CME Group

CME Listed FX Options: A Capital Efficient, Low Cost Solution

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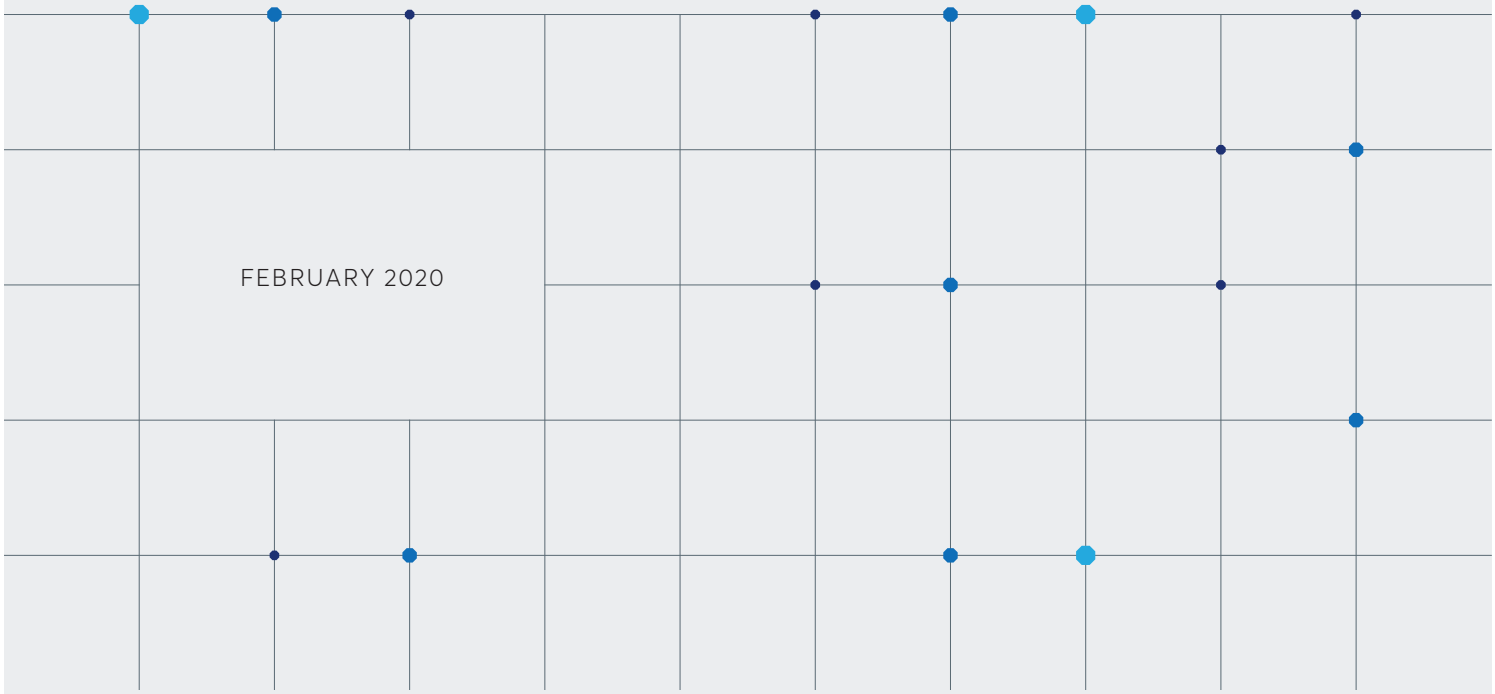


FEBRUARY 2020

In this white paper, we explore in detail the characteristics and features of trading CME listed FX options on a regulated, electronic central limit order book and how these capital and cost-efficient products can be used by market participants as a complement to their over-the-counter FX options trading activity.

Introduction

The launch of electronic trading in FX options at CME Group fueled strong growth with daily turnover in excess of 90,000 contracts by 2017 – the equivalent of over $10 billion notional – with 98% traded electronically. In the process, the product was transformed to better align to OTC market conventions and provide more flexibility for all participants. CME listed FX options provide transparency, low cost trade executions and capital-efficient risk management capabilities that are quickly becoming critical in today's increasingly regulated markets. According to ISDA, the final two phases of Uncleared Margin Rules ("UMR") will potentially impact more than a thousand market participants over the course of 2020 and 2021. UMR will require these OTC FX option market participants to post and segregate margin for non-cleared derivatives transactions at levels far exceeding the thresholds of listed centrally cleared trades and it is expected to create increased demand for viable alternatives such as CME listed FX options.

CME Group value proposition

CME FX options offer multiple features to market practitioners seeking a potential complement to their OTC FX options business:

- **More capital efficient**

  A recently released Greenwich Associates[1] report on UMR indicates that CME FX options will require significantly less margin and capital and could be as much as 86% more capital efficient than bilateral positions.

- **More cost effective**

  The Greenwich Associates study also highlighted an execution cost analysis ("ECA") indicating that significant savings could be achieved from trading on the CME Globex central limit order book ("CLOB") – as much as 70% per trade in some cases – compared to bilateral OTC executions.

- **Stronger alternative**

  CME FX options are now a stronger, more efficient alternative for OTC FX options as they feature European-style exercise, alignment with the 10 a.m. New York cut, increased strike price granularity, multiple contract expirations out to one year (i.e., twelve weekly, eight monthly, and four quarterly expiries), and more efficient auto-exercise process.

