OPTIONS

FX OPTIONS TRADER HANDBOOK

Understanding the relationship between CME FX Options on Futures and OTC Options.

CME Group

Table of contents

Three unique ways to access $8 billion+ in daily FX options liquidity.

On CME Globex:
Speed, transparency, access and liquidity

With FX options on CME Globex, you have access to the speed, liquidity, flexibility and transparency you need to get the highest possible return. That's why over 85 percent of our FX options average daily volume is traded electronically. Only CME Globex offers:

- 31 electronic FX options contracts on a single platform accessible around the globe 23 hours a day
- Major or emerging-market currencies
- Quarterly, monthly and weekly contracts
- American- and European-style expiration
- 1,000 direct connections in more than 90 countries and foreign territories
- Telecommunication hubs in Hong Kong, Kuala Lumpur, London, Mexico City, New York, São Paulo, Seoul, Singapore and Tokyo.

On the floor:
Access voice trading benefits

From the pits that created the modern derivatives markets, trading FX options on the floor can offer any trader:

» Quick set up and nearly immediate access to our liquidity (no connection infrastructure or front-end systems required)

» Use services of a voice broker to maximize the flexibility in execution

» Facilitate price discovery through interaction with experienced floor traders

Block trades:
Private negotiation with security of CME Clearing

Designed to provide traders the benefits of CME Clearing, while maintaining existing bilateral pricing relationships.

» Retain control and convenience of privately negotiating a trade with a selected eligible counterparty

» Access the risk management and counterparty credit guarantees of CME Clearing

» Now at reduced fees: we've reduced transaction fees 43% — from $1.75 to $1.00

Get started today.

Find out how you can start trading CME FX options today. Contact a CME Group FX team member, or visit **cmegroup.com/fxoptions**.

CME FX options deliver into a futures contract

One option contract delivers into one futures contract, and correspondingly, each option contract has a notional value equivalent to its underlying future and currency denomination.

Examples:

EUR/USD = €125,000	CAD/USD = C$100,000
JPY/USD = ¥12,500,000	CHF/USD = SF125,000
GBP/USD = £62,500	AUD/USD = A$100,000

There are four futures contracts per year (March, June, September and December — called the March Quarterly Cycle) each with a delivery date set on the third Wednesday of the Quarterly month (referred to as the International Money Market or IMM dates by many forwards traders).

Our FX futures contracts are denominated in foreign currency amounts and quoted in USD terms (except for cross-currency pairs). Thus, a CALL option gives the right to BUY the foreign currency and PUT the right to SELL the foreign currency (i.e. JPY/USD option contract: CALL = BUY JPY; PUT = SELL JPY). This is similar to the trader convention in the OTC.

CME FX options have standardized maturities

In the major currency pairs, there are 10 maturities listed at any one time: four Quarterlies, two Serials and four Weeklies.

The four Quarterly option expiration dates are set on the second Friday prior to the third Wednesday of the Quarterly months — two Fridays before the futures delivery date. This allows exercised options holders at least a week to unwind (trade out of) futures positions if they prefer that to taking delivery.

The two Serial option expiration dates are the first two nearest months that are not a Quarterly month. For example, on April 15th, the nearest Serial will be May, the first Quarterly will be June, and the second nearest Serial will be July. Serial expiration is also on the second Friday before the third Wednesday of the month. It is important to remember that Serial options deliver into the nearest Quarterly futures contract.

The four Weekly option expiration dates are the first four nearest Fridays on the calendar that are not also a Serial or Quarterly expiration. These contracts are listed on a rolling basis. When one expires, the next fourth nearest Weekly is listed. Thus the label "Weekly" may be a bit confusing as these tend to be listed for approximately one month before expiration.

The end result being that there will be a Friday option expiration for at least the nearest five to six weeks of the calendar, then a slight gap to the next Serial or Quarterly representing approximately a 10-week maturity, with the last Quarterlies representing approximately 3 months, 6 months and 9 to 12 months.

