



# Options Markets

2019

[cmegroup.com/options](https://cmegroup.com/options)

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## Nearly 4 million options contracts traded daily in 2018

Options on futures offer **deep liquidity** on the broadest set of products, maturities and strikes across **the major investable asset classes at CME Group**

Capitalize on greater risk management flexibility and precision, advanced on-screen spreading capabilities and the efficiencies of central clearing.

Trading options and their underlying futures at CME Group maximizes capital efficiencies through margin offsets and streamlined operations.

*An option on a futures contract gives the holder the right, but not the obligation, to buy (call option) or sell (put option) a particular futures contract at a specific price on or before a specified expiration date and time, regardless of the market price of the futures contract.*

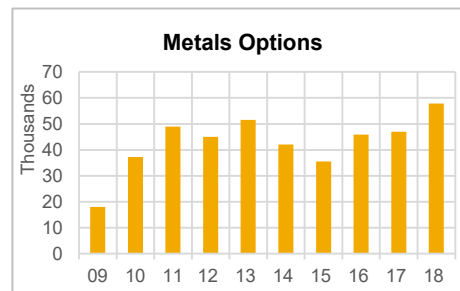
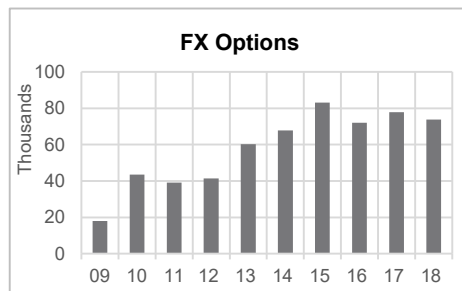
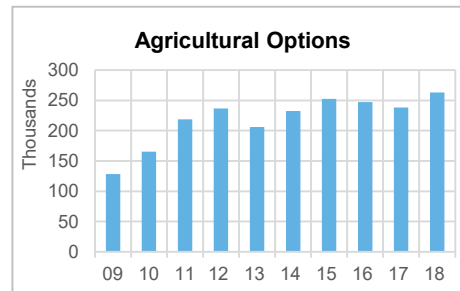
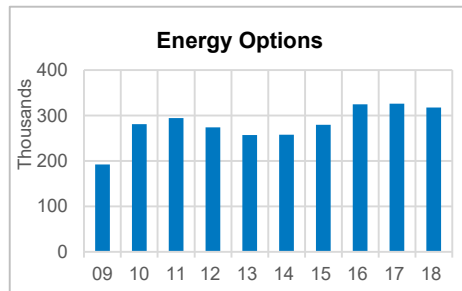
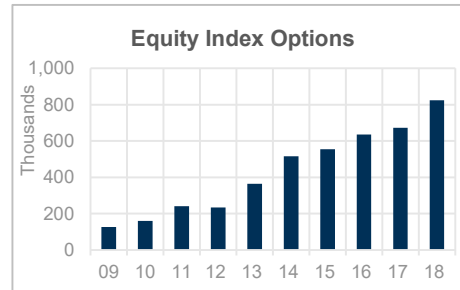
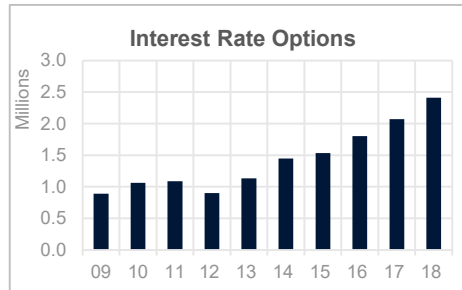
# Benefits of options on futures

1. **Around-the-clock options liquidity** on the world's leading benchmark futures across all six major asset classes
2. **Extensive range of maturities** to manage exposure wherever your risks lie - from 1 day to 4 years
3. **Capital and operational efficiencies** through low initial margin, margin offsets, and frequently lower regulatory reserve requirements vs alternatives
4. **Seamless delta transition\*** as options on futures are self-liquidating with zero slippage to futures on expiration or exercise
5. **Easy access** offered through [CME Direct](#), our highly configurable front end, or through any one of 50+ third-party software and API vendors
6. **Advanced options analytics** tools offered for free through [QuikStrike](#)
7. **24/6 options support** via Global Command Center (GCC)

\*For physically settled contracts only

# Growth in usage by a diverse array of participants

## Annual options ADV by asset class



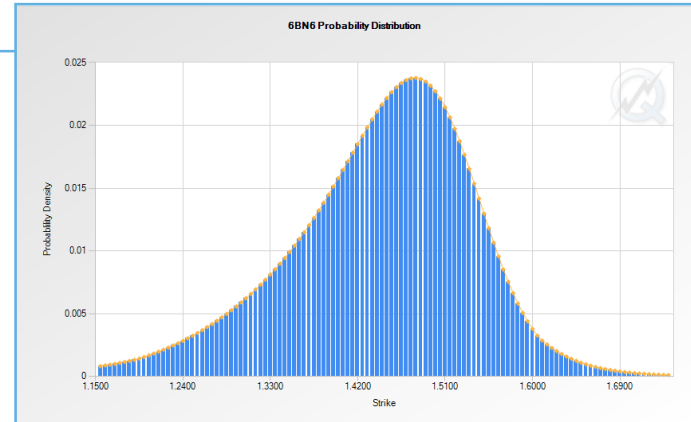
## Who Uses Options on Futures?

- Active traders
- Asset Managers
- Banks
- Commercial Hedgers
- Family Offices
- Hedge Funds
- Individual Investors
- Insurance Companies
- Liquidity Providers
- Pension Funds
- Physical Hedgers
- Systematic traders

Source: CME Group  
Data as of 12/31/18

# Trading Advantages

- › **Position for geopolitical and global-macro events**
- › **Trade volatility** on 6 asset classes
- › **Rebalance portfolios:** lower slippage costs and fees than many alternatives
- › **Potential income generation**
- › **Trade options on the futures of the actual underlying asset** rather than on synthetic securities such as ETFs that may produce tracking error
- › **Optimize Gamma/Vega balance:** Build positions across the entire term structure
- › **Trade Spreads:** build complex, multi-leg options strategies to express specific views
- › **Arbitrage**