- **Competitive screen liquidity**

  CME Globex offers market participants deep, liquid, and transparent markets by option expiry and strike price that are highly competitive.

- **Bilateral trading capability**

  In addition to electronic execution on CME Globex, participants can choose to trade blocks of CME listed FX options against preferred bilateral relationships to optimize their execution flexibility.

- **FX global code of conduct**

  CME FX options markets are regulated and governed by a rulebook which is aligned with the principles of the FX Global Code. CME FX options promote a robust, fair, liquid, open, and transparent market in which market participants can confidently and effectively transact at competitive prices that reflect available market information and in a manner that conforms to acceptable professional standards of industry behavior.

- **Operational efficiency**

  Central clearing through CME Group effectively removes the need for entering into complex ISDA® Master Agreements with multiple bilateral counterparties. A single clearing agreement provides access to the full liquidity available in CME FX futures and options.

1 *See "FX Options in the Age of Uncleared Margin Rules", by David Stryker, Greenwich Associates, Second Quarter 2019 cmegroup.com/fxotca.*

Understanding CME FX options

CME Group offers the largest, all-to-all electronic venue for trading FX options in the world with listed options on 24 currency pairs. In recent years, CME Group has aligned its listed FX options offerings with over-the-counter market conventions to make them a more familiar and attractive alternative for OTC FX market practitioners seeking capital and cost-effective solutions.

- **New exercise-style**

  All CME FX options were converted from American- to European-style.

- **Efficient exercise process**

  Options are auto-exercised against a fixing, providing a fully deterministic and highly efficient process.

- **Large selection of maturities**

  CME Group now provides 12 monthly and 12 weekly option contracts – including the new Monday options which launched on February 24, 2020 – for more precise hedging and trading opportunities.

- **More strike prices**

  CME Group has increased the strike price granularity in short-dated FX options , introducing 25-pip increments for strikes near-the-money in short dated contracts.

- **New expiration time**

  The expiration time of CME FX options on major currencies has been changed to 10 a.m. New York time from 2 p.m. Chicago time to match the prevalent convention in OTC options.

At CME Group, one option contract is based on one underlying futures contract, therefore options have the same notional value as their underlying futures, and the price of the option is quoted in terms of US dollars per the base unit of the underlying notional. For example, the EUR/USD futures contract has a notional value of €125,000, so a price of $0.0125 for a EUR/USD option means a premium of $0.0125 125,000 = $1,562.50 per contract.

In the major currencies, there are 24 option maturities to choose from at any given time: 4 new weekly Mondays (launching February 24, 2020), 4 weekly Wednesdays, 4 weekly Fridays, and 12 monthly contracts (in CME parlance, the monthly contracts are split between 4 quarterlies and 8 serials). FX options are listed on a rolling basis so when one option expires the next nearest such maturity is listed. FX options exercise (deliver) into the nearest quarterly futures contract, with the quarterly option expiry being the last option contract month to deliver into it's underlying future.

CME FX options on a given currency pair share identical contract specifications regardless of option maturity. All weekly and monthly options contracts on a specific currency pair will have the same underlying contract unit, minimum price increment, trading hours, trading venues, settlement procedures, termination times on last trading day, position and reportable limits, minimum block thresholds, price limits, exercise style, and settlement methods.

CME FX options specifications

- **Options deliver into underlying quarterly futures (March, June, September, and December)**
  - Same notional value as underlying futures
  - EUR = €125,000; JPY = ¥12,500,000; GBP = £62,500; AUD = A$100,000; CAD = C$100,000
  - Call options convey the right to buy the notional currency (i.e., go long EUR, JPY, etc.)
  - Put options give the right to sell the notional currency (i.e., go short EUR, JPY, etc.)
- **24 maturity dates**
  - 4 new Monday options launched February 24, 2020 (first four Mondays on calendar)
  - 4 weekly Wednesday options (first four Wednesdays on calendar)
  - 4 weekly Friday options (first four Fridays that are not a serial or quarterly)
  - 12 monthly contracts (Eight serials + four quarterlies)
- **All options are European-style**
- **Expiration time is 10 a.m. New York**
- **All options are auto-exercised against CME Group-calculated fix prices:**
  - Calls are exercised if in-the-money ("ITM") or at-the-money ("ATM") against the fix, abandoned if out-of-the-money ("OTM")
  - Puts are exercised if ITM against the fix, abandoned if ATM or OTM
  - No contrary instructions are permitted

Comparing CME options on FX futures with OTC options on FX spot

With the new CME Group expiration time now aligned with the 10 a.m. New York OTC convention, CME options on FX futures can be a near perfect substitute for an equivalent strike OTC option on FX spot.[2]

Options on FX futures are theoretically very similar to OTC options on FX spot. The primary difference is that one underlying (futures) is more exposed to interest rate changes than the other (spot), so options on FX futures will have slightly more sensitivity to interest rates (i.e. rho) than options on FX spot. However, CME FX futures are deliverable contracts, which promotes strong price correlation and ultimately price convergence between futures and spot. Consequently, the change in the value of options on FX futures will track the equivalent option on FX cash very closely.

An OTC FX option with the same maturity date as a CME FX option will have nearly identical Greek values (apart from rho) if one adjusts the strike price to insure the comparison is between equal delta options. The example below highlights how to adjust the strike price on an OTC FX option to achieve near equivalence with a given standard strike CME FX option. The adjustment required is based on the swap points differential between the spot delivery and the futures delivery on the option targeted maturity date.

