

CME FX LINK

Quotation and Pricing Guide

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Douglas Meyers

Senior Program Manager, Planning & Execution

Matthew Gierke

Executive Director, FX Products

Daniel Grombacher

Senior Director, FX Research & Product Development

**CME FX Link is the first ever
anonymous, automated
central liquidity pool for
efficiently managing a wide
range of FX swap, forward,
and basis risk exposures.**

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Introduction

CME FX Link is a CME Globex basis spread between FX futures and over-the-counter ("OTC") spot FX, traded as a differential between CME FX futures and OTC spot FX. The spreads result in the simultaneous execution of FX futures cleared by CME and OTC spot FX subject to OTC documentation and credit relationships.

In this white paper, we describe the quotation and pricing conventions of CME FX Link – the first ever electronic central limit order book for trading spreads between OTC FX spot and CME FX futures.

This document provides a description of how CME FX Link spreads are priced and traded on CME Globex and will cover the following topics:

- Spread quotation and pricing
- Tick sizes determination for each currency pair
- OTC spot FX rate and notional calculations

FX Futures and OTC FX Quoting Conventions

The OTC market generally, but not exclusively, quotes currencies with a base currency that has a higher purchasing power relative to the second currency (e.g., with USD/JPY, the US Dollar has a higher purchasing power than the Japanese Yen). The second currency is commonly referred to the quote or term currency, which is calculated by multiplying the base currency ("CCY") amount by price. Price level fluctuations directly affect the quote currency amount, which means that the futures contract will tick in the quote currency amount.

In contrast, all major ("non-cross") FX futures contracts tick in US Dollars, such that the base currency may not have more purchasing power than the second currency, resulting in quoting conventions that could differ between the futures and OTC markets. Where this difference occurs, futures market quoting conventions can be harmonized with the OTC market by inverting the currency pair (dividing 1 by the rate) and flipping the currency sides, but that changes the shape of the instrument's price curve, from linear ($f(x) = \text{rate}$) to asymptotic ($f(x) = 1/\text{rate}$).

Currently, four futures currency pairs that are available for trading via CME FX Link spreads (CAD/USD, CHF/USD, JPY/USD, and MXN/USD) are quoted inversely to the OTC market. Given these dynamics and market quoting conventions, such currency pairs will need to be inverted before calculating, quoting, and trading the spread differential on CME Globex.

CME FX Link Spread Quotations

The CME FX link spread is traded on CME Globex as the differential between the futures and spot prices in OTC terms, which is also equivalent to the relevant forwards points for the futures contract.

EUR/USD (Non-Inverted)

Spread Price	Futures Price	Spot Price
0.00001 =	1.12955 –	1.12954

For inverted currency pairs, the futures value is expressed as 1 divided by the futures price, such that the differential is calculated in OTC terms.

CAD/USD (Inverted)

Spread Price	1/Futures Price	Spot Price
0.00001 =	1.33360053 (1/0.74985) –	1.333590

CME FX Link Spread Construction

For a non-inverted currency pair:

- The buyer of the spread buys CME FX futures and sells OTC spot FX; and
- The seller sells CME FX futures and buys OTC spot FX.

For an inverted currency pair:

- The buyer of the spread sells* CME FX futures and sells OTC spot FX; and
- The seller buys* CME FX futures and buys OTC spot FX.

CME FX Link Tick Sizes

FX spot basis spread ticks are approximated to reflect a fixed percentage – i.e., approximately one-tenth (1/10th) – of the outright futures' tick value, considering full tick increments, and not the current minimum price increment that may be one-half tick for certain currency pairs. If the futures quoting convention matches the OTC market, the spreads' tick US Dollar value will equal exactly one-tenth of the outright futures' tick value, while inverted currency pairs will be approximated at close to 1/10th of the outright futures' tick value.

The tick increment for inverted currency pairs is an approximation of 1/10th of one full tick of an outright futures contract because the spot leg of the instrument is calculated by dividing one by the applicable futures price (1/Futures Price) before the spread price is subtracted. The function (1/Futures Price) is non-linear, which will cause the spot leg quote amount to change at a variable rate for each tick movement of the futures price, which moves at a linear rate. As a result, as FX price levels change, CME will on an as-needed basis re-evaluate tick sizes of the inverted currency pairs to maintain a tick increment that most closely approximates the US Dollar equivalent of 1/10th of the tick value of the outright futures contract (or the prevailing target US Dollar spread tick value), based on the current outright futures price level.

The table below illustrates that the spread value in US Dollars varies from the 1/10th US Dollar futures tick value for four inverted currency pairs: USD/CAD, USD/CHF, USD/JPY, and USD/MXN.