Tail Risk: GBP/USD Probability Distribution implied by options ahead of Brexit

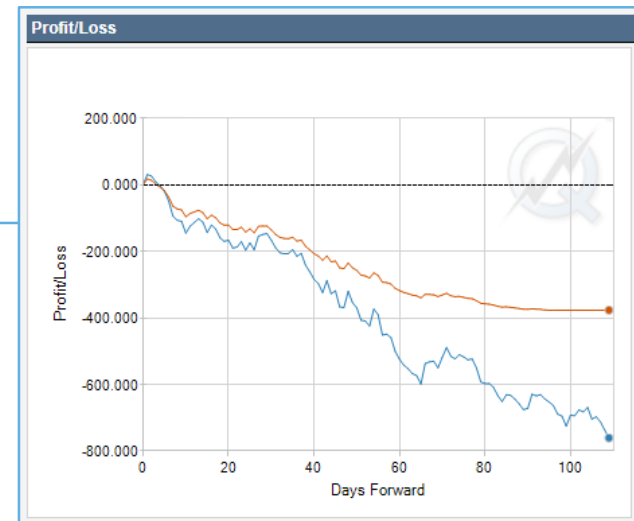
E-MINI S&P 500 FORWARD VOLATILITY MATRIX												
	EWG8 2 DTE	EW1H8 4 DTE	E1AH8 7 DTE	E1CH8 9 DTE	EW2H8 11 DTE	E2CH8 16 DTE	ESH8 18 DTE	EW4H8 25 DTE	EW8H 31 DTE	EW1J8 39 DTE	EW3J8 53 DTE	
+ 2 DAYS	15.44	13.21	11.37	11.95	12.39	11.95	12.01	12.07	12.04	11.97	12.41	+ 2 DAYS
+ 4 DAYS		14.49	9.95	11.41	12.14	11.73	11.83	11.95	11.95	11.90	12.37	+ 4 DAYS
+ 7 DAYS			12.86	13.31	13.56	12.26	12.30	12.26	12.18	12.07	12.51	+ 7 DAYS
+ 9 DAYS				12.96	13.80	11.95	12.06	12.12	12.07	11.98	12.48	+ 9 DAYS
+ 11 DAYS					13.11	11.11	11.49	11.86	11.89	11.84	12.41	+ 11 DAYS
+ 16 DAYS						12.54	12.50	12.25	12.13	11.99	12.57	+ 16 DAYS
+ 18 DAYS							12.54	12.19	12.08	11.95	12.58	+ 18 DAYS
+ 25 DAYS								12.44	11.95	11.82	12.68	+ 25 DAYS
+ 31 DAYS									12.35	11.72	12.87	+ 31 DAYS
+ 39 DAYS										12.22	13.48	+ 39 DAYS
+ 53 DAYS											12.56	+ 53 DAYS

# Risk Management Advantages

- › **Improve Sharpe Ratios**—volatility can hurt returns over time. Leverage options for volatility reducing strategies
- › **Manage a portfolio's covariance exposure** across asset classes
- › **Hedge physical storage costs and future price changes**
- › **Trade Collar Spreads** to lock in price ranges
- › **Bridge time and exposure gaps with greater precision** via an extensive range of expiries
- › **Hedge systematic risks** from macro factor exposures
- › **Protect against unique market risks:** Hedge specific windows of the growing season at reduced cost with Short-Dated New Crop options

CORRELATION OF DAILY LOG RETURNS OF 30-DAY CONSTANT MATURITY FUTURE PRICES FOR MAJOR BENCHMARKS (3/13/2017 - 3/13/2018)

	GRAINS		MEATS		METALS		ENERGY		INDEXES		RATES		FX	
	ZC	ZS	LE	HE	GC	HG	CL	NG	ES	NQ	ED	TY	EE	6J
ZC	1.00													
ZS	0.61	1.00												
LE	-0.08	-0.06	1.00											
HE	0.07	0.05	0.06	1.00										
GC	0.01	0.04	0.02	-0.02	1.00									
HG	0.07	0.07	-0.03	0.08	0.20	1.00								
CL	0.15	0.06	0.01	0.10	0.16	0.22	1.00							
NG	0.09	0.08	0.01	-0.09	0.14	0.05	0.16	1.00						
ES	0.05	0.04	0.06	-0.04	-0.04	0.11	0.18	0.04	1.00					
NQ	0.05	0.05	0.09	-0.04	-0.02	0.08	0.09	0.02	0.57	1.00				
ED	0.03	0.00	0.06	0.03	0.15	-0.05	-0.02	0.06	-0.21	-0.17	1.00			
TY	0.00	0.03	0.02	-0.05	0.41	-0.11	-0.04	0.07	-0.19	-0.10	0.46	1.00		
EE	0.06	0.15	0.02	-0.04	0.38	0.22	0.04	0.03	0.04	0.02	0.10	0.19	1.00	
6J	0.02	0.07	0.04	-0.05	0.59	0.02	0.02	0.04	-0.20	-0.15	0.30	0.64	0.41	1.00



P&L of a High Yield US Energy Credit portfolio during 2014 Crude Oil sell-off (Blue), and same portfolio with 6mo WTI put options (Orange)

# Options Markets and Products

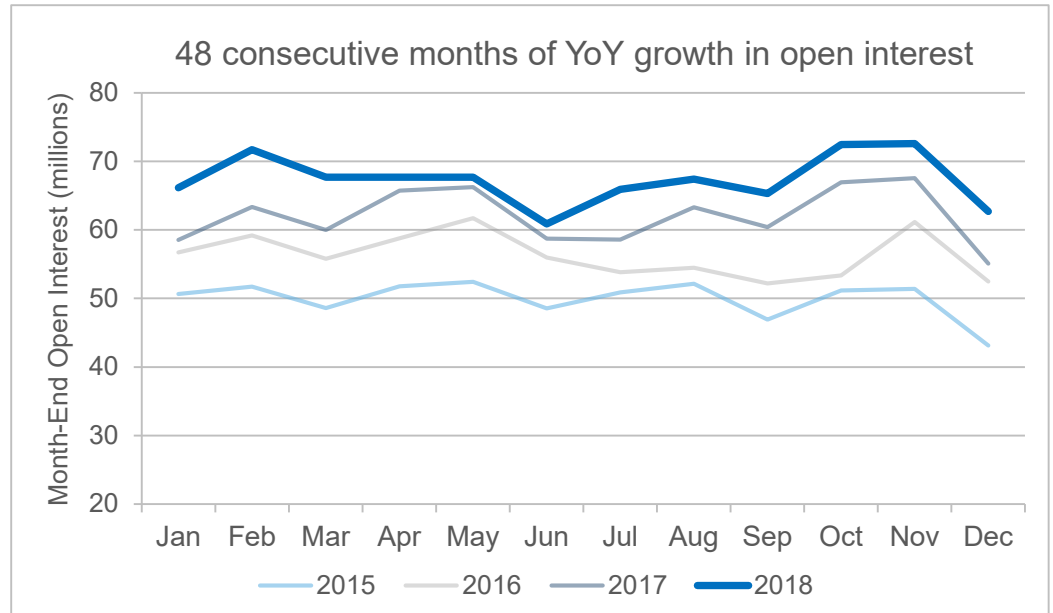
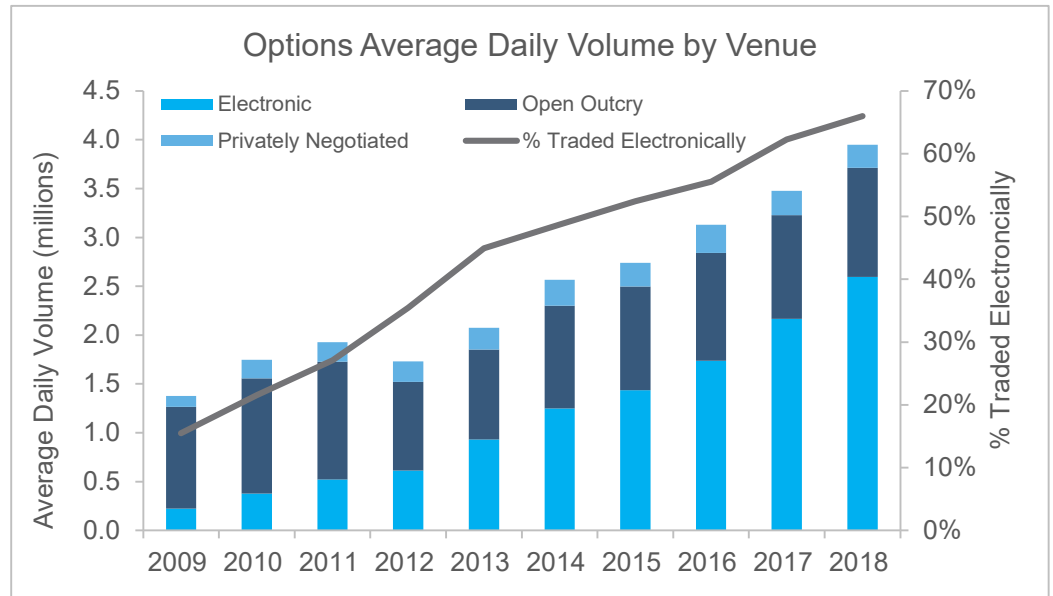


# Record Participation and Liquidity

Liquidity begets liquidity. An adage that has proved true in the case of options on futures at CME Group. Continued enhancements to electronic access through CME Globex have improved liquidity and drawn new institutional traders to the market, creating a virtuous circle that continues to drive greater liquidity and record participation.