CME FX options come in two styles: European and American

American-style can be early-exercised at the strike price at any time up to the evening prior to expiration day by contacting your clearing firm. European-style are exercised only on expiration day. It is important to remember that early exercise of American-style options on futures does NOT carry the major benefits found in options on spot, because taking delivery of a futures contract does not provide immediate access to the higher yielding underlying currency. Theoretically, early exercise should only occur when options are very deep in the money and cost of carry is higher than time value. For most options, the pricing difference between European- and American-style options on futures should be negligible. The main difference is in the timing of the expiration. European-style options expire at 9:00 a.m. Central Time (CT) (10:00 a.m. NY) and American-style expire at 2:00 p.m. CT (3:00 p.m. NY) on the Friday of expiration.

The American-style options are the legacy products at CME, constituting about 98 percent of the volume, primarily because they provide an extra five hours of trading on the Friday expiration days. Many of these cover important economic releases such as "U.S. employment."

When trading on CME Globex, the default description is assumed to be an American-style option but if the option is European-style, it will be clearly stated in the long product description. The product code will also differentiate: American-style will have a six in the code sequence (i.e. **6EU8: 6** = American-style, **E** = EUR/USD, **U** = September, **8** = 2008); while European-style will have an X in the sequence (i.e. **XJZ8: X** = European-style, **J** = JPY/USD, **Z** = December, **8** = 2008).

A full code would look like: 6EU8 P1550 and refer to the American-style, EUR/USD, September 5th expiration, 2008, Put with strike of 1.5500. Notice the strike's decimal and the last digit are both dropped for simplicity sake.

CME FX options expiration procedure

CME FX options on the six major currencies are AUTO-EXERCISED against a daily fixing with no choice to the holder (buyer) of the option.

The daily fixing is computed by CME Group and is based on a 30 second volume weighted average price of trades in the underlying futures occurring on CME Globex immediately preceding the 9:00 a.m. expiry (for European-style) and 2:00 p.m. expiry (for American-style). This daily fixing is published in real time on the CME Group website at:

cmegroup.com/fxfixing-price.

All in-the-money (ITM) options (1 pip or more) will be exercised and all at-the-money (ATM) and out-of-the-money (OTM) options will be abandoned with no recourse.

Premium-quoted product codes

This is just a subset of CME FX Premium-Quoted options.

PREMIUM-QUOTED OPTIONS

Product	Style	Maturity	Product Code
AUD/USD	American	Monthly	6A
		Weekly	6A1 thru 6A5
CAD/USD	American	Monthly	6C
		Weekly	6C1 thru 6C5
	European	Monthly	XD
		Weekly	XD1 thru XD5
CHF/USD	American	Monthly	6S
		Weekly	6S1 thru 6S5
	European	Monthly	XS
		Weekly	XS1 thru XS5
EUR/USD	American	Monthly	6E
		Weekly	6E1 thru 6E5
	European	Monthly	XT
		Weekly	XT1 thru XT5
GBP/USD	American	Monthly	6B
		Weekly	6B1 thru 6B5
	European	Monthly	XB
		Weekly	XB1 thru XB5
JPY/USD	American	Monthly	6J
		Weekly	6J1 thru 6J5
	European	Monthly	XJ
		Weekly	XJ1 thru XJ5
MXN/USD	American	Monthly	6M, 1M thru 5M
		Weekly	

Note: For Weekly contracts, the number one means first week of the month, the number two means second week of the month, etc. So an American-style CHF/USD option that expires on the third Friday in October would have a code of: 6S3V8.