Example:

A CME FX option expiring on September 6, 2019 will deliver into a September 2019 FX futures contract that delivers on September 18, 2019, while the equivalent OTC FX option will deliver spot on September 10, 2019. Assume the swap differential between September 10 and September 18 is +25 pips (+0.0025). The OTC strike must be 25 pips lower than the CME strike to generate an equivalent delta value. If one compares an OTC 1.1275 strike call (put) option with a CME 1.1300 strike call (put), they will see nearly equivalent delta, vega, gamma, and theta values, while rho will be higher on the CME option.

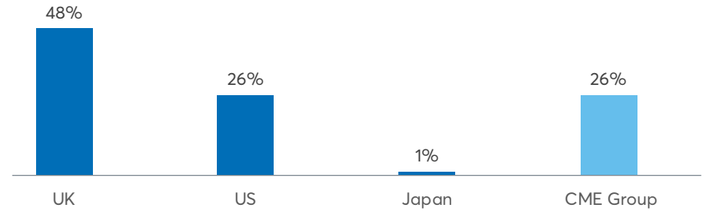
2 *This is a layman's approach that traders have used as a quick way to approximate equivalence. A more comprehensive, theoretical relationship between options on futures strikes and OTC strikes is described in several financial publications for those inclined.*

Analysis of CME Globex

CME Globex is the premier electronic trading system for global connectivity to the broadest array of futures and options across all asset classes, providing users across the globe with virtually 24-hour access to CME markets. Approximately 98% of CME FX options are transacted electronically on CME Globex. When compared to single- and multi-dealer electronic trading platforms, CME FX options on CME Globex display robust market liquidity that is highly competitive with the bilateral OTC FX options market. Trading flow in CME FX options is consistent with global markets, peaking at the London market close/New York market open. Liquidity providers stream quotes 23 hours a day (one hour market close from 4 p.m. – 5 p.m. Chicago time), but participants can trade blocks during the CME Globex close.

FX Options
Electronic Direct Average Daily Volume

Regional Combined Turnover of Single- and Multi-Dealer Platforms and CME Globex

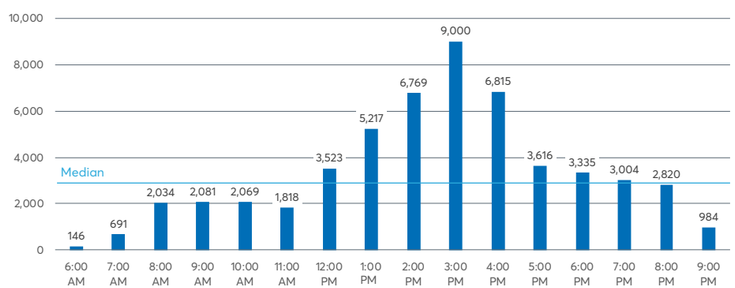


Source: Greenwich Associates, 2019.

Rank	Pair	2018 ADV (Contracts)	2018 ADV (Notional)	Open Interest (Contracts)	Open Interest (Notional)
1	EUR/USD	34,675	$5.0 billion	342,110	$50 billion
2	JPY/USD	12,460	$1.4 billion	113,692	$12.8 billion
3	GBP/USD	12,907	$1.1 billion	150,814	$12.5 billion
4	CAD/USD	7,453	$0.6 billion	81,904	$6.2 billion
5	AUD/USD	6,293	$0.5 billion	80,788	$5.8 billion

Source: CME Group.

CME FX Options
Average Daily Volume, May 2019, by London Hour



Source: CME Group.

The full extent of liquidity in CME FX options is readily transparent on CME Globex around the clock. For example, the average spread size for short-dated (90 days or less), at-the-money ("ATM") FX options on the major currency pairs is approximately 2.5 ticks or less at the top of the CME Globex central limit order book during regular trading hours ("RTH")[3]. For long-dated (91-150 days), ATM FX options on the major currency pairs, the average spread size is generally 3.0 ticks or less at the top of the CME Globex CLOB during RTH.

Notionally, the average bid-ask size for short-dated, ATM FX options on the major currency pairs ranges up to $40 million at the top of the CME Globex CLOB during RTH. For long-dated, ATM FX options on the major currency pairs, the average bid-ask size is approximately $15 million at the top of the CME Globex CLOB during RTH.

EURUSD	Month	Day count	Top-of-Book		2 Level Sweep	
			Spread	Size	Spread	Size
Wednesday	Jan	1	2.16	195	2.72	437
Friday	Jan	3	2.14	256	2.70	581
Wednesday	Jan	8	2.15	242	2.70	539
Friday	Jan	10	2.20	281	2.74	606
Wednesday	Jan	15	2.13	237	2.70	545
Friday	Jan	17	2.18	270	2.73	599
Wednesday	Jan	22	2.20	236	2.77	560
Friday	Feb	24	2.22	264	2.78	605
Serial	Feb	31	2.04	386	2.55	792
Quarterly	Mar	59	1.96	314	2.53	741
Serial	Apr	87	2.19	220	2.77	532
Serial	May	115	2.77	146	3.33	314
Quarterly	Jun	150	2.86	140	3.45	340
Quarterly	Sep	241	5.01	55	6.14	109
Quarterly	Dec	332	6.06	58	7.65	111

