following table describes the details to complete.

Fields	Description
Fader Type	Select the type of Fader. • DECREASE NOTIONAL — The predefined notional decreases. Each time the spot condition is met on a fixing date, a proportion of the option's notional is faded out from the maximum that could have been included in the option's total notional amount at expiry. • INCREASE NOTIONAL — The final notional increases. Each time the spot condition is met on a fixing date, a proportion of the option's notional is paid.
Range Type	Select the predefined spot condition. This can be set as a range, where the spot must be inside or outside the range, or as a one-sided condition, where the spot is above or below a predetermined trigger. [NOTE: Currently only one-sided faders are supported] Select one of the following trigger types: • BELOW — The spot rate below the trigger meets the condition. Enter the High Trigger. • ABOVE — The spot rate above the trigger meets the condition. Enter the Low Trigger.
Trigger	Enter the trigger depending on the range type that you select.
Fixing	Select the frequency for the sample dates. Click ... to customize the dates as described in Asian Options above.

The final notional is calculated as described below.

If the option is a:

- Fade in, each time the spot condition is met on a fixing date, a proportion of the notional is paid or faded in (i.e., the final notional increases). That is, on expiry date the notional is:
  n/N x ‹notional amount›

- Fade out, each time the spot condition is met on a fixing date, a proportion of the notional is deducted or faded out from the maximum that can be used (i.e., the predefined notional decreases). That is, on expiry date the notional is:
  ‹notional amount› - (n/N x ‹notional amount›)

Where:

- ‹notional amount› is the maximum notional amount set in the fader option.

- n is how many times the spot satisfies the predefined condition (whether it is meant to be above/below a predetermined trigger, or inside/outside a predetermined range) on the predefined fixing dates.

- N is how many fixings dates there are over the life of the option (N).

For example, you buy a USD/JPY fade in option with a maximum notional set to $1 million, with 10 fixings dates. The predefined condition (that on each fixing date the spot is above 122) is met 4 times. Therefore the notional used in the underlying vanilla option is $400000 (4/10 x 1 million).

Forward Starting Options

The strike is determined at a later date. Like a standard option, a Forward Start option is paid for in the present; however the strike price is not fully determined until an intermediate date before expiration. This date is called the fixing date.

The fixing process is similar to the fixing process for Asian options.

The fixing date is set in the Fixing Date property, and the FX reset is selected from the Fixing Source property.

The relative strike can be based on AtmS = yes (ATM spot), or AtmF = yes (ATM forward). For AtmF, you can specify the percentage of forward in AtmPct.

Lookback Options

In Lookback Options, the payout is based on either a fixed or floating strike:

- Fixed Strike — Call pays the maximum of the rate during the option life, minus the strike; put pays the strike minus the minimum rate during the option life.

- Floating Strike — Call pays the rate at expiry minus the minimum of the rate during the option life; put pays the maximum rate during the option life, minus the rate at expiry.

The trade worksheet displays the following fields to enter the lookback details.

The following table describes the details to complete.

Fields	Description
Average Type	Select from one of the following averaging types: • FIXED STRIKE — Enter a strike in the field above. The rate is floating. • FLOATING STRIKE — No strike price is required; the system disables the strike field. The rate is the rate at expiry.
Frequency	Select the calculation frequency for the sample dates. See Custom Values below to select custom sample dates.
Custom Values	Click ... to open the Custom Values window. Here you can define custom sample dates. See Custom Values in Asian Options above for a description of this window.
Double Average	Select to enter a second set of averaging details.

The following table is a summary of the Lookback Options that you can enter in the FX Option trade window.

Type	Expiry	Physical Delivery	Cash Delivery
Floating Rate	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.
Floating Strike	At expiry, payout calculated.	Payout is an FX Spot deal.	Rebate is a Fee.

Range Accrual Options

A standard range accrual option is a mix of Digital and Asian options.

In the case of Asian options, we calculate an average strike or rate to apply to a Vanilla option.

In the case of Range Accrual options, we calculate a weighting to apply to a Digital option. For each day where the spot is within a specified range, we pay digital payout / total sample days defined in the option.

A KI or KO range accrual option includes some KI/KO features. If the spot rate reaches some level, the system extinguishes the option in the case of a KO or creates the option in the case of a KI.