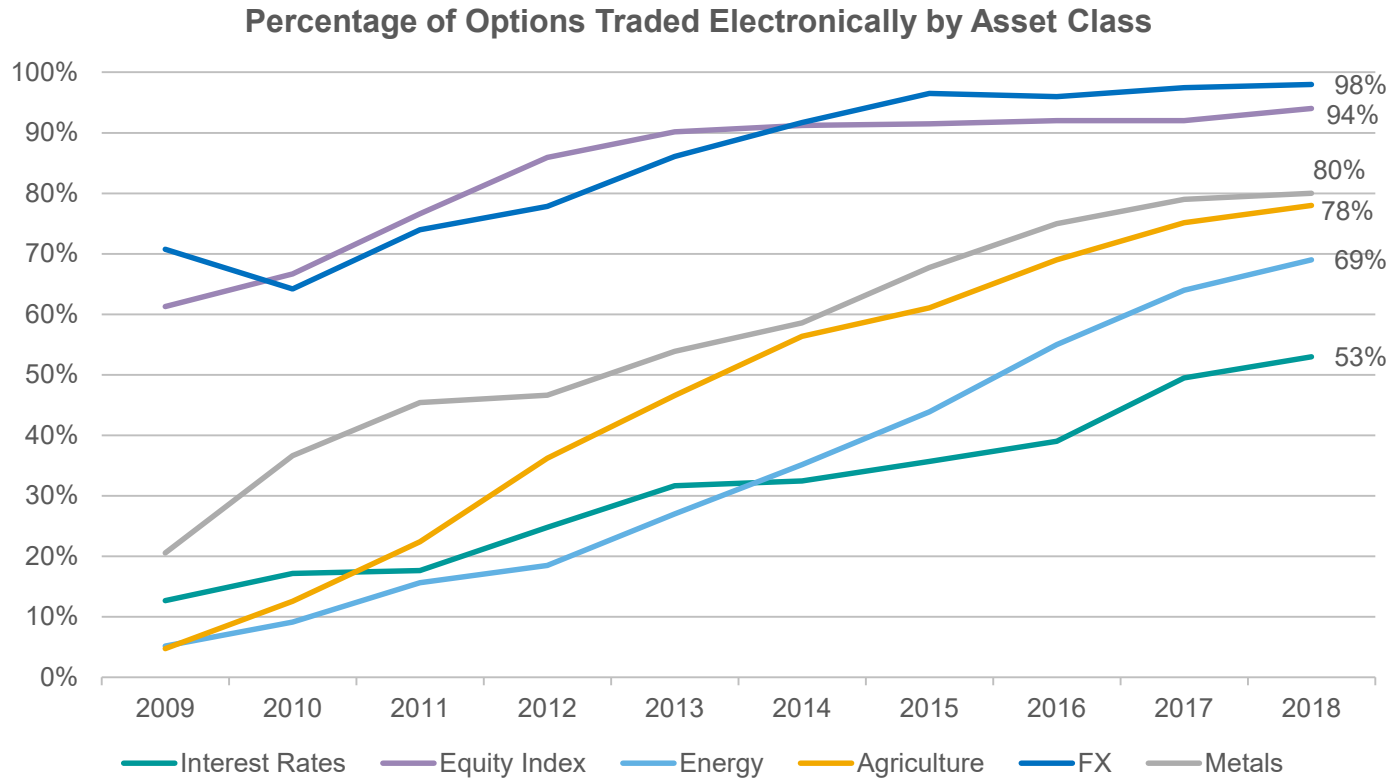
*CME Group options volume grew 14% in 2018, registering a 6<sup>th</sup> consecutive record year*

Source: CME Group  
Data as of 12/31/18



# Delivering Liquidity to Global Participants

Growth of electronic options across every asset class enables greater access to liquidity globally

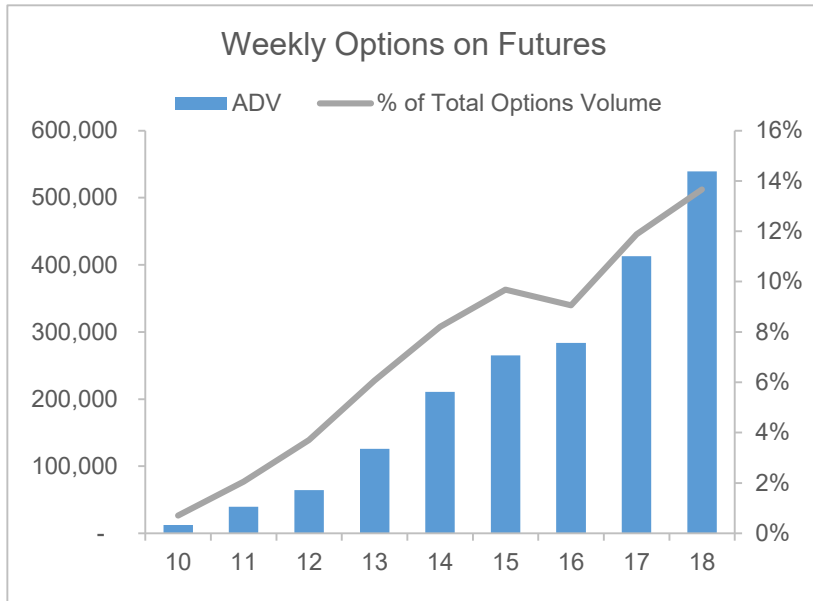


Source: CME Group  
Data as of 12/31/18

# Extensive Range of Expirations

Offering the precision to manage risk wherever it exists—from 1 day to 4 years

	Quarterly / Serial	Monthly	Friday Weekly	Wednesday Weekly	Monday Weekly	Daily	Mid-Curve	Calendar Spread	Average Price / Asian
Interest Rates	X		X	X			X	X	
Equity Index	X	X	X	X	X				
FX	X		X	X					
Energy		X	X			X	X	X	X
Agriculture	X		X				X	X	
Metals		X	X						X



Source: CME Group  
Data as of 12/31/18

## Trade Events with More Precise Expiration Selection

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
4	5	6	7	8	9
European Election	ISM PMI	CPI	FOMC EIA Crude Stocks	WASDE Report	Non-Farm Payrolls

ES Mon option	ES Mon option	ZN Wed option	ZN Wed option	ZC Fri option	ES Fri option
6E Wed option	ZN Wed option	ES Wed option	ES Wed option	ZS Fri option	NQ Fri option
ZN Wed option	GC Fri option	ES Wed option	6J Wed option		ZN Fri option
			CL Fri option		GC Fri option
					6E Fri option
					CL Fri option
					ZC Fri option

### LEGEND

ES: E-mini S&P 500, NQ: E-mini Nasdaq 100, ZN: 10-Year Note  
6E: EUR/USD, 6J: JPY/USD, GC: Gold, CL: Crude Oil  
ZC: Corn, ZS: Soybeans

