

CME GROUP CUSTOMER FORUM

APAC CME Specific Topics
July 2019

Agenda

1. **CME Group: Technology Topics**
 - **BrokerTec US Treasury Data on MDP**
 - **iLink 3 FIX Binary**
 - **iLink Tags**
 - **NEX Data Now Available on CME DataMine**
 - **Partnership Updates**
2. CME Group: Product Topics



BrokerTec US Treasury Data on MDP: Q3

CME Group will be distributing the NEX Data US Treasury data on MDP.

This feed includes Active, Once Old and Twice Old Benchmarks and is available to all *licensed* customers.

- Provides real-time comprehensive order book information, trade indicators and market statistics for Active US Treasury Benchmarks as well as indicative price levels for Once Old & Twice Old Benchmarks. Acts as a one-stop service for:



For more information, please contact the NEX Data Sales Team.

Technical specifications and launch timelines will be provided in a future CME Globex Notice update.



NEX Data Now Available on CME DataMine

BrokerTec Historical Data

- Available for six different maturities (2-yr, 3-yr, 5-yr, 7-yr, 10-yr, 30-yr) in three different formats (Top of Book, Depth of Book, and Full Order Book) dating back as far as 2000

GovPX Historical US Treasury Data

- Comprehensive historical tick market data coverage across a wide range of US Treasury and Agency markets

GovPX US Treasury End-of-Day

- End-of-Day pricing information for all active and off the run US Treasury issues

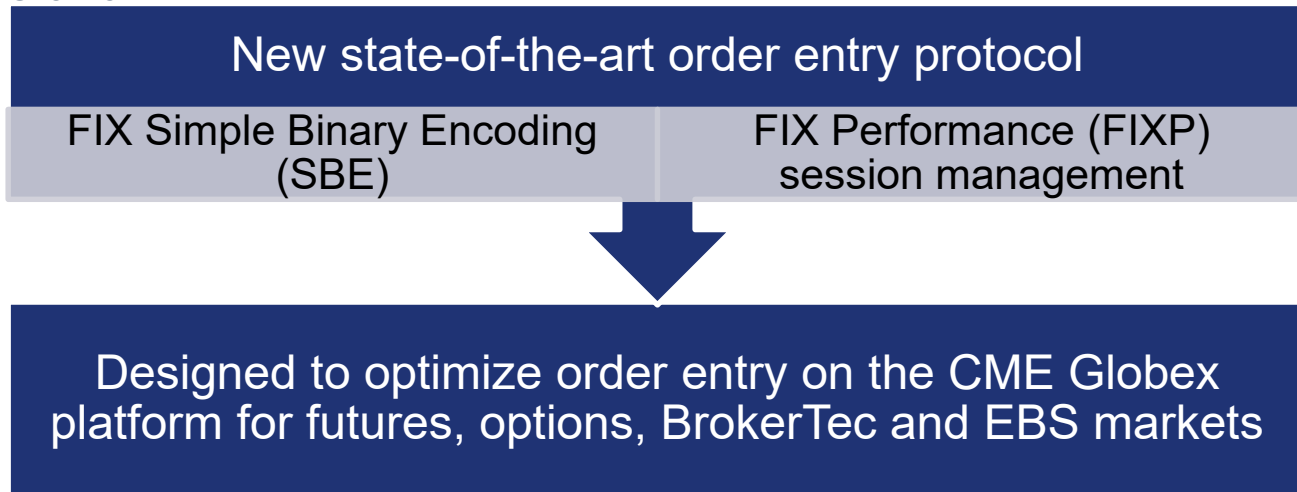
For more information, please see:

- BrokerTec: <https://datamine.cmegroup.com/#t=p&p=cme.nexBrokerTec>
- GovPX: <https://datamine.cmegroup.com/#t=p&p=cme.govPx>
- GovPX EOD: <https://datamine.cmegroup.com/#t=p&p=cme.govPxEod>



iLink 3: FIX Binary Order Entry

Overview





iLink 3: FIX Binary Order Entry

Benefits

More efficient iLink FIX messaging

- Simple Binary Encoding (SBE) delivers faster encoding/decoding
- Lean messages move administrative information out of order entry business message