JPYUSD	Month	Day count	Top-of-Book		2 Level Sweep	
			Spread	Size	Spread	Size
Wednesday	Jan	1	2.29	86	2.85	198
Friday	Jan	3	2.14	115	2.70	262
Wednesday	Jan	8	2.09	90	2.73	245
Friday	Jan	10	1.95	98	2.60	276
Wednesday	Jan	15	2.22	92	2.87	259
Friday	Jan	17	2.16	99	2.81	286
Wednesday	Jan	22	2.24	88	2.90	259
Friday	Feb	24	2.23	93	2.91	291
Serial	Feb	31	2.08	141	2.67	344
Quarterly	Mar	59	2.17	113	2.81	315
Serial	Apr	87	2.43	101	3.06	274
Serial	May	115	3.26	94	3.86	207
Quarterly	Jun	150	3.31	64	3.99	193
Quarterly	Sep	241	0.00	0	0.00	0
Quarterly	Dec	332	7.56	62	8.57	117

AUDUSD	Month	Day count	Top-of-Book		2 Level Sweep	
			Spread	Size	Spread	Size
Wednesday	Jan	1	2.49	87	2.94	158
Friday	Jan	3	2.10	87	2.62	181
Wednesday	Jan	8	2.39	110	2.84	202
Friday	Jan	10	2.34	115	2.86	236
Wednesday	Jan	15	2.50	114	2.99	223
Friday	Jan	17	2.36	115	2.90	250
Wednesday	Jan	22	2.54	118	3.02	228
Friday	Feb	24	2.29	122	2.81	257
Serial	Feb	31	2.38	159	2.85	304
Quarterly	Mar	59	2.31	142	2.83	292
Serial	Apr	87	2.48	113	3.03	250
Serial	May	115	3.00	88	3.59	171
Quarterly	Jun	150	3.01	63	3.60	136
Quarterly	Sep	241	5.59	39	6.43	92
Quarterly	Dec	332	7.28	50	8.41	96

CADUSD	Month	Day count	Top-of-Book		2 Level Sweep	
			Spread	Size	Spread	Size
Wednesday	Jan	1	2.26	109	2.83	256
Friday	Jan	3	2.07	125	2.59	263
Wednesday	Jan	8	2.15	141	2.62	269
Friday	Jan	10	2.32	185	2.78	343
Wednesday	Jan	15	2.45	174	2.86	298
Friday	Jan	17	2.40	199	2.86	361
Wednesday	Jan	22	2.53	182	2.95	316
Friday	Feb	24	2.40	198	2.88	376
Serial	Feb	31	2.06	236	2.53	436
Quarterly	Mar	59	2.39	201	2.90	389
Serial	Apr	87	2.43	195	2.95	410
Serial	May	115	3.00	145	4.27	254
Quarterly	Jun	150	3.08	108	3.67	258
Quarterly	Sep	241	4.97	53	5.63	109
Quarterly	Dec	332	4.58	53	6.29	115

Source: CME Group. Average spread in ticks and size in contracts for the at-the-money strike price on the CME Globex central limit order book, averaged across regular trading hours a single day in January 2019 to show the maturity liquidity profile.

3 *Regular trading hours ("RTH") are 7:00 a.m. to 4:00 p.m. Chicago time, or 1:00 p.m. to 10:00 p.m. London time (usually).*

Favorable TCA in CME FX options

Greenwich Associates conducted a total cost analysis ("TCA") of buy-side firms that compared the pricing of OTC FX options pricing with CME FX options and discovered that most market participants would see meaningful transaction cost savings by trading the first level of the CME Globex central limit order book between 40-70% per trade, depending upon the option's expiry date and strike price[4]. The study found that buy-side firms trading OTC generally had access to two-sided markets that averaged 2.6 pips for short-dated at-the-money strikes and 4.1 pips for long-dated ATM strikes. For short- and long-dated out-of-the-money strikes, Greenwich found two-sided markets of 2.8 and 4.2 pips wide.

Average quote spread in US Dollar PIPs

Short-Dated		Long-Dated	
OTM	ATM	OTM	ATM
2.81	2.59	4.24	4.12

Source: CME Group and Greenwich Associates, 2019 FX Options Study.

Greenwich then compared these results against equivalent data from listed FX options on CME and found that participants could have saved between $2,000 and $7,000 per execution on trades of $50 million notional, and more significant savings on a percentage basis on smaller executions.

OTC pricing comparison with CME Globex order book
(Top-of-Book versus top two levels)

	Short-Dated		Long-Dated	
	OTM	ATM	OTM	ATM
Average Buyside	1.58	1.47	2.29	2.23
CME 1st Level	0.69	0.87	0.77	1.02
% Saving	56%	41%	66%	54%
CME 2nd Level	1.17	1.39	1.20	1.52
% Saving	26%	5%	48%	32%
Saving per Ticket				
$25,000,000	$2,226	$1,487	$3,796	$3,040
$50,000,000	$4,453	$1,938	$7,249	$4,619

Source: CME Group and Greenwich Associates, 2019 FX Options Study.

4 *See "FX Options in the Age of Uncleared Margin Rules", by David Stryker, Greenwich Associates, Second Quarter 2019. cmegroup.com/fxotca*

Since two-thirds of buy-side traders in the Greenwich study reported average trade sizes of up to $50 million notionally, most market participants would see significant cost reductions by trading on CME Globex. For larger transaction sizes, market participants should be able to maximize cost savings by working a series of smaller orders over relatively short time periods to take advantage of the liquidity resilience on the CME Globex CLOB.