# Robust Spreading Capabilities on CME Globex

Spread activity represented 60% of CME Globex options volume in 2018

*All Common Strategies are recognized such as Trees, straddles and ratio spreads*

*Create delta-neutral covered strategies*

*Conditional Curve strategies between Eurodollar and Mid-Curve products*

CC	Description	X	Qty	Bid	Ofr	Qty
<b>- Interest Rate Strategies</b>						
GE3	-1 GE0 Mar18 97.750 C, -1 GE0 Mar18 97.750 P, +1 GE3 Jun18 97.500 C, +1 GE3 Jun18 97.500 P	x	1,514	17.0	18.5	250
GE2	Jun18 97.625 STRD	x	1,200	32.5	33.5	1,600
GE	Dec18 98.125/98.250/98.375 CTREE	x	15,505	0.0	0.5	8,398
GE2	Jun18 97.750/98.000 CS 1x2	x	1,000	1.5	2.0	17,760
ZN5	Dec17 Wk5 123.75 Call	x	246,975	0'04	0'06	174,745
OZN	Mar18 125.00/128.00 CS 1x2 vs 10-Year U.S. Treasury Note Future Mar18 123'165 -0.16d	x	68,152	0'09	0'10	9,300
WY4	Dec17 Wk4 123.50/123.00 PS	x	74,739	0'01	0'03	41,967
WY4	Dec17 Wk4 123.75 Call vs 10-Year U.S. Treasury Note Future Mar18 123'155 -0.10d	x			0'01	29,102
WB4	+1 USWED Dec17 Wk4 151.0 C, -1 OZB Dec17 Wk5 151.0 C	x	2,376	-0'14	-0'12	50

*Calendar spreads between weekly and quarterly options*

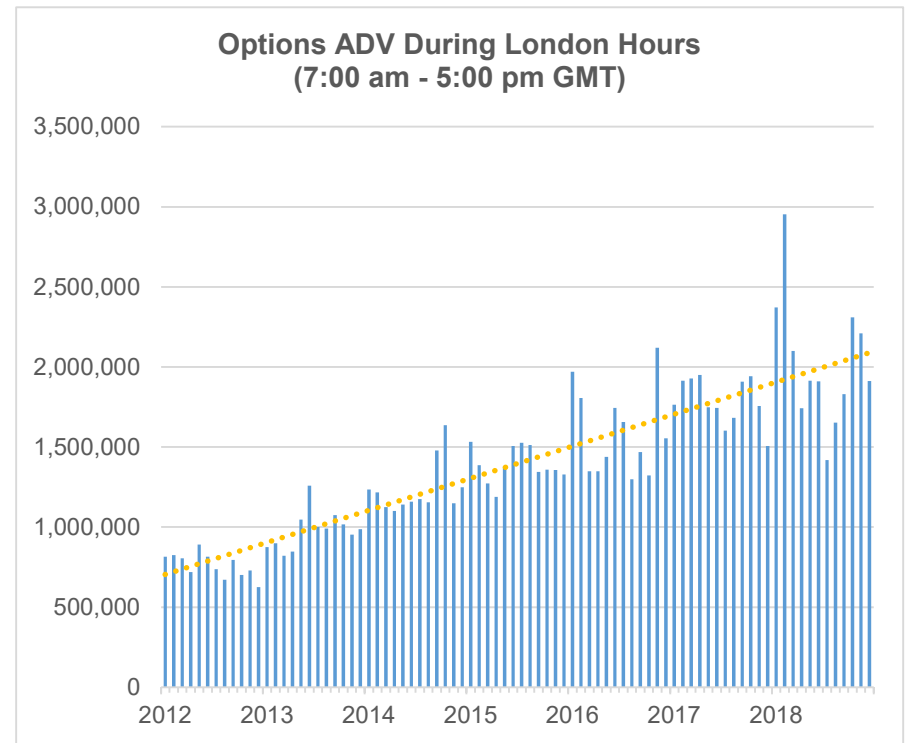
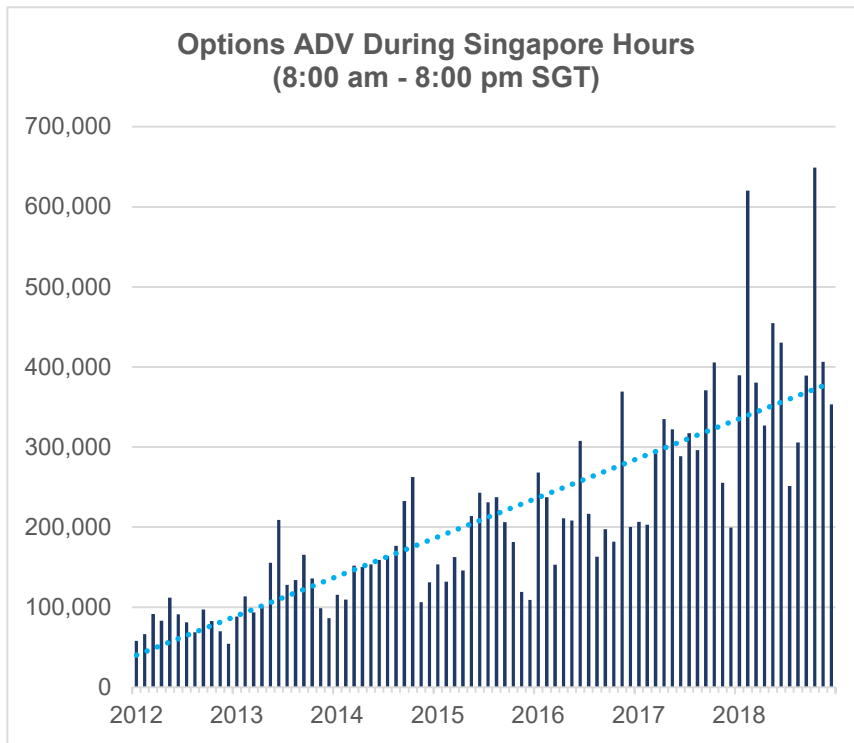
*Create and trade custom unique strategies*

- › Request for Quote (RFQ) functionality enables users to get competitive quotes in any market
- › Typical bid/ask spreads are tightened following an RFQ
- › Strategies often have equal or tighter markets than outright legs
- › Market Makers respond to RFQs and stream markets—typical RFQ response time is under 2 seconds

# Growing Liquidity Across Time-Zones

## 2018 ADV

- › London Hours: Over 2M contracts/day +13% YoY, including a record 2.9M in February
- › Singapore Hours: 413K contracts/day, +40% YoY, including a record 649K in October



Source: CME Group

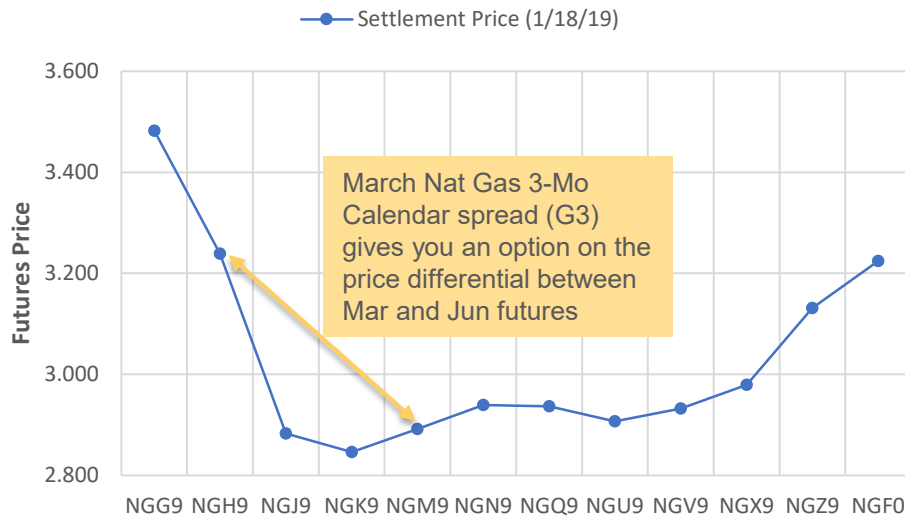
# Calendar and Intercommodity Spread Options