Fixed message sizes

- Access to all iLink functionality with no performance impact
- More deterministic performance for all customers

Simplified recovery modes via FIXP session management

- Messages may or may not be recovered by retransmission
 - Recoverable: If client system detect a gap, then missed messages can be recovered by retransmission
 - Idempotent: If CME Globex detects a gap, the client is notified by CME Globex, but recovery is under control of the client
- Session-level information (e.g. headers) no longer required

Consistent encoding method for market data and order entry

- XML schema and templates for order entry just like MDP 3



iLink 3: FIX Binary Order Entry

Only MSGW sessions will support iLink 3

- iLink 3 and iLink 2.x will be available in parallel for MSGW sessions for 6 months

Only iLink 3 will support access to BrokerTec and EBS markets

- CGW customers must migrate to MSGW+iLink 3 to access the full complement of CME Globex markets

Drop Copy will support both iLink 3 and iLink 2.x source sessions

- All Drop Copy message payloads will match current formats and encoding to reduce the work for Drop Copy consumers.



iLink 3: Business Messages

Ability to pre-register administrative information

- CME Group will launch the new Service Gateway for customers to register administrative information out-of-band
 - Customers login using the same MSGW session and FIXP protocol
 - Support only Party Detail Definition messages
- iLink 3 allows customers a choice to optimize their message construction by removing Administrative information from the order entry path
- Administrative information includes:
 - Account, Account Type, SenderComp, CTI Code and Self-Match Prevention
- **For most efficient order messages:** customers may pre-register administrative information in the new Service Gateway weekly and omit from order entry by using a tag to reference the registered information
 - Pre-registration information is submitted via iLink 3 to the new, out-of-band Service Gateway
- **For easiest messaging flow:** send the administrative information to MSGW before each business message (new order, order modify, etc)
- Drop Copy messages will have full details of both the administrative and business information



iLink 3: FIX Binary Order Entry

MSGW Session Migration

Customer self-service session ID migration from iLink 2.x to iLink 3 through CME Request Center

- Customers with HMAC key administration rights can migrate sessions from iLink 2.x to iLink 3 on a session-by-session basis
- No new sessions required for trading futures and options
- Changes effected once a week on Sunday startup
- Sessions cannot fall back to iLink 2.x mid-week – Manage your migration!
- All MSGW sessions must be migrated to iLink 3 by the end of the parallel period

iLink 3 Timeline

Q3 2019			Q4 2019			Q1 2020			Q2 2020			Q3 2020			Q4 2020		
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
 Late July 2019 - Client Impact Assessment with message specifications available - Message specifications will support CMEG and BTEC markets	 August 2019 - New Release for futures and options - Subset of functionality - FIXP - Administrative Registration - Order/Modify/Cancel			 November 2019 - AutoCert+ certification for futures and options - Required for clients who want to support iLink 3 - New Release for BTEC plus all remaining functionality - Retransmission, Mass Quotes, RFC, RFQ, Administrative In-Message Formats				 March 2020 - Production Parallel for futures and options - CME Request Center for session migration self-service - AutoCert+ certification for BTEC							iLink 2.x Decommissioned on all MSGWs		

Market Segment Gateway Enhancements

To further safeguard CME Globex infrastructure, the following changes to **MSGW** will launch in Q1

- Sessions that send a network packet with an incomplete message will be subject to additional processing
 - This processing takes at least 3 microseconds before the message(s) can be sent to the trading engine
- The number of messages the gateway can hold for a session is undergoing additional processing is fixed
 - If a session exceeds the permitted number of messages, the session will be logged out and all in-flight messages will be rejected.
- iLink messages impacted by this enhancement will be flagged in the corresponding Acknowledgement sent from CME Globex.
- *As a reminder, CME Group Rulebooks prohibit any customer behavior that may cause an operational risk to markets in Rule 575*
- **Messaging Impacts**
 - New FIX tags returned on iLink outbound messages
 - Tag 9553-SplitMsg to identify the reason for the additional processing
 - Tag 5904-DelayDuration to identify the duration
 - New Logout Reason when MSGW session is logged out due to the number of in-flight message
- **Launch Timeline:**
- New Release: November 4, 2019
- No certification required; two mock sessions will be scheduled
- Production: Phased rollout starting January 26 – March 8