Following are calculations for delta and gamma:

delta = ((price [spot + incr_spot] – price [spot - incr_spot])/ (2 * incr_spot * spot)

where incr_spot = spot * 0.001

Note that price[spot + incr_spot] = price(spot*(1+0.001))

gamma = ((price[spot + incr_spot] + price[spot - incr_spot]) - (2 * price [spot])) / (incr_spot * incr_spot * spot * spot)

The trade window displays the following fields to enter the range, barrier, and payout details.

Field	Description
Range Type	Select the type of range to use in the option: • IN — Payout occurs when the spot rate is inside the defined range. • OUT — Payout occurs when the spot rate is outside the defined range. • ABOVE — Payout occurs when the spot rate is above the entered rate. • BELOW — Payout occurs when the spot rate is below the entered rate.
High	Enter the high rate for the range.
Low	Enter the low rate for the range.
Custom Values	Click ... to open the Custom Values window. Here you can define custom sample dates. See Custom Values in Asian Options above for a description of this window.
T1	Enter the higher level barrier.

Field	Description
T2	Enter the lower level barrier.
Pay Out	Enter the total payout possible if the spot rate meets the range accrual requirements on all of the sample dates.
Currency	Select the currency for the payout.
Term	Select the option outcome: • EXPIRY — If the barrier(s) is reached on the expiration date, the option pays out. • NO TOUCH — If the barrier(s) is not touched on the expiry date, the option pays out. • ONE TOUCH — If either barrier is reached prior to maturity, the option expires and pays the payout amount based on the specified timing. Otherwise, there is no payout.
Timing	Select one of the following options: • INSTANT — Payout occurs on the spot date after touching the barrier. • EXPIRY — Payout occurs at option expiration.
Calc Pay Out	Specifies the cumulative amount of the payouts that have occurred on the sample dates. The system updates the Calc Pay Out field as the rates are reset and the payouts occur on the sample dates. The payout for each sample date is: total payout / number of sample dates.

Volatility Forward Options

The calculation for the NPV is:

NPV = e^-rT * notional * vega * 100 * [mkt impl. fwd vol - fixed implied vol]

The following table describes the Forward Volatility fields.

Fields	Description
Settlement Type	You can define the settlement type in the trade window. However, you can change the settlement type during the exercise process in the Exercise Window. • Cash — Enter the volatility in the Exercise Window. Cash Settlement = Notional * vega (volatility fixed on trade date – volatility on exercise date) The cash settlement is paid on the delivery date defined in the Forward Volatility trade. • Physical — Enter the strike, spot, and forward deposit rate in the Exercise Window. The system generates an ATM straddle. In the ATM Straddle: - The trade date of the new trade is the fixing date defined in the Forward Volatility trade. - The premium payment date is the delivery date defined in the Forward Volatility trade.

Fields	Description
Fixing Date	Date on which you fix the actual volatility.
Delivery Date	Physical — Premium payment date. Cash — Cash amount settle date.
Expiry Date	Date on which the underlying option expires.
Impl Vol @ Fix	Displays the volatility from the surface for the fixing date.
@ Fwd	Displays the calculated implied forward volatility. The calculator below provides an example. If you are viewing this document in Word, double-click the Excel object below to open the spreadsheet. **Calculator for implied fwd vol (Fixed Vol Price)** S: = 165 days to short expiration (Fixing date settlement) VS: = 10.00% short expiration vol (Vol from the surface = fixing date) L: = 348 days to long expiration (Final delivery expiry) VL: = 12.00% long expiration vol (Vol from the surface = expiry date) SVL: = 13.55% implied forward vol (Fixed Vol Price) $$SVL := \left(\frac{L\,VL^2 - S\,VS^2}{L - S} \right)^{.5}$$
@ Exp	Displays the volatility from the surface for the expiry date.
Fixed Vol	The forward volatility agreed to on the trade date. The price that is agreed upon to buy the ATM straddle. This value defaults to the calculated implied forward volatility that is displayed in the @ Fwd field. However, you can modify the Fixed Vol value.
Vega	The vega in the Forward Volatility option is what the vega would be in a Vanilla option from the trade date to the number of days calculated from the difference of the Expiry Date and the Fixing Date in the Forward Volatility option.
Straddle	After you exercise a physical Forward Volatility option, click this button to open the generated straddle option.