	Key features
CME Globex CLOB	Anonymity
	First In, First Out ("FIFO") Matching Algorithm
	No last look
	Limit orders
	All-to-all competition
	Price transparency
	Operational efficiency

Source: CME Group and Greenwich Associates, 2019 FX Options Study.

In its analysis, Greenwich stated that "there is rapidly growing evidence that traders may be underestimating the liquidity available in listed options." Greenwich concluded by stating "we anticipate a meaningful increase in the number of traders who will turn to listed FX options as a viable alternative to some of their OTC activity."

Anticipated impact of UMR

In the wake of the global financial crisis of 2007-2008, market regulators introduced Uncleared Margin Rules ("UMR") to reduce systemic risk in the financial system and to promote central clearing of the OTC derivatives markets. By September 2021, an estimated 1,000+ firms with $8 billion in average aggregate notional amount ("AANA")[5] will qualify to post and collect initial margin ("IM") and variation margin ("VM") to segregated custodial accounts without rehypothecation for non-centrally cleared derivatives such as OTC FX options.

The impact of UMR on market participants during these final phases of IM implementation is expected to change the economics of trading OTC FX options since UMR will require these participants to post and segregate margin for non-cleared derivatives transactions at levels far exceeding the thresholds of centrally cleared trades.

In addition to higher margin for non-cleared derivatives transactions under UMR, a recent Citi analysis on the funding cost of margining such transactions showed that fees of an FX prime broker ("FXPB") would need to increase by a factor of 31 times just to break even on the funding costs associated with a competitive working capital rate of 50 basis points to offset the impact of UMR[6].

To validate this anticipated impact, CME Group conducted its own margin analysis by comparing the IM requirement and resulting funding implications of a simulated FX option portfolio under three scenarios:

1. A dealer facing counterparties under a non-optimized bilateral standard initial margin model ("SIMM") with no delta-offsetting of cash-settled forwards.
2. A dealer facing counterparties via single prime broker ("PB") with netted SIMM.
3. A dealer with an equivalent portfolio of CME listed FX options under CME SPAN[7].

The results:

- The listed FX option portfolio generated 65% less margin requirement than the PB portfolio
- And 89% less margin than the portfolio with bilateral SIMM.

These results confirm that market participants stand to benefit significantly from the powerful netting that occurs in listed FX options and from the advantageous 5-day margin period of risk ("MPOR") used to calculate IM requirements based on a central counterparty ("CCP") clearing model versus a 10-day MPOR used to calculate IM based on SIMM.

Furthermore, CME Group's analysis found the lower IM noted above combined with the advantageous capital treatment under the Standard Approach for Counterparty Credit Risk ("SA-CCR") made the listed FX options portfolio 55% more capital efficient than the portfolio with netted SIMM via PB and 86% more efficient than the portfolio with bilateral SIMM.

5 *Calculation of the AANA to determine the threshold for UMR currently includes the average gross notional of all non-cleared derivatives (i.e., swaptions, equity swaps, NDFs, options and deliverable forwards) outstanding over a three-month period (both EU and US). For more information on the AANA calculation, visit cmegrooup.com/aanacalc*

6 *See "Collateral Damage? How Uncleared Margin Rules Will Revolutionize the FXPB Business Model", by Kevin Wilson, Christopher Perkins, and Chelsea Lo, Citigroup Inc., April 2019.*

7 *The Standard Portfolio Analysis of Risk ("SPAN®") system is a sophisticated methodology that calculates performance bond requirements by analyzing the "what-ifs" of virtually any market scenario.*

Analysis using SA-CCR model assumption

	Futures CME SPAN	Netted SIMM ("PB")	Bilateral SIMM
Funding Requirements			
Initial Margin ("IM")	7,987	22,806	74,431
IM as % of Notional	0.8%	2.3%	2.6%
Default Fund	0	0	0
Total Funding	**$7,987**	**$22,806**	**$74,431**
Captial Requirements			
Leverage Ratio ("SA-CCR")	442	442	1,190
EAD w/ Collateral (Proxy for CVA)*	5,346	5,671	13,992
Default Fund	0	0	0
CVA VaR*	18	19	48
Total Capital	**$461**	**$462**	**$1,238**
Annualized Costs			
Funding Costs	160	456	1,489
Capital Costs	46	46	124
CVA Costs	64	68	168
LCR* Costs	40	114	372
Total Costs Annualized	**$310**	**$684**	**$2,152**
Cost Differentials over CME:		+121%	+595%

** Exposure at Default ("EAD"); Credit Value Adjustment ("CVA"); Value at Risk ("VaR"); Liquidity Coverage Ratio ("LCR").*

Assumptions		
Default Fund as % of IM	5%	CME Ranges
Funding Costs	2%	CME Estimate
Cost of Capital	10%	CME Estimate
Annualized CVA	1.2%	CME Estimate
LCR (based on funding)	0.5%	CME Estimate
Default Fund C-Factor	1%	CME Ranges
CVA VaR Multiplier	0.34%	CME Estimate
S-CCR C/V Ratio	125%	Over 100% indicates Over Charge

Margin model assumptions: MPOR	
Bilateral SIMM	10 Days
Netted SIMM ("PB")	10 Days
CME SPAN/Futures	5 Days

Use cases for CME FX options

With the increased product granularity and liquidity, market participants, including traditional OTC FX options traders, will find they can easily switch to CME FX options as a viable alternative to some of their OTC FX options activity for a variety of risk management and yield enhancement purposes.