Trade or hedge price spreads efficiently and eliminate leg risk

- › Hedge physical storage costs and future price changes
- › Mitigate the costs associated with rolling futures positions forward
- › Express an opinion on changes in the shape of the forward curve

Most Active Spread Options	Symbol
WTI 1-Mo Calendar Spread (Physical)	WA
WTI-Brent "Arb" Spread	BV
WTI 1-Mo Calendar Spread (Financial)	7A
Brent 1-Mo Calendar Spread (Financial)	9C
Natural Gas 1-Mo Calendar Spread (Financial)	G4
Natural Gas 3-Mo Calendar Spread (Financial)	G3
Natural Gas 6-Mo Calendar Spread (Financial)	G6
Jul-Nov Soybean Calendar Spread	SC5
Jul-Dec Corn Calendar Spread	CC6
HRW Wheat Consecutive Calendar Spread	K7C
HRW Wheat Calendar Spread	CKM
HRW-SRW Wheat Intercommodity "Arb" Spread	KWC
Corn Nearby+2 Calendar Spread	PYC
Wheat Nearby+2 Calendar Spread	WZC
Dec-Dec Corn Calendar Spread	CCZ

Natural Gas Futures Term Structure



Source: CME Group

# Flexible Execution for Relationship-Based Trading

## Options Blocks on CME ClearPort

- › CME ClearPort provides an electronic venue to submit and clear select, privately negotiated options trades with eligible counterparties
- › Transact with the flexibility of bi-lateral trading but with the benefits of centralized clearing
- › Leverage CME Group technologies such as CME Direct and CME STP (Straight-Through-Processing) to reduce operational risk in bilateral trading

## Both Sides of an Order—Crossing Options on Globex

- › Specific to product, and subject to pre-ex communication rules, Globex offers select crossing algorithms for two-sided orders
- › Access Globex matching and liquidity
- › Customers may benefit from price improvement
- › Cross complex options strategies

Time	Type	Instrum	Product	Description	Price	Qty
(Today)	Cross					
14:15:04	Cross	Option	OZS	Jul18 1040.0 STRD vs ZS Jul18 1,034'0 +0.06d	48'3	100
13:54:41	Cross	Option	GNF	Q318 100.000/84.000 RR [SUM]	-0.500	10
12:39:24	Cross	Option	OZC	Sep18 390.00 Put vs ZC Sep18 394'4 +0.59d	18'7	50

More on CME Globex crossing protocols:

<http://www.cmegroup.com/education/crossing-protocols-on-cme-globex.html>

# Did you know: you can block a delta-neutral S&P 500 options trade at CME?

- You can block S&P 500 futures (Standard and E-mini) as part of a delta-neutral Standard S&P 500 options on futures trade
- 100% of the trade can be privately negotiated and consummated, and subsequently reported to CME
- Each S&P 500 option leg in a block trade is required to satisfy a minimum of 250 contracts; (and please note that while the number of covering futures contracts can be below the option leg minimum of 250, the delta of the futures contract must equal the net delta of the option legs)
- **Example: Delta-Neutral Block Trade Ticket in CME Direct**

Add Deal - S&P 500 Option Jun18 2792.0 Call vs S&P 500 Future Jun18 2783.0 -0.50d

Deal Cross

CME Group | CME Direct

Product: SP: S&P 500 Option Strategy: Call Trade type: Block Clearing: CME

Term: Jun18 Strike: 2,792.00 Ratio: Ref: 2,783.0 Delta: 0.5000

Price: 1.25 Quantity: 1,000 Unit: Contracts/Month

	Side	Ratio	Product	Term	Strike	Type	Delta	Price	Quantity	Units	Settlement Price
	BUY	-	SP: S&P 500 Option	Jun18	2,792.00	Call			1.25	1,000 Contracts/Month	N/A
I	SELL	-	SP: S&P 500 Future	Jun18		Hedge	0.5000	2,783.0	500 Contracts/Month	2,783.0 (6/11/20...	

S&P 500 Option Jun18 2792.0 Call vs S&P 500 Future Jun18 2783.0 -0.50d

Buyer: Alleged Aggressor Affirmed

- CMED Test Trader Firm 4
- CMED Trader 109/CMEDT4
- ERICTEST
- George Harrison/GCC BROKERS
- Demo Clearing firm LLC

Notes: Exec date: 12 Jun 2018 Exec time: 14:07:22

Seller: Alleged Aggressor Affirmed

- CMED Test Trader Firm 1
- CMED Trader 75/CMEDT1
- CMEDTEST0101
- George Harrison/GCC BROKERS
- Demo Clearing firm LLC

Buy order no. Requires affirmation

Sell order no. Add another

Fees (F4) Save draft (F5) Pre-confirm (F9) Close



# Historical Options Market Data on DataMine

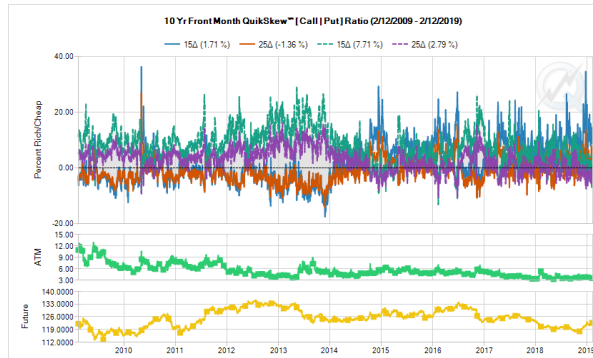
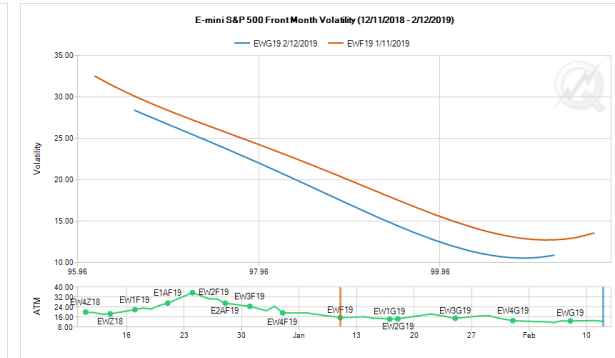
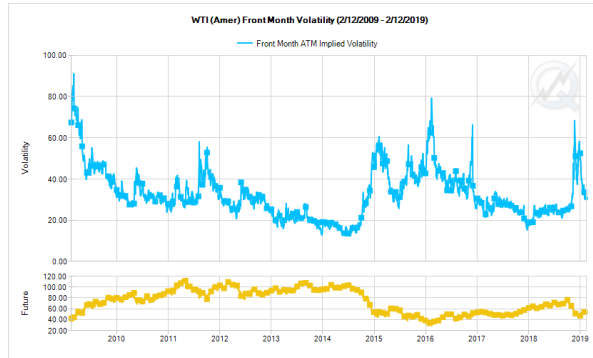
Refine pricing models | Find trends | Back-test strategies | Create analytics | Legal/Compliance queries