Pricing of premium-quoted CME FX options

One option contract delivers into one futures contract, and correspondingly, each option contract has a notional value equivalent to its underlying future and currency denomination. Examples:

EUR/USD = €125,000
JPY/USD = ¥12,500,000
GBP/USD = £62,500
CAD/USD = C$100,000
CHF/USD = SF125,000
AUD/USD = A$100,000

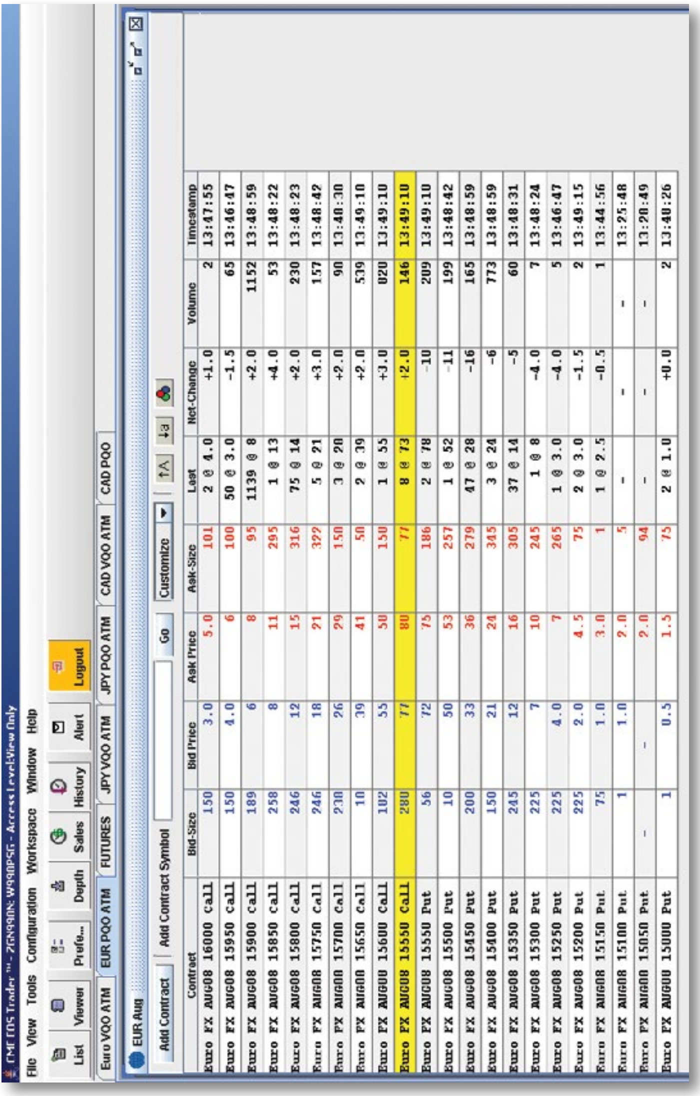
Premium-quotation is the equivalent of a "live" price in the OTC market (the transaction is unhedged). Premiums are quoted in USD points per amount of foreign currency with the minimum tick usually set at $0.0001 (except in JPY/USD = $0.000001). The minimum "tick" is for example in EUR/USD = $0.0001 times the contract size of €125,000 = $12.50.

On the screen shot shown on the next page, the EUR/USD AUG08 1.5550 Call is quoted on the bid side at a price of 77 for 280 contracts. This means that each contract is bid at a premium value of $0.0077*€125,000 = $962.50. If a seller were to hit the bid on the full amount, the premium collected would be 280*962.50 = $269,500. The notional value of the short option position would be 280*€125,000 = €35,000,000.

If the option dealer wants to hedge the trade:

In the futures market: Multiply the option delta by the number of option contracts and buy/sell equivalent number of futures contracts. Example above, the delta is approximately 50 percent, the buyer will sell 280*0.50 = 140 futures contracts.

In the OTC spot market: Multiply the option delta by the number of option contracts, then multiply by the notional amount per contract and buy/sell the currency amount. Example above, 50%*280*€125,000 = €17,500,000 and the option buyer would sell €17,500,000 against USD in the spot market.