Hedging a non-US dollar equity or fixed income portfolio

Market participants can use CME FX options to hedge against exchange rate fluctuations in a non-US dollar equity or fixed income portfolio. For example, assume a US-based portfolio manager running a global allocation strategy takes a ¥10 billion position in Japanese equities or government bonds. The manager is effectively long the Japanese Yen/US Dollar exchange rate. The manager could purchase CME JPY/USD put options to hedge the portfolio's currency risk. The hedge ratio would be determined by dividing the total Yen exposure (¥10 billion) by the notional size of the contract (¥12.5 million) resulting in 800 contracts to be purchased for the correct hedge. Purchasing at-the-money JPY/USD put options provides the manager with more price protection but entails a much larger up-front investment. Comparatively, buying out-of-the-money JPY/USD put options provides the manager with less price protection but requires a much smaller up-front investment.

Yield enhancement

In addition to hedging the FX risk of a non-US dollar equity or fixed income portfolio, market participants can use CME FX options to enhance the returns of a foreign currency denominated portfolio as well. For example, assume a US-based portfolio manager has a €100 million position in German equities or government bonds. The manager is effectively exposed to price movements in the EUR/USD exchange rate. The manager can utilize CME EUR/USD options to enhance portfolio returns if the EUR/USD exchange rate remains stable for his investment horizon by selling EUR/USD call options. Selling ATM EUR/USD call options may provide the manager with more yield enhancement and greater degree of protection through the initial receipt of the option premium in the event of a market decline in the EUR/USD exchange rate. By comparison, selling OTM EUR/USD call options provides the manager with less opportunity for yield enhancement and protection in the event of a market decline in the EUR/USD exchange rate.

Market participants can also trade CME FX options in combination with the new CME FX Link – the first ever electronic central limit order book for trading basis spreads between OTC FX spot and CME FX futures – to replicate cost-efficient, manageable synthetic exposure to OTC FX spot, forwards, and swaps.

Use cases for CME FX Link

Replacement of OTC FX delta hedge for CME FX option

Market participants can use FX Link to replace an OTC FX spot delta hedge of a CME FX option transaction for enhanced margin management. For example, a bank sells ATM put options on the CME JPY/USD futures contract. The bank seeks to delta hedge the short ATM put options against price movements in JPY versus USD to create a delta-neutral portfolio that will profit from the declining implied volatility and/or time decay of the short ATM put option position. The bank could execute a delta hedge by buying spot USD/JPY in the OTC market in an amount equal to the delta, or half of the underlying notional amount, of the short ATM JPY/USD put option position to create a delta-neutral portfolio. Alternatively, the bank could replace the OTC USD/JPY spot delta hedge of the short ATM put option position by buying the USD/JPY FX Link spread – i.e., selling a delta-equivalent IMM-dated CME JPY/USD futures position while simultaneously selling an offsetting delta equivalent OTC USD/JPY spot position, effectively replacing the OTC USD/JPY spot position with a delta equivalent IMM-dated JPY/USD futures position.

Optimizing an CME FX option hedge

Market participants can use FX Link to make a CME FX option transaction more effective for hedged exposures requiring delivery of spot currency. For example, a fixed income portfolio manager has a Euro-denominated bond maturing and wants to repatriate the proceeds of this asset for use in the US. The manager can purchase a bespoke dated EUR/USD put option from a bank for this purpose. If the put is in-the-money at expiry, the manager will exercise the option and use the spot transaction to sell EUR for USD for value on the bespoke date of the option. If the put is OTM at expiry, the manager will need to enter a second transaction to sell EUR versus USD on a spot basis. Alternatively, the manager could buy a CME EUR/USD put option. If the put is ITM at expiry, the listed EUR/USD put option is auto-exercised. The manager can then buy the EUR/USD basis on FX Link to offset the short futures position originating from the put option's exercise while achieving the desired spot settlement of selling EUR for USD. If the put expiries OTM, the manager simply executes a spot transaction instead, selling EUR for USD.

Conclusion

When UMR is fully implemented in 2021, traditional market practitioners in OTC FX options will find themselves increasingly motivated to trade CME FX options as a viable complement to their current OTC FX options trading activity. Traditional participants will benefit significantly as they migrate to CME FX options, which will require less margin and capital to trade than OTC FX options. Moreover, these same participants will capture material cost savings from trading anonymously on CME Globex, and also have the ability to execute block trades by leveraging their current bilateral relationships during times when they may find it less conducive to trade options electronically.

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For more information on any of the themes discussed in this document, please contact your CME Group account representative or **fxteam@cmegroup.com**

For more information on FX link, how it works and how to get connected, visit cmegroup.com/fxlink

Appendix 1

Alternative execution methods

Besides the central limit order book of CME Globex, CME Group offers market participants opportunities to trade FX options through two additional transaction types: blocks and request for quote.

The key feature of blocks is that it allows market participants to leverage their current bilateral relationships to execute large notional sizes to manage the price risks of their FX portfolios at single prices with absolute full trade certainty during times when these participants may find it less conducive to trade FX options electronically or when they require special pricing attention for specific FX options strategies or instruments.