## CME Group Data

- › Block Trades
- › End of Day
- › Market By Order
- › Market Depth
- › Time and Sales
- › Top of Book

## Third-Party Data (Bantix Technologies)

- › End of Day Implied Volatility Curve data dating back to 2007
- › Available in One Strike, One Delta, One Standard Deviation, Two Moneyness curve types



PRODUCT	FRONT FUTURE	RID PRICE	RID VOL	2SD QUICKSKEW™	AVERAGE 30 DAY 21-Delta CONSTANT MATURITY QUICKSKEW™ VALUES PER TIME PERIOD											
					1W	1M	2M	3M	6M	9M	12M					
Corn	377.75	11.90	10.80	0.54 (+3.00)	6.90 (+10.70)	7.50 (+12.80)	7.50 (+12.80)	7.50 (+12.80)	4.60 (+7.40)	5.60 (+8.60)	5.70 (+8.60)	5.70 (+8.60)				
Wheat (SRW)	528.00	21.14	17.81	7.20 (+9.80)	8.00 (+11.00)	8.00 (+11.00)	8.00 (+11.00)	7.30 (+9.50)	7.10 (+9.10)	6.90 (+8.70)	6.90 (+8.70)					
Soybeans	917.90	30.83	14.72	2.20 (+4.10)	8.00 (+7.10)	8.00 (+7.10)	8.00 (+7.10)	1.50 (+4.40)	0.70 (+3.70)	1.00 (+4.10)	1.20 (+4.40)					
Lean Cattle	127.675	3.231	11.00	2.80 (+5.40)	4.80 (+2.30)	4.80 (+2.30)	4.80 (+2.30)	4.80 (+2.30)	5.80 (+1.10)	5.80 (+1.10)	5.80 (+1.10)					
Lean Hogs	55.125	4.124	32.87	5.80 (+1.80)	1.90 (+3.30)	0.60 (+1.80)	0.70 (+2.10)	2.40 (+1.10)	5.70 (+3.90)	4.80 (+3.50)	4.80 (+3.50)					
Feeder Cattle	144.200	3.340	10.14	3.00 (+3.30)	5.00 (+1.50)	4.80 (+2.30)	4.80 (+2.30)	4.80 (+2.30)	5.10 (+3.70)	5.10 (+3.70)	5.10 (+3.70)					
WTI (Amer)	53.13	3.72	30.69	6.70 (+4.50)	6.70 (+4.50)	6.70 (+4.50)	6.70 (+4.50)	7.00 (+5.70)	5.20 (+3.30)	4.80 (+2.50)	4.20 (+1.90)					
Nat Gas (Amer)	2.867	0.177	29.05	8.50 (+1.70)	0.70 (+1.50)	7.70 (+13.70)	8.90 (+12.80)	9.50 (+12.80)	6.30 (+7.90)	4.70 (+5.60)	3.90 (+4.40)					
Heating Oil	1.0095	0.1887	24.48	4.70 (+1.10)	3.80 (+1.30)	4.00 (+1.30)	4.00 (+1.30)	5.00 (+1.60)	4.40 (+1.60)	4.40 (+1.60)	4.40 (+1.60)					
Eurodollar (3M)	97.3550	3.87	16.84	1.90 (+1.10)	20.00 (+14.80)	12.00 (+6.70)	7.10 (+3.70)	5.40 (+2.80)	5.60 (+3.40)	5.20 (+3.90)	4.80 (+3.30)					
Eurodollar (6M)	97.4150	12.61	16.25	3.00 (+1.60)	4.50 (+3.30)	4.60 (+3.30)	5.00 (+2.00)	5.60 (+3.00)	5.70 (+3.00)	5.40 (+3.00)	5.20 (+3.00)					
Eurodollar (9M)	97.4400	16.42	15.97	2.70 (+1.50)	3.20 (+1.10)	4.20 (+7.20)	4.30 (+6.60)	4.60 (+7.20)	4.40 (+7.40)	5.30 (+6.60)	5.30 (+6.60)					
Eurodollar (12M)	97.5000	14.88	15.18	1.60 (+1.30)	2.10 (+5.50)	4.10 (+7.80)	4.10 (+6.80)	3.30 (+8.00)	2.90 (+5.30)	2.90 (+4.70)	2.90 (+4.70)					
2 Yr	108.0100	14.4	0.93	1.60 (+1.60)	27.70 (+8.40)	45.30 (+9.40)	25.80 (+8.60)	20.20 (+7.20)	15.20 (+8.70)	11.50 (+8.20)	9.70 (+8.20)					
5 Yr	114.1625	37.4	2.21	2.40 (+4.80)	3.90 (+4.60)	3.10 (+4.70)	2.80 (+5.20)	2.50 (+5.50)	2.20 (+6.10)	2.00 (+6.10)	1.80 (+6.10)					
10 Yr	121.3950	69.6	3.49	0.70 (+3.20)	2.30 (+3.20)	2.30 (+3.20)	2.30 (+3.20)	2.10 (+4.10)	1.90 (+3.90)	1.80 (+3.90)	1.60 (+3.20)					
30 Yr	143.310	205.3	6.25	0.80 (+3.50)	1.30 (+3.50)	0.80 (+3.50)	1.00 (+3.50)	0.90 (+3.50)	1.00 (+3.50)	1.20 (+3.50)	1.30 (+3.50)					
E-mini S&P 500	2144.50	79.10	12.09	15.70 (+10.70)	17.30 (+11.60)	17.30 (+11.60)	16.70 (+11.60)	16.70 (+11.60)	17.60 (+12.40)	16.90 (+12.80)	16.90 (+12.80)					
E-mini NASDAQ 100	7017.25	209.81	16.84	16.80 (+11.80)	15.70 (+10.30)	16.80 (+12.10)	15.80 (+12.90)	15.80 (+11.30)	17.00 (+12.50)	17.00 (+12.70)	17.00 (+12.60)					
E-mini Russell 2000	1337.20	53.719	16.18	15.20 (+13.60)	16.20 (+11.60)	15.20 (+13.60)	13.80 (+13.60)	12.50 (+13.60)	14.30 (+13.60)	15.30 (+13.60)	15.30 (+13.60)					
E-mini Dow	20395.0	755.6	13.03	12.70 (+8.90)	13.70 (+8.50)	14.70 (+10.30)	14.10 (+10.30)	15.70 (+10.70)	16.00 (+10.70)	16.00 (+10.70)	16.00 (+10.70)					
EURUSD	1.1364	0.9188	6.15	5.00 (+2.00)	3.70 (+1.10)	2.80 (+0.40)	2.80 (+1.10)	2.80 (+0.70)	4.30 (+2.20)	4.70 (+2.30)	4.80 (+1.70)					
AUDUSD	0.7103	0.8168	6.53	5.80 (+2.70)	5.70 (+2.70)	4.80 (+1.60)	4.70 (+2.70)	4.60 (+1.60)	5.00 (+1.90)	5.30 (+2.90)	5.10 (+2.70)					
CADUSD	0.7569	0.9111	4.42	2.30 (+1.20)	2.80 (+0.70)	3.80 (+0.90)	3.80 (+1.10)	3.10 (+1.00)	3.10 (+0.90)	3.10 (+1.10)	3.10 (+1.10)					
CHFUSD	0.9960	0.8129	5.66	2.60 (+4.00)	0.90 (+3.50)	1.50 (+4.30)	1.40 (+4.80)	0.80 (+3.90)	0.20 (+1.10)	0.20 (+1.10)	0.60 (+1.50)					
GBPUSD	1.2920	0.8965	10.36	7.50 (+1.10)	7.40 (+4.80)	5.00 (+2.60)	5.00 (+2.60)	5.10 (+2.60)	5.80 (+1.20)	5.40 (+1.20)	5.40 (+1.20)					
JPYUSD	0.0097	0.000128	6.18	5.70 (+8.80)	6.10 (+8.80)	6.10 (+8.80)	6.10 (+8.80)	5.70 (+8.10)	5.30 (+8.60)	5.10 (+8.60)	5.10 (+8.60)					
KRWUSD	0.010191	0.001091	11.03	8.40 (+1.10)	7.20 (+1.60)	8.70 (+1.60)	8.90 (+1.60)	10.10 (+1.10)	9.80 (+1.50)	9.80 (+1.50)	9.70 (+1.50)					
MXNUSD	0.05145	25.1	1.49	4.50 (+3.80)	4.40 (+3.40)	3.20 (+1.70)	4.80 (+1.70)	3.70 (+1.90)	2.10 (+4.20)	1.70 (+4.20)	2.30 (+3.80)					
SGD	15.890	0.507	14.15	3.50 (+3.80)	4.20 (+4.70)	4.00 (+5.20)	2.90 (+4.80)	1.80 (+4.40)	1.90 (+4.70)	1.90 (+4.70)	2.50 (+5.50)					
Skew	2.7720	0.114	17.69	10.30 (+3.80)	6.10 (+4.80)	1.60 (+3.80)	1.00 (+3.80)	0.90 (+3.80)	0.70 (+3.80)	0.70 (+3.80)	1.10 (+3.80)					