Currency Pair	Spot FX Spread Tick Size	1/10th US Dollar Futures Tick Value	CME FX Link Spread Value in US Dollars**
AUD/USD	0.00001	\$1.00	\$1.00
EUR/USD	0.00001	\$1.25	\$1.25
GBP/USD	0.00001	\$0.625	\$0.625
NZD/USD	0.00001	\$1.00	\$1.00
USD/CAD	0.00001	\$1.00	\$0.5831
USD/CHF	0.00001	\$1.25	\$1.3104
USD/JPY	0.001	\$1.25	\$1.0768
USD/MXN	0.0005	\$0.50	\$0.6802

Spread tick sizes, are subject to revision and recalibration as the market changes, based on the CME's discretion within the established CME Globex communication service level agreement.

CME Globex Fills

The CME FX Link is traded as a differential on CME Globex. Once an order is matched, CME Globex will return three filled transactions for the spread, the futures leg, and the spot leg. The fill price of the OTC spot FX leg will initially be shown in the fill message as equal to the CME FX Link spread price (reflecting the differential from the assigned FX futures leg price that the OTC spot FX fill price will ultimately take), while the actual OTC spot FX leg fill price and full transaction details can be consumed via CME STP.

* The spread construction for an inverted currency pair is different because when a market participant sells a futures contract that is quoted inversely to the OTC market, the execution is equivalent to buying the currency pair in OTC terms.

** Calculated using futures price levels as of June 27, 2019.

Spot Leg Price Calculation

The spot leg of the spread will be calculated by anchoring off the last CME Globex futures price, and subtracting the traded spread.

EUR/USD (Non-Inverted)

Spot Price (Assigned)	Futures Price	Spread Price
1.12954 =	1.12955 –	0.00001

In the case of the inverted currencies, the futures price is inverted prior to subtracting the traded spread.

CAD/USD (Inverted)

Spot Price (Assigned)	1/Futures Price	Spread Price
1.333590 =	1.333600053 (1/0.74985) –	0.00001

Spot Leg Rounding

In the case of non-inverted currency pairs, the spot leg will be rounded to the same precision of the spread tick. If the currency pair is inverted, the spot leg will be rounded to one decimal place beyond granularity of the spread, to avoid rounding impact to the tick value of the traded spread differential.

The below table describes the minimum price increment that will determine the spot rate precision and rounding.

Currency Pair	Minimum Price Increment
AUD/USD	0.00001 (0.1 pip)
EUR/USD	0.00001 (0.1 pip)
GBP/USD	0.00001 (0.1 pip)
NZD/USD	0.00001 (0.1 pip)
USD/CAD	0.000001 (0.01 pip)
USD/CHF	0.000001 (0.01 pip)
USD/JPY	0.0001 (0.01 pip)
USD/MXN	0.00001 (0.1 pip)

Notional Calculations

The base and quote notional for each spot transaction will be calculated and assigned for each transaction.

For each spot currency pair, the non-US Dollar notional per spread is fixed and equivalent to the futures notional, as defined in the CME rulebook.

For the non-inverted currencies, the quote amount is calculated by multiplying the futures base amount by the spot price.

EUR/USD (Non-Inverted)

Base Notional	Spot Rate	Quote Notional
125,000.00 EUR x	1.12954 =	141,192.50 USD

With inverted currency pairs, the quote notional is divided by the spot rate to determine the base notional.

CAD/USD (Inverted)

Quote Notional	Spot Rate	Base Notional
100,000.00 CAD ÷	1.333590 =	74,985.57 USD

All notional values are rounded to the nearest penny.

End-to-End Example for Non-Inverted Currency Pair: EUR/USD Spot FX vs. April FX Futures Expiry

The following example is from the perspective of a market participant buying the CME FX Link spread on CME Globex.