Request for Quote ("RFQ"), on the other hand, differs from blocks as it is not a bilateral execution transaction but a user defined spread ("UDS") functionality that is available on CME Globex. Market participants can use the RFQ feature to leverage the CME Globex central limit order book to trade large notional sizes at single prices with full trade certainty when trading FX options electronically is conducive.

Market participants, especially traditional OTC FX option traders, will find these two alternative execution methods will help bridge the gap between the over-the-counter and listed FX options markets.

Blocks[8]

CME Group offers eligible market participants the ability to execute FX options outside of the CME Globex central limit order book via block transactions. In short, a block trade is a privately negotiated futures, options, or combination transaction that is permitted to be executed outside of the public auction market of the CME Globex CLOB. Block transactions in outright FX options must to be executed in minimum size thresholds. For FX option spreads, the sum of all the spread legs must meet the block minimum threshold. For FX options and futures combinations, block transactions may be executed based on a delta hedge ratio. Upon agreeing to the terms of a block transaction, the parties to the trade must report it to the exchange via CME Direct or CME ClearPort within five minutes of trade execution during Regular Trading Hours ("RTH") and within 15 minutes of trade execution during either European Trading Hours ("ETH") or Asian Trading Hours ("ATH").[9] Block transactions in FX options must be fairly and reasonably priced based on the transaction's size and the prices and sizes of other transactions in the same FX options contract and related over-the-counter FX markets prevailing in the marketplace at the time of the block trade's execution.

Blocks: Key features

- Minimum size thresholds in contracts (see adjacent table).
- For option spreads, the sum of all the legs must meet the minimum.
- Option and futures combinations allowed in delta hedge ratio.
- Five-minute reporting during RTH, otherwise 15 minutes.
- Transaction must be fair and reasonably priced.
- Block fees are the same as CME Globex fees for non-members.

Minimum Block Size Thresholds

	Level		Level
EUR/USD	250	JPY/USD	250
AUD/USD	250	GBP/USD	250
CAD/USD	250	CHF/USD	250
NZD/USD	50	MXN/USD	50
BRL/USD	50	RUB/USD	50
ZAR/USD	50	KRW/USD	50
PLN/EUR	50	CZK/EUR	50
CNY/EUR	50	CNY/USD	50
CZK/USD	50	HUF/EUR	50
HUF/USD	50	ILS/USD	50
PLN/USD	50	EUR/GBP	50
EUR/CHF	50	EUR/JPY	50

Source: CME Group.

8 *https://www.cmegroup.com/clearing/trading-practices/block-trades.html.*

9 *For purposes of CME FX futures and options products, the following times apply: Regular Trading Hours (RTH): 7:00 a.m. – 4:00 p.m. Central time (CT), Monday through Friday on regular business days. Asian Trading Hours (ATH): 4:00 p.m. – 12:00 a.m. CT, Monday through Friday on regular business days and at all times on weekends. European Trading Hours (ETH): 12:00 a.m. – 7:00 a.m. CT, Monday through Friday on regular business days.*

Request for quote[10]

The migration of FX options markets to CME Globex has been dramatic in recent years, with over 98% of FX options now traded electronically. The use of RFQ functionality on CME Globex has played a key role in enabling this transition to occur by allowing traders to electronically execute multi-leg and hedged FX options strategies. With the numerous combinations of expiries and strike prices, RFQ is important as liquidity providers cannot price all combinations, especially as the options are "live" or premium quoted.

In an RFQ, traders can send an electronic notification to all CME Globex market participants that express interest in a specific FX options strategy or instrument. A trader can request a specific size on the RFQ but is not obligated to show any preference as a buyer or seller. The RFQ alerts interested participants to submit bids and offers on the specified FX options strategy or instrument. A trader can also submit an RFQ on an existing instrument where there is no market. Responding markets are active and tradable so traders can hit, lift, post a bid or offer, or continue to monitor the market. Like all trading activity on CME Globex, the RFQ market is completely anonymous.

RFQ: Key features

- Allows participants to get competitive quotes, even during times of low market activity.
- Request multi-leg spreads as one market on screen. With the creation of a spread, traders can execute option strategies at one price eliminating risk.
- Speed, transparency, and easy access of electronically traded markets, with the flexibility and efficient price discovery of a brokered market.

10 *https://www.cmegroup.com/education/request-for-quote.html.*

Appendix 2

Contract codes for CME FX options

By and large, CME FX options on a given currency pair share identical contract specifications regardless of option maturity. All weekly and monthly expiring listed options on a specific currency pair will have the same underlying contract unit, minimum price increment, trading hours, trading venues, settlement procedures, termination times on last trading day, position and reportable limits, minimum block thresholds, price limits, exercise style, and settlement methods.

With respect to contract ticker symbols, however, CME FX options on a given currency pair will feature product codes that not only differ by option maturity but also differ with respect to vendor.