# Options Tools

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**QuikStrike Essentials**: The base version of QuikStrike's benchmark pricing and analysis platform offers an all-in-one tool for analyzing volatility, volume/oi, delta sheets, pricing, spreads, risk graphs and more



**Options Calculator**: Generate fair value prices and Greeks. Customize input parameters by strike, option type, underlying futures price, volatility, DTE, interest rate, and pricing model



**Strategy Simulator**: Analyze how a position will perform based on hypothetical price scenarios, compare custom strategies and apply "what-if" scenarios based on time decay or volatility



**Volatility Term Structure**: Illustrates the volatility term structures allowing user to view volatilities across expirations, and compare them to one week prior



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# Tool Spotlight: Open Interest Heatmap

[cmegroup.com/oiheatmap](http://cmegroup.com/oiheatmap)

## Gain insight into market sentiment through the lens of put/call open interest

- Track the concentration of put/call positions across strikes for all listed expiration on a specific underlying
- See how the market has evolved over the last day, week or month
- Analyze by open interest, OI change, OI % change, volume and volume change

VIEWS	EURODOLLARS OPEN INTEREST																		
Open Interest	AS OF 2/21/2018																		
Call/Put	EDH8 25 DTE 97.9300		EDZ8 298 DTE 97.4900		EDH9 389 DTE 97.4000		EDH0 753 DTE 97.1050		EDH1 1117 DTE 97.0250		EDH2 1481 DTE 96.9700								
Put	EDH8 25 DTE		EDZ8 298 DTE		0EH8 22 DTE		EDH9 389 DTE		2EH8 22 DTE		EDH0 753 DTE		3EH8 22 DTE		EDH1 1117 DTE		4EH8 22 DTE		
Total	STRIKES				CALL		PUT		CALL		PUT		CALL		PUT		CALL		
OI Change	95.750			500				10				15							
Call/Put	95.875			220				1,200		75									
Call	96.000	3,954		5,123				38,081				4,841					1,135		
Put	96.125							50				40,500		300					
Net	96.250	156		6,489		200		2,746				3,755		547		800			
Volume	96.375	600		5,400				505		500		41,800		1,582					
OI % Change	96.500	2,535		40,776				18,948		100		16,350		2,867		3,660			
Call/Put	96.625	100		6,565		1		4,865		9,201		17,178		1,501					1,000
Call	96.750	400	3,166	500	13,933			47,571		28,391		4,310		16,724					4,500
Put	96.875	2,000	138	12,339				33,845		4,134	40,172	11,884		47,856					6,068
Net	97.000	26,801		49,163			18,099		169,724	6,807	169,235	21,750	18,575	60,642	100	120	16,860	15,687	
Volume	97.125	23,251	1	151,796		61,712	7,134	180,078	21,992	141,154	5,100	15,562	36,132	84,219	2,300	2,300	46,300	3,683	
Call/Put	97.250	170	13,747	5,009	511,417	2,463	63,141	509	126,107	40,215	202,332	650	23,400	64,371	76,290		19,063	3,878	
Call	97.375		37,407	89	376,488	12,731	212,162	4,600	180,014	102,150	202,494	263	51,249	91,790	8,450	8,450	27,340	25,731	
Put	97.500	535	24,641	12,673	462,884	126,030	266,827	28,407	325,266	105,179	111,373	8,849	8,899	86,513	39,542	3,000	50	6,250	7,767
Net	97.625	250	60,800	33,556	213,431	89,884	188,991	17,320	51,438	67,557	104,413	6,050	11,152	53,504	44,370	1,900		6,614	2,350
Volume	97.750	22,658	204,415	49,352	246,243	177,161	162,025	24,173	61,467	88,590	134,779	6,242	4,450	87,936	25,729	400	400	8,000	250
Call/Put	97.875	17,470	234,649	196,773	138,008	113,358	120,244	47,775	12,219	77,027	51,374	29,766	35,300	53,378	33,372	1,050	1,050	3,419	1,850
Call	98.000	75,552	252,968	94,396	121,774	167,888	121,589	305,458	40,754	110,065	73,233	23,675	17,975	51,894	16,889	10		9,600	
Put	98.125	177,910	244,176	73,170	88,680	153,194	62,124	33,496	26,286	40,845	9,394	2,500	500	63,218	584			8,000	
Net	98.250	353,314	295,415	71,295	40,360	217,995	33,015	63,567	58,900	73,855	6,073	29,711	12,250	42,508	1,521				
Volume	98.375	367,549	179,844	61,931	12,552	106,884	14,412	32,063	14,333	46,734	210			20,090					
Call/Put	98.500	484,605	72,641	70,457	14,630	188,459		72,521	2,200	145,426		7,700		11,567		10			
Call	98.625	285,693	14,200	44,643	3,555	71,394	2,880	14,937	2,525	38,799		3,000		2,083					
Put	98.750	302,431	12,871	40,508	10,348	63,072		44,267	5,748	23,136		850		11,865					
Volume	98.875	83,337	13,000	16,502	2,546	100,801		28,000	1,850	5,016		1,500		1,862					
Call/Put	99.000	135,893	2,769	231,397	6,635	29,351		76,851	1	1,000		2,450							
Call	99.125	69,521	722	15,002		1,115		8,950		4,300				300					

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# Tool Spotlight: Cross-Asset Correlation Tool

[cmegroup.com/correlation-tool](http://cmegroup.com/correlation-tool)

## Optimize a portfolio's covariance exposure with options across all major benchmark futures:

- Track product relationships to identify how activity in one market might affect another
- Three ways to analyze correlations:
  - Daily log returns of 30-day constant maturity futures prices
  - 30-day constant maturity ATM implied volatilities
  - 20-day realized volatilities of 30-day constant maturity futures prices