iLink Tags: Tag 1031-CustOrderHandling

- Collaboration with FIA to provide trading and clearing firms a more effective means to reconcile executing broker fees
- Tag 1031 will be validated for presence and values on all iLink business messages
 - W - Desk
 - Y - Electronic
 - C - Vendor-provided platform
 - G – Sponsored Access via Exchange API
 - H – Premium Algo Trading Provider
 - D – Others
- iLink messages without 1031 or with an invalid value will be rejected
- Validation Launch:
 - FIA white paper available now!
 - NR – August 26, 2019
 - Production – November 17, 2019

Recently Launched iLink Tags

End-to-End Note Field

FIX tag 5149-Memo

Allows front-end or trading customer to pass instructions or information directly to middle and back offices, including your FCM.

Available now!

Clearing Instructions

New FIX tags for post trade clearing instructions on customer orders:

**Tags 819: AvgPxIndicator
Tag 1731: AvgPxGroupID
Tag 1598:
ClearingTradePriceType**

- **Both methods are currently supported**
- **Special characters in tag 1 will be deprecated in the future**
- **Migrate now to the new explicit FIX tags!**

Third Party Data via CME DataMine

Six external party historical datasets are now available via the CME DataMine self-service platform:

- **Bantix** - Implied volatility curves
- **Orbital Insight** - Geospatial crude supply estimates
- **RS Metrics** - Satellite imagery global copper estimates
- **Tellus Labs** - Crop estimates
- **1Qbit** - Options and futures price sentiment meter
- **Johannesburg Stock Exchange** - Equity and Currency Derivatives

<https://www.cmegroup.com/datamine>

Partnership Updates

Financial & Energy Exchange Ltd. (FEX) Australia

CME Group Clearinghouse will provide clearing for FEX Asian Crude, Australian Power and other energy products the second half of 2019. NYMEX members may apply for FEX Clearing; for more information on membership please contact FEX at onboarding@fex.com.au

Eris Innovations

Dec. 2nd, 2018, Eris Standard Swap tenors 2-30 years migrated from Eris SwapBook to CME Globex under CBOT Designated Contract Market.

- Eris Swap Futures set a new monthly volume record of 181,442 contracts in the first 9 trading days of June, surpassing the previous record of 173,330 set in March.
- Since launch, daily ADV 6,856, front-months Open Interest 59,442 (Sept and Dec) and total Eris Swap Futures Open Interest 198,722.

Agenda

1. CME Group: Technology Topics
2. **CME Group: Product Topics**
 - **FX/IR: Rates Products Highlights, SOFR, FX Products Highlights**
 - **Equity: U.S Micro E-mini Equity Index Futures, Bitcoin Futures**
 - **Energy: Product Changes, Energy Futures, Energy Options**
 - **Metals: COMEX Gold Futures and Options, Copper Futures and Options**
 - **Agricultural: Overview, African Swine Fever, Ag Options Product Suite**

Rates Products: Highlights

- The **2-Year Note tick cut** in 2019 has improved cost of trading by as much as 36%, and volume has grown 39% vs. 2018 (Treasury futures complex +10% during the same period)
- **Ultra 10**, launched in 2016 to pinpoint 10-year Treasury exposure, has grown to 220K in ADV YTD with OI reaching a record 778K
- **Invoice Spreads** ADV has grown to 122K YTD (\$17B notional) following rule clarification in Oct '16 and enhanced electronic entry
- **Portfolio margining** between futures & cleared OTC delivers \$4.2B in daily margin savings for clients
- **Additional Eurodollar and Treasury options listings** offer expirations from weekly to over 3 years, expanding the streaming and RFQ-driven CLOB