Contract	Bid-Size	Bid Price	Ask Price	Ask-Size	Last	Net-Change	Volume	Timestamp
Euro FX AUG08 16000 Call	150	3.0	5.0	101	2 @ 4.0	+1.0	2	13:47:55
Euro FX AUG08 15950 Call	150	4.0	6	100	50 @ 3.0	-1.5	65	13:46:47
Euro FX AUG08 15900 Call	189	6	8	95	1139 @ 8	+2.0	1152	13:48:59
Euro FX AUG08 15850 Call	258	8	11	295	1 @ 13	+4.0	53	13:48:22
Euro FX AUG08 15800 Call	246	12	15	316	75 @ 14	+2.0	230	13:48:23
Euro FX AUG08 15750 Call	246	18	21	322	5 @ 21	+3.0	157	13:48:42
Euro FX AUG08 15700 Call	230	26	29	150	3 @ 20	+2.0	90	13:40:30
Euro FX AUG08 15650 Call	10	39	41	50	2 @ 39	+2.0	539	13:49:10
Euro FX AUG08 15600 Call	102	55	58	150	1 @ 55	+3.0	820	13:49:10
Euro FX AUG08 15550 Call	280	77	80	77	8 @ 73	+2.0	146	13:49:10
Euro FX AUG08 15550 Put	56	72	75	186	2 @ 78	-10	209	13:49:10
Euro FX AUG08 15500 Put	10	50	53	257	1 @ 52	-11	199	13:48:42
Euro FX AUG08 15450 Put	200	33	36	279	47 @ 28	-16	165	13:48:59
Euro FX AUG08 15400 Put	150	21	24	345	3 @ 24	-6	773	13:48:59
Euro FX AUG08 15350 Put	245	12	16	305	37 @ 14	-5	60	13:48:31
Euro FX AUG08 15300 Put	225	7	10	245	1 @ 8	-4.0	7	13:48:24
Euro FX AUG08 15250 Put	225	4.0	7	265	1 @ 3.0	-4.0	5	13:46:47
Euro FX AUG08 15200 Put	225	2.0	4.5	75	2 @ 3.0	-1.5	2	13:49:15
Euro FX AUG08 15150 Put	75	1.0	3.0	1	1 @ 2.5	-0.5	1	13:44:56
Euro FX AUG08 15100 Put	1	1.0	2.0	5	-	-	-	13:25:48
Euro FX AUG08 15050 Put	-	-	2.0	94	-	-	-	13:20:49
Euro FX AUG08 15000 Put	1	0.5	1.5	75	2 @ 1.0	+0.0	2	13:40:26

Above picture of CME EOS Trader is used in pricing examples on the facing page.

Converting CME "tick" price to implied volatility

Some pricing models have preset CME International Monetary Market (IMM) formats. However, most are set with a default American-style profile with a maturity day count set to the Saturday following expiration (giving full time value to the Friday expiration day). While this is perfectly correct theoretically, it creates a slight discrepancy when trying to compare implied volatility (IV) levels with the OTC option expiring on the Friday morning. This day-count can be adjusted by manually changing the days to expiry field or by permanently changing the rule in the default settings for IMM options. This allows an apples-to-apples comparison of IV for the European-style contracts (and with the awareness that the CME American-style contracts provides an extra five hours of trading).

For other models, follow these steps to compare IV pricing with OTC options:

1. Set up pricing system to follow Foreign Currency (FC)/USD convention
2. Input CME option's expiration day (Friday xx) as the maturity date
3. Input CME contract's strike in appropriate FC/USD slot
4. Select American- or European-style (remember its not a big factor in options on futures)
5. Input the CME underlying Futures IMM date (i.e. third Wednesday of Quarterly month) as the option's value date or delivery date
6. Input the correct all-in forward rate for the IMM date (either by having correct spot and swap or by simply inputting the futures price as the forward outright rate). Again, make sure the rate is in FC/USD convention and option price is set to $pips/FC notional
7. Input CME contract's "tick" price in the $pips per FC slot
8. Set the premium value date to today's date (same day payment — this is not a big factor)
9. Solve for IV

This IV can be compared to same-delta (not same-strike) OTC options.

Comparison of CME strike to OTC strike for same maturity

In order to match CME options with OTC options with the same maturity dates, one must adjust the strikes (which will also lead to equivalent deltas).