Step	Description	Notes								
1. Market Prices	<ul style="list-style-type: none"> Spot Price (EUR/USD): 1.1260 Futures Price (EUR/USD): 1.12955 Differential (Futures – Spot): 0.00355 	Prevailing market prices for each leg will drive a participant's view of the CME FX Link basis differential and resulting orders to trade the basis on CME Globex.								
2. Quoting on CME Globex	<table border="1"> <thead> <tr> <th>Quantity</th> <th>Bid</th> <th>Offer</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>0.00355</td> <td>0.00356</td> <td>65</td> </tr> </tbody> </table> <ul style="list-style-type: none"> 1 Spread = 125,000 EUR per Leg Minimum Order Quantity = 5 	Quantity	Bid	Offer	Quantity	50	0.00355	0.00356	65	CME Globex quotes for trading CME FX Link are expressed as the applicable differential with spread quantities expressed as the number of spreads (notional quantity of each spread leg is equal to the base currency notional of the FX futures leg).
Quantity	Bid	Offer	Quantity							
50	0.00355	0.00356	65							
3. Spread Match	Assume an aggressing order to buy 5 spreads @ 0.00356 resulting in a match on CME Globex for 5 spreads @ 0.00356.	Aggressor is buying 5 futures (125,000 EUR notional per contract) and selling (125,000 EUR x 5) in FX spot.								
4. CME Globex Fill Messages	CME Globex fill message contains 3 price values: <ul style="list-style-type: none"> Spread Price: 0.00356 Futures Price: 1.12955 Spot Price:* 0.00356 	User receives 3 fill messages containing the spread, futures leg, and spot leg prices.								
5. Futures Leg Price & Quantity	<ul style="list-style-type: none"> Futures Leg Price = Last CME Globex Price Last CME Globex Price = 1.12955 Buy 5 Spreads = Buy 5 EUR FX Futures <p><i>(Notional Calculations: Base = 125,000 EUR x 5 Spreads = Long 625,000 EUR, Quote = 625,000 EUR x 1.12955 = Short 705,968.75 USD)</i></p>	Future price and quantity values available via CME STP.								
6. OTC Spot Leg Price	<ul style="list-style-type: none"> Spot Price = Futures Leg Price – Traded Spread Spot Price = 1.12955 – 0.00356 = 1.12599 	Spot leg price consumed via STP for trading firms. PB and central FXPB consume via Traiana or CME MQ.								
7. OTC Spot Notional	<ul style="list-style-type: none"> Base = 125,000 EUR x 5 Spreads = Short 625,000 EUR Quote = 625,000 EUR x 1.12599 = Long 703,743.75 USD 	OTC spot notional consumed via STP for trading firms. PB and central FXPB consume via Traiana or CME MQ.								

* The spot leg fill price is only available on STP and MQ messages, and will be reflected as the traded spread differential to the futures leg price on the fill message.

End-to-End Example for Inverted Currency Pair: USD/JPY Spot FX vs. September FX Future Expiry

The following example is from the perspective of a market participant buying the CME FX Link spread on CME Globex.

Step	Description	Notes								
1. Market Prices	<ul style="list-style-type: none"> Spot Price (USD/JPY): 108.7629 Futures Price (JPY/USD): 0.0092215 Differential (1/Futures – Spot): -0.3207 	Prevailing market prices for each leg will drive a participant's view of the CME FX Link basis differential and resulting orders to trade the basis on CME Globex.								
2. Quoting on CME Globex	<table border="1"> <thead> <tr> <th>Quantity</th> <th>Bid</th> <th>Offer</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>-0.321</td> <td>-0.320</td> <td>25</td> </tr> </tbody> </table> <ul style="list-style-type: none"> 1 Spread: 12,500,000.00 JPY per Leg Minimum Spread Contract Quantity = 5 	Quantity	Bid	Offer	Quantity	30	-0.321	-0.320	25	CME Globex quotes for trading CME FX Link are expressed as the applicable differential with spread quantities expressed as the number of spreads (notional quantity of each spread leg is equal to the base currency notional of the FX futures leg).
Quantity	Bid	Offer	Quantity							
30	-0.321	-0.320	25							
3. Spread Match	Assume an aggressing order to buy 5 spreads @ -0.320 resulting in a match on CME Globex for 5 spreads @ -0.320.	Aggressor is selling 5 futures (12,500,000.00 JPY notional per contract) and buying (12,500,000.00 JPY x 5) in FX spot.								
4. CME Globex Fill Messages	CME Globex fill message contains 3 price values: <ul style="list-style-type: none"> Spread Price: -0.320 Futures Price: 0.0092215 *Spot Price: -0.320 	User receives 3 fill messages containing the spread, futures leg, and spot leg prices.								
5. Futures Leg Price & Quantity	<ul style="list-style-type: none"> Futures Leg Price = Last CME Globex Price Last CME Globex Price = 0.0092215 Buy 5 spreads = Sell 5 JPY FX Futures <p><i>(Notional Calculations: Base = 12,500,000 JPY x 5 Spreads = Short 62,500,000 JPY, Quote = Long 62,500,000 JPY x 0.0092215 = Long 576,343.75 USD)</i></p>	Future price and quantity values available via CME STP.								
6. OTC Spot Leg Price	<ul style="list-style-type: none"> Spot Price = 1/Futures Leg Price – Traded Spread Spot Price: $1/0.0092215 - 0.320 = 108.7622$ 	Spot leg price consumed via STP for trading firms. PB and central FXPB consume via Traiana or CME MQ.								
7. OTC Spot Notional	<ul style="list-style-type: none"> Base = $62,500,000 \text{ JPY} / 108.7622 = \text{Short } 574,648.18 \text{ USD}$ Quote = $12,500,000 \text{ JPY} \times 5 \text{ Spreads} = \text{Long } 62,500,000 \text{ JPY}$ 	OTC spot notional consumed via STP for trading firms. PB and central FXPB consume via Traiana or CME MQ.								

* The spot leg fill price is only available on STP and MQ messages, and will be reflected as the traded spread differential to the futures leg price on the fill message.

For more information, please contact fxteam@cmegroup.com
cmegroup.com/fxlink



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