Strong Growth in Volume & OI

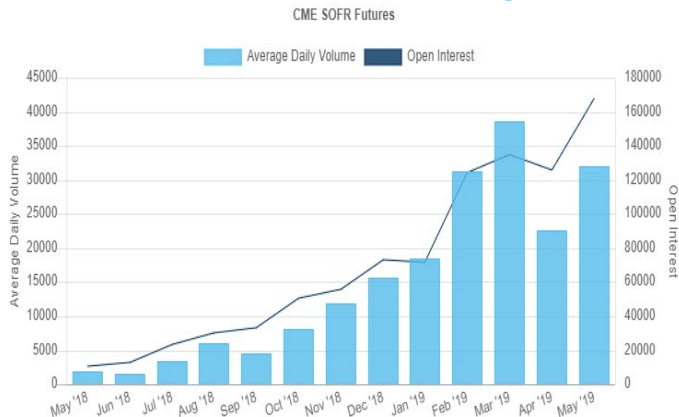
Open interest has surged over the last six years as global participants increasingly turn to futures for liquid, capital-efficient, and off-balance-sheet interest rate exposure. Client-driven enhancements are delivering greater total cost savings and capital efficiencies, helping to more than double buy-side participation since 2013.

	ADV		Open Interest	
	2019 YTD	% vs. '13	2019 as of 5/31	% vs. '13
Eurodollar Futures	2,890,696	+41%	13,124,415	+65%
Eurodollar Options	1,748,165	+194%	64,421,790	+562%
Fed Fund Futures	310,035	+1580%	2,547,743	+469%
Treasury Futures	4,582,583	+70%	15,253,723	+198%
Treasury Options	1,023,269	+90%	6,829,388	+194%
Total Rates	10,600,447	+90%	102,609,309	+300%

2019 YTD as of 5/31. 2013 open interest as of 1/2/13



CME SOFR Futures: Activity



SOFR Futures - Use

- Futures are a reliable indicator of market expectations of SOFR along the curve
- Easy spread trading against Eurodollar and Fed Fund futures via inter-contract spreads, provides a transparent basis market
- Margin efficiencies against Eurodollar and Fed Fund Futures, up to 80%, and will become eligible for efficient portfolio margining against cleared swaps using the same clearinghouse
- SOFR futures since launch are supported by over ten market makers

- Clients have indicated that SOFR futures will have immediate investing, risk management, and hedging applications:
 - Hedging **Term Repos**
 - Hedging **SOFR based Overnight Index Swaps (OIS)**
 - **Relative Value trading**: Differences in SOFR and EFR are affected by supply and demand dynamics in each market, and create relative value trading opportunity for futures market participants

Source: CME Group

SOFR Futures: Vendor Codes for Outrights and Spreads

	3-Month SOFR	1-Month SOFR	3-Month SOFR vs. Eurodollar	1-Month SOFR vs. 30-Day Fed Funds	1-Month SOFR vs. 3-Month SOFR	30-Day Fed Funds vs. 3-Month SOFR
Product Type	Outright	Outright	1:1 Spread	1:1 Spread	10:6 Spread	10:6 Spread
CME Globex	SR3	SR1	SR3	SR1	SR1	ZQ
Bloomberg	SFR Comdty	SER Comdty	SFRED	SERFF Comdty	SERSFR Comdty	FFSFR Comdty
Thomson Reuters Globex Chain RICs	0#1SRA:	0#1S1R:	0#1SRA-ED:	0#1S1R-FF:	0#1S1R-S1R-SRA:	0#1FF-FF-SRA:
Thomson Reuters Composite Chain RICs	0#SRA:	0#S1R:	0#SRA-ED:	0#S1R-FF:	0#S1R-S1R-SRA:	0#FF-FF-SRA:
TT	SR3	SR1	SR3	SR1	SR1	ZQ
CQG	SR3	SR1	SGI0	SZI0	SRWI1	ZSWI1
FIS/SunGard	SR3	SR1	SR3	SR1	SR1	ZQ
Fidessa	SR3	SR1	SR3	SR1	SR1	ZQ
ION (Pats & FFastFill)	SR3	SR1	Pending	Pending	Pending	Pending
Broadway Technology	SR3	SR1	Pending	Pending	Pending	Pending
Stellar	SR3	SR1	SR3-GE	SR1-ZQ	SR1-SR3	ZQ-SR3
DTN	@SR3	@SR1	Pending	Pending	Pending	Pending
Itiviti	SR3	SR1	Pending	Pending	Pending	Pending

FX Products: Highlights

Need to Know: In our Markets

We're working to deliver creative solutions to your most important challenges,

so you can access the capital and margin efficiencies of our centrally-cleared and transparent market.