To do this, one needs to approximate what the forward swap difference will be between the spot and the futures contract on the day of expiration. This forward swap difference must then be added or subtracted to the CME strike to provide an OTC equivalent strike. If the futures trades at a discount, add back the swap differential. If it trades at a premium, subtract the swap differential.

Note: the below example dates back a few years when the rate curve was steeper. The current flat rate curve makes this adjustment negligible, but still good to keep in mind.

Example 1:

Determine OTC strike equivalent for a CME EUR/USD, August 8, 1.5550 Call (delivers into September 17th future).

Assumption: EUR/USD forward swap curve = −0.8 pips/day (−0.00008)

1. On August 8th, spot date will be Aug 12th and CME September IMM date is Sep 17th. The day count between spot and IMM is 36, so swap differential is 36 * (−0.8) = −28.8 pips (−0.00288)

2. Take CME strike and add back the differential:
   1.5550 + ~0.0029 = 1.5579

An OTC option for Aug 8th expiry, with a strike of 1.5579 should respond (delta) to spot in a corresponding manner as a CME Aug 8th 1.5550 will respond to its underlying future.

The process requires an extra inversion step for CME contracts quoted inversely to OTC such as, CAD/USD, CHF/USD and JPY/USD.

See Example 2 on next page.

Example 2:

Determine OTC strike equivalent for a JPY/USD, September 5, 9450 Call (actual strike is 0.009450 but quoted without decimals for practical reasons).

Assumption: USD/JPY forward swap curve = –0.6 pips/day (–0.006)

1. On September 5th, spot date will be Sep 9th and Sep IMM date is Sep 17th. The day count between spot and IMM is 8, so swap differential is 8 * (–0.6) = –4.8 (–0.048)

2. Take CME strike and invert to OTC convention:
   1/0.009450 = 105.82

3. Add the differential back to the CME strike:
   105.82 + .048 = approximately 105.87

(This adjustment can be minimal when interest differentials are small and option expiration is close to the IMM date.)

When the strike is adjusted as described above, OTC and CME FX options with same expiration dates provide a strong arbitrage opportunity (because they behave nearly identically, they should be priced identically). The CME European-style options will have nearly identical expirations (10:00 a.m. NY VWAP vs. 10:00 a.m. NY spot), and thus could be effectively used as offsets. In fact, CME American-style options can also be used as offsets, preferably in a Short OTC – Long CME scenario in which the CME option provides an extra five hours of positive gamma trading after the OTC offset rolls off.

CME trading conventions for FX options spreads

Important default rules for pricing option spreads:

We use the following default format for market consistency in pricing spreads electronically:

1. First listed contract is always BOUGHT; second listed contract is SOLD
2. Vertical spreads: first listed = more-ITM strike; second listed = less-ITM
3. Calendar spreads: first = BACK date; second = FRONT date
4. Risk reversals: first = CALL strike; second = PUT strike

Examples assuming the following EUR/USD option quotes:

Sep08 – P15500 bid/ask = 50/51

Sep08 – P15400 bid/ask = 21/22

Oct08 – P15500 bid/ask = 150/153

Dec08 – P15100 bid/ask = 147/150

Sep08 – C15600 bid/ask = 19/21

Sep08 15500 – 15400 Put vertical:

Example 1: Sep08 15500 – 15400 Put vertical

· Quoted 28/30 to buy the 15500 and sell the 15400

Example 2: Oct08 15500 – Sep08 15500 Put calendar

· Quoted 99/103 to buy the Oct and sell Sep

Example 3: Dec08 15100 – Oct08 15500 Put calendar

· Quoted –6/0 to buy the Dec and sell Oct

Example 4: Sep08 C15600 – P15400 Risk reversal

· Quoted –3/0 to buy the Call and sell the Put

A quick guide to FX options on CME Globex

Contract	Style	Size
AUD/USD	A/E	100,000 Australian dollars
BRL/USD	A	100,000 Brazilian reais
CAD/USD	A/E	100,000 Canadian dollars
CHF/USD	A/E	125,000 Swiss francs
CZK/EUR	A	4,000,000 Czech koruna
CZK/USD	A	4,000,000 Czech koruna
EUR/CHF	A	125,000 euro
EUR/GBP	A	125,000 euro
EUR/JPY	A	125,000 euro
EUR/USD	A/E	125,000 euro
GBP/USD	A/E	62,500 British pounds
HUF/EUR	A	30,000,000 Hungarian forint
HUF/USD	A	30,000,000 Hungarian forint
ILS/USD	A	1,000,000 Israeli shekelim
JPY/USD	A/E	12,500,000 Japanese yen
KRW/USD	A	125,000,000 Korean won
MXN/USD	A	500,000 Mexican pesos
NZD/USD	A	100,000 New Zealand dollars
PLN/EUR	A	500,000 Polish zloty
PLN/USD	A	500,000 Polish zloty
RMB/EUR	A	1,000,000 Chinese renminbi
RMB/JPY	A	1,000,000 Chinese renminbi
RMB/USD	A	1,000,000 Chinese renminbi
RUB/USD	A	2,500,000 Russian rubles

A = American-style options **E** = European-style options

Tick	Expiration(s)	Futures Delivery/ Settlement
$.0001 per Australian dollar = $10/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.00005 per Brazilian real = $5/contract	12 consecutive months and 4 weekly	Cash
$.0001 per Canadian dollar = $10/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.0001 per Swiss franc = $12.50/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
.000002 euro per Czech koruna = €8/contract	4 months in the March quarterly cycle and 2 serial months	Physical
$.000002 per Czech koruna = $8/contract	4 months in the March quarterly cycle and 2 serial months	Physical
.0001 Swiss francs per euro = SF12.5/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
.00005 British pounds per euro = £6.25/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
.01 Japanese yen per euro = ¥1,250/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.0001 per euro = $12.50/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.0001 per British pound = $6.25/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
.0000002 euro per Hungarian forint = €6/contract	4 months in the March quarterly cycle and 2 serial months	Physical
$.0000002 per Hungarian forint = $6/contract	4 months in the March quarterly cycle and 2 serial months	Physical
$.00001 per Israeli shekel = $10/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.000001 per Japanese yen = $12.50/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
$.0000001 per Korean won = $12.50/contract	12 consecutive months and 4 weekly	Physical
$.000025 per Mexican peso = $12.50/contract	12 consecutive months and 4 weekly	Physical
$.0001 per New Zealand dollar = $10/contract	4 months in the March quarterly cycle, 2 serial months and 4 weekly	Physical
.00002 euro per Polish zloty = €10/contract	4 months in the March quarterly cycle and 2 serial months	Physical
$.00002 per Polish zloty = $10/contract	4 months in the March quarterly cycle and 2 serial months	Physical
.00001 euro per Chinese renminbi = €10/contract	12 consecutive months and 4 weekly	Cash
.001 Japanese yen per Chinese renminbi = ¥1,000/contract	12 consecutive months and 4 weekly	Cash
$.00001 per Chinese renminbi = $10/contract	12 consecutive months and 4 weekly	Cash
$.00001 per Russian ruble = $25/contract	4 months in the March quarterly cycle and 4 weekly listed 4 weeks prior to termination	Cash

Important contact information:

For emergency issues on any CME Globex related orders, fills, connectivity or general rules questions, please contact:

CME Globex Control Center (GCC):

United States:	+1 312 930 2322
Europe:	+44 20 7623 4708
Asia:	+65 6223 1357

For more information on our global FX Options offering, contact fxteam@cmegroup.com.

CME GROUP HEADQUARTERS

20 South Wacker Drive
Chicago, Illinois 60606
cmegroup.com

CME GROUP GLOBAL OFFICES

New York
London
Singapore
Beijing
Belfast
Calgary
Cambridge
Hong Kong
Houston
São Paulo
Seoul
Tokyo
Washington D.C

FX317/385/0314