CORRELATION OF DAILY LOG RETURNS OF 30-DAY CONSTANT MATURITY FUTURE PRICES FOR MAJOR BENCHMARKS (3/13/2017 - 3/13/2018)														
	GRAINS		MEATS		METALS		ENERGY		INDEXES		RATES		FX	
	ZC	ZS	LE	HE	GC	HG	CL	NG	ES	NQ	ED	TY	6E	6J
ZC	1.00													
ZS	0.61	1.00												
LE	-0.08	-0.06	1.00											
HE	0.07	0.05	0.06	1.00										
GC	0.01	0.04	0.02	-0.02	1.00									
HG	0.07	0.07	-0.03	0.08	0.20	1.00								
CL	0.15	0.06	0.01	0.10	0.16	0.22	1.00							
NG	0.09	0.08	0.01	-0.09	0.14	0.05	0.16	1.00						
ES	0.05	0.04	0.08	-0.04	-0.04	0.11	0.18	0.04	1.00					
NQ	0.05	0.05	0.09	-0.04	-0.02	0.08	0.09	0.02	0.87	1.00				
ED	0.03	0.00	0.06	0.03	0.15	-0.05	-0.02	0.06	-0.21	-0.17	1.00			
TY	0.00	0.03	0.02	-0.05	0.41	-0.11	-0.04	0.07	-0.19	-0.10	0.46	1.00		
6E	0.06	0.15	0.02	-0.04	0.38	0.22	0.04	0.03	0.04	0.02	0.10	0.19	1.00	
6J	0.02	0.07	0.04	-0.05	0.59	0.02	0.02	0.04	-0.20	-0.15	0.30	0.64	0.41	1.00
	ZC	ZS	LE	HE	GC	HG	CL	NG	ES	NQ	ED	TY	6E	6J

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# Appendix

# Weekly Options Codes

Contract	Expiry	CME Globex	Bloomberg	Reuters
<b>Equity Options</b>				
<b>E-mini S&amp;P 500</b>	Monday	E1A-E5A	IWWA Index	0#1AEW+
	Wednesday	E1C-E5A	IEWA Index	0#ECW+
	Friday	EW1-EW4	1EA Index - 4EA Index	0#ESW+
<b>Standard S&amp;P 500</b>	Monday	S1A-S5A	SVPWA Index	0#1ASW+
	Wednesday	S1C-S5C	SPWA Index	0#SCW+
	Friday	EV1-EV4	1DA Index - 4DA Index	0#EVW+
<b>E-mini NASDAQ-100</b>	Friday	QN1, QN2, QN4	10A Index, 20A Index, 40A Index	0#1NQW+
<b>E-mini Russell 2000</b>	Friday	R1E-R4E	RUWA Index	0#1RTYW+
<b>Treasury Options</b>				
<b>2-Year Note</b>	Wednesday	WT1-5	TUIA Comdty	0#WTW+
	Friday	ZT1-5	1W-5W	0#TUW+
<b>5-Year Note</b>	Wednesday	WF1-5	FVWA Comdty	0#WFW+
	Friday	ZF1-5	1I-5I	0#FVW+
<b>10-Year Note</b>	Wednesday	WY1-5	TYYA Comdty	0#WYW+
	Friday	ZN1-5	1M-5M	0#TYW+
<b>T-Bond</b>	Wednesday	WB1-5	USYA Comdty	0#WBW+
	Friday	ZB1-5	1C-5C	USW+
<b>FX Options</b>				
<b>EUR/USD</b>	Wednesday	WE1-WE5	WEYA	
	Friday	1EU-5EU	UAW	0#1EUUW+
<b>GBP/USD</b>	Wednesday	WG1-WG5	WLYA	
	Friday	1BP-5BP	BGW	0#1GBUW+
<b>JPY/USD</b>	Wednesday	WJ1-WJ5	WJYA	
	Friday	1JY-5JY	JAW	0#1JPUW+
<b>CAD/USD</b>	Wednesday	WD1-WD5	WCBA	
	Friday	1CD-5CD	UDW	0#1CHUW+
<b>AUD/USD</b>	Wednesday	WA1-WA5	WABA	
	Friday	1AD-5AD	AUW	0#1ADUW+
<b>Energy Options</b>				
<b>WTI Crude</b>	Friday	LO1-5	CLWA Comdty	0#CLW+
<b>Brent Crude</b>	Friday	BW1-5	BZCA Comdty	0#BZZW+
<b>Natural Gas</b>	Friday	LN1-5	GKWA Comdty	
<b>Metals Options</b>				
<b>Gold</b>	Friday	OG1-5	XGCA Comdty OMON <GO>	0#GCW+
<b>Silver</b>	Friday	SO1-5	WSIA Comdty OMON <GO>	
<b>Copper</b>	Friday	H1E-H5E	HGWA Comdty OMON <GO>	
<b>Ag Options</b>				
<b>Corn</b>	Friday	ZC1-5	1-5XA Comdty	0#CW+
<b>Soybeans</b>	Friday	ZS1-5	1-5SA Comdty	0#SWW+
<b>Wheat</b>	Friday	ZW1-5	1-5WA Comdty	0#WW+
<b>Soybean Meal</b>	Friday	ZM1-5	1-5DA	0#SMW+
<b>Soybean Oil</b>	Friday	ZO1-5	1-5AA	0#BOW+

# Most Active Options

2018

2018 Rank	2017 Rank	Product	Product Group	Primary Symbol	ADV	% YoY	% Globex	Open Interest
1	1	Eurodollars	Interest Rates	GE	1,415,619	3%	33%	41,240,443
2	2	E-mini S&P 500	Equity Index	ES	760,542	26%	100%	3,653,405
3	3	10-Year Note	Interest Rates	OZN	666,519	30%	81%	3,366,837
4	4	WTI Crude Oil	Energy	LO	199,173	4%	75%	3,923,152
5	6	5-Year Note	Interest Rates	OZF	164,677	39%	78%	1,906,313
6	7	T-Bond	Interest Rates	OZB	140,468	30%	89%	922,841
7	5	Natural Gas	Energy	LN	104,316	-19%	62%	2,223,424
8	8	Corn	Agriculture	OZC	101,725	7%	74%	949,381
9	9	Soybeans	Agriculture	OZS	75,758	11%	82%	450,699
10	11	Gold	Metals	OG	48,745	21%	81%	1,184,907
11	10	Standard S&P 500	Equity Index	SP	48,643	-11%	0%	193,167
12	13	SRW Wheat	Agriculture	OZW	37,435	25%	78%	324,314
13	12	EUR/USD	FX	EUU	34,571	-5%	99%	224,215
14	19	2-Year Note	Interest Rates	OZT	23,705	160%	72%	182,207
15	15	GBP/USD	FX	GPU	12,875	1%	96%	165,410
16	20	Soybean Meal	Agriculture	OZM	12,684	47%	66%	101,240
17	14	JPY/USD	FX	JPU	12,426	-15%	98%	113,275
18	25	Brent Crude Oil	Energy	BZO	11,431	388%	30%	303,229
19	17	E-mini NASDAQ-100	Equity Index	NQ	11,422	0%	100%	34,598
20	18	Lean Hogs	Agriculture	HE	10,991	9%	88%	190,625
21	16	Live Cattle	Agriculture	LE	10,484	-9%	89%	149,181
22	24	Silver	Metals	SO	7,438	30%	82%	221,725
23	22	CAD/USD	FX	CAU	7,432	-3%	98%	65,694
24	23	AUD/USD	FX	ADU	6,271	3%	96%	64,572
25	21	Soybean Oil	Agriculture	OZL	5,656	-31%	69%	67,281

Data as of 12/31/18

Reflects all expires in a given product (10-Year note data includes Quarterly/Serial and Friday and Wednesday Weeklies).



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