That's why:

We've expanded our FX futures offering

With quarterly expiries across every contract, and monthly expiries on six pairs, all with implied liquidity, and now with CME FX Link which connects the OTC FX market with FX futures electronically, for the first time.

We've expanded our listed FX options offering

With Friday and Wednesday Weeklies, we are now the largest centralized all-to-all electronic FX options marketplace in the world.

We've expanded our OTC FX clearing offering

Clear NDFs, G10 NDFs (Cash-settled forwards) and new FX options. All under one Guarantee Fund.

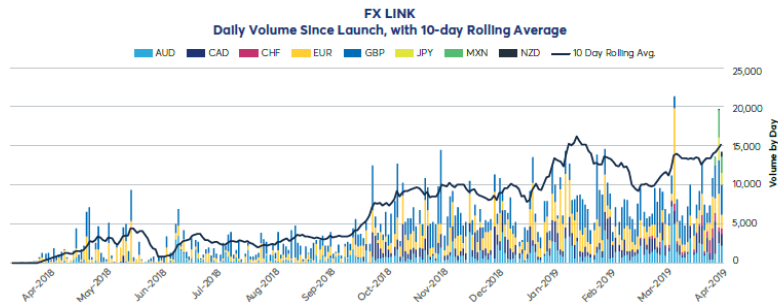
FX Products: Highlights

Launched

- **SHIFT TO 10am NEW YORK EXPIRATION TIME:** Across all FX Options. Last2pm Chicago expiration is the June Quarterly on 7June, the first 10am is the Wednesday Week2 on 12June – to bring our markets in line with OTC convention
- **STRIKE LISTING CHANGE:** New quarterly strikes are now available in CAD/USD, AUD/USD, EUR/USD and JPY/USD – to provide traders with more choice and more ability to optimize strategies
- **TWO NEW PAIRS ON FX LINK:** *NZD/USD* and *USD/CHF* launched on February 19, 2019 – to create more opportunities to trade the OTC FX & FX Futures spread in these currencies
- **GBP/USD: Changes to intra-currency calendar spreads**
 - Trade Match Algorithm: The new configuration will be 20% FIFO and 80% Pro Rata - with no levelling and all residuals being distributed via FIFO.
 - Minimum Price Increment (MPI): The MPI is changing from 1 to .5 for non-consecutive month intra-currency calendar spreads.

FX Products: FX Link

- CME FX Link marked its first year anniversary – live since March 25, 2018. In our first year, over 1,687,441 contracts were traded, equivalent to over \$164 Billion in notional.
- In response to the ECB announcement on March 11, more participants utilized FX Link than ever before – as a source of liquidity and a means to manage market risk in a capital efficient way. Volume reached a record 26,039 contracts traded with a notional of +\$2.86B.
- March volume averaged 14,000 contracts from a diverse user base including banks, prop trading firms and buy side firms. All pairs are trading, including NZD & CHF which launched in February, and increasingly strong activity in Mexican Peso.



FX Products: EMFX

EMFX Listed Futures, March 2019

Mexican Peso Future

 **13%**
88,670 ADV

Brazil Real Future

 **50%**
7,935 ADV

Russian Ruble Future

 **19%**
6,750 ADV

Indian Rupee Future

 **12%**
3,650 ADV

S.African Rand Future

 **10%**
2,971 ADV

Chinese Renminbi Future

 **535%**
981 ADV

Emerging Market FX

 **31%**
84,722 ADV

Leader in Emerging Market Clearing

219 participants across Brazilian real,
Mexican peso, Chilean peso, Colombian peso, Indian rupee,
Korean won & Chinese yuan