Option Contract	Contract Specs	Maturity	Globex/TT/ Fidessa/FIS	Bloomberg	Refinitiv (Reuters)	CQG
EUR/USD Options	Notional = €125,000 Tick = $0.0001 ($12.50/tick)* Minimum Block Size = 250	Monthlies**	EUU	UEA	0#1EUU+	EUE
		Weekly Friday	1EU-5EU	UAW	0#1EUUW+	EUE1-EUE5
		Weekly Wednesday	WE1-WE5	WEBA	0#1WEW+	EUE31-EUE35
		Weekly Monday	MO1-MO5	To be announced	0#1MOW+	EUE11-5
JPY/USD Options	Notional = ¥12,500,000 Tick = $0.000001 ($12.50/tick) Minimum Block Size = 250	Monthlies	JPU	JAD	0#1JPU+	JYE
		Weekly Friday	1JY-5JY	JAW	0#1JPUW+	JY1-JY5
		Weekly Wednesday	WJ1-WJ5	WJBA	0#1WJW+	JY31-JY35
		Weekly Monday	MJ1-MJ5	To be announced	0#1MJW+	JY11-5
AUD/USD Options	Notional = A$100,000 Tick = $0.0001 ($10.00/tick) Minimum Block Size = 250	Monthlies	ADU	AUA	0#1ADU+	DAE
		Weekly Friday	1AD-5AD	AUW	0#1ADUW+	DA1-DA5
		Weekly Wednesday	WA1-WA5	WABA	0#1WASW+	DA31-DA35
		Weekly Monday	MA1-MA5	To be announced	0#1MAW+	DA11-5
GBP/USD Options	Notional = £62,500 Tick = $0.0001 ($6.25/tick) Minimum Block Size = 250	Monthlies	GBU	BGA	0#1GBU+	BPE
		Weekly Friday	1BP-5BP	BGW	0#1GBUW+	BP1-BP5
		Weekly Wednesday	WG1-WG5	WLBA	0#1WGW+	BP31-BP35
		Weekly Monday	MB1-MB5	To be announced	0#1MBW+	BP11-5
CAD/USD Options	Notional = C$100,000 Tick = $0.0001 ($10.00/tick) Minimum Block Size = 250	Monthlies	CAU	UCD	0#1CAU+	CAE
		Weekly Friday	1CD-5CD	UDW	0#1CAUW+	CA1-CA5
		Weekly Wednesday	WD1-WD5	WCBA	0#1WDW+	CA31
		Weekly Monday	MD1-MD5	To be announced	0#1MDW+	CA11-5

* There is a minimum tick increment of one-half tick value for premiums under five ticks, except for GBP/USD options.
** The monthly expiration is the second Friday before the third Wednesday of the month.

Subsequently, market participants will need to become familiar with the product codes of CME FX options on a given currency pair by maturity and vendor to access real-time data such as bid-ask prices, bid-ask sizes, transaction data, volume, and open interest on the CME Globex electronic trading system.

Visit cmegroup.com/fxocodes for a complete list of platforms and products

Appendix 3

Tools and resources

CME Group provides FX options participants with numerous analytical tools and resources to research, generate, and test options trading strategies before turning them into action. QuikStrike®, an industry leader of financial services software, developed these exclusive, web-based options tools for CME Group to help traders identify trends, trade opportunities more quickly, and act more decisively.

Pricing, volatility and strategy tools

These seven QuikStrike tools help FX option traders calculate fair values, measure the price sensitivity of FX options "Greeks," chart volatility and correlations, and test FX options strategies in simulated markets.

Options calculator

Generate fair value prices and Greeks for any CME Group option on futures product, or price a generic option with our universal calculator.

Economic event analyzer

Track upcoming economic events and map to nearby expiring options contracts to manage related event risk.

Cross-asset correlation tool

Easily analyze pairwise correlations of CME Group futures and options from different asset classes in charts. Available in multiple views, log returns, 30-day implied volatilities, or 20-day realized volatilities.

Event volatility calculator

See how markets are pricing upcoming economic and geopolitical events through the lens of options volatility.

Volatility term structure tool

Monitor for the onset of price uncertainty by analyzing changes in current implied volatilities versus the previous week's numbers, by expiration.

Vol2Vol™ expected range tool

See how many standard deviations a strike is from the at-the-money ("ATM") futures price. Chart open interest and volume to see where trading is focused and to gauge market sentiment on price.

Strategy simulator

Compare how an option, futures or physical position would perform across different underlying price scenarios, in a risk-free simulated environment.

Product and market data tools

These four QuikStrike tools allow FX option traders to download data for active and upcoming expirations up to a year out, analyze historical block trade data and options settlements, and more.

Option expiration calendar

Download a year's worth of expiration dates, including yet-to-be-listed weekly options.

Block trade browser

View intraday and one-week historical block trade data by type, quantity, price, and more.

Product and expiration browser

View and download active expiration information across all CME Group products, to help plan your strategies.

Option settlement tool

Analyze settlement values for all CME Group options, including settlement prices and implied volatilities.

Volume and open interest tools

These four QuikStrike tools enable FX option traders to create a heatmap of the most active strikes and expirations, track positions by customer, compare volume and open interest over time, and more.

Open interest heatmap

See instantly which option calls and puts have the most trading, by strike and expiration, and compare vs. the last day/week/month, to help you plan.

Most active strikes tool

See what is hot now by viewing volume, open interest, and open interest change activity on the most active strikes, by calls, puts, and combined calls and puts.

Commitment of traders tool

Drawn from data on the CFTC report of the same name, see which trader types have positions in a market you want to trade, at what size, whether they're long or short, and chart changes over time.

***This Week In Options* report**

Track intraday and weekly rolling contract statistics (such as volatility, risk reversal prices, open interest, put/call ratios, and more), and compare them to the prior week.

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PM2658/0220