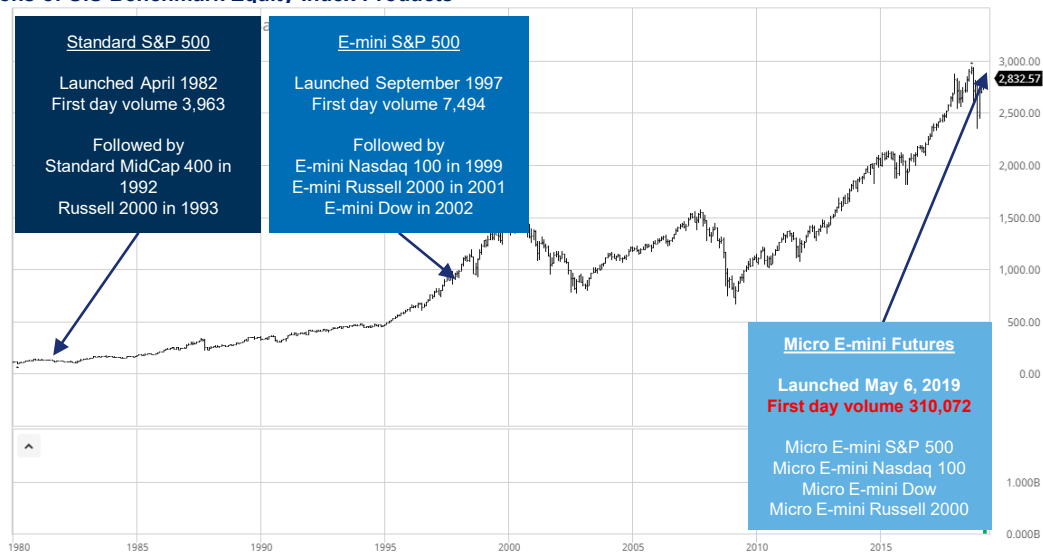
FX Products: EMFX Margin Efficiencies

EMFX, Efficiencies: Margin offsets across FX and across commodities

	AUD	BRL	CAD	CNH	INR	JPY	MXN	NZD	RUB	ZAR	Brent Crude Oil	WTI Crude Oil	Gold	Copper
BRL	30%	–	–	–	25%	–	30%	–	20%	35%	–	–	–	–
CLP	–	50%	–	–	–	–	45%	–	–	–	–	–	–	30%
CNH	45%	–	–	–	30%	45%	–	–	–	–	–	–	40%	50%
INR	35%	25%	–	30%	–	–	–	–	–	25%	–	–	20%	–
KRW	45%	–	30%	–	–	25%	–	44%	–	–	–	–	–	30%
MXN	–	30%	30%	–	–	–	–	–	20%	30%	30%	30%	–	–
RUB	20%	20%	–	–	–	–	20%	–	–	20%	25%	25%	–	–
ZAR	20%	35%	26%	–	25%	–	30%	30%	20%	–	–	–	30%	–

History of Equity Index Futures at CME Group

Three Generations of U.S Benchmark Equity Index Products



Source: Barchart.com



Introducing Micro E-mini Futures

A little is a lot of opportunity – Something **BIG** is coming to Equities Trading



Small size, big opportunity

A slice of the most liquid equity index futures in the world. All the benefits of E-mini, except a smaller notional size that's complementary to our product suite

- Portfolio diversification
- Around the clock 23 hours access – Trade ALL DAY LONG, ALL NIGHT LONG
- Easy to implement Long / Short view



More flexibility, ease of going short, and greater precision

Better precision and flexibility in tailoring exposure and managing the risk. No short-selling restrictions. Also fungible versus the E-mini contracts by **10:1** ratio



Power of leverage

Capital efficiency is possible by margin offsets with other benchmark CME equity index products. Potentially lower trading costs than trading a basket of equities or ETFs, and there is NO management fees.

U.S Micro E-mini Equity Index Futures

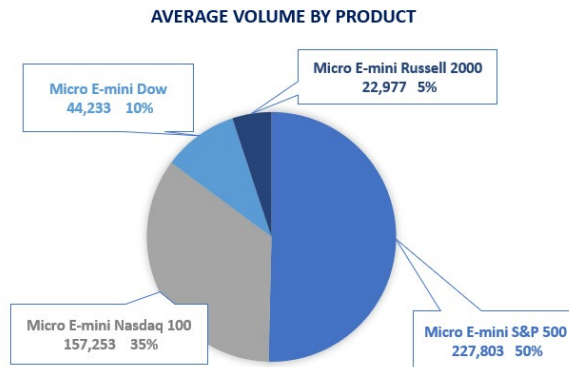
	Micro E-mini S&P 500	Micro E-mini Nasdaq 100	Micro E-mini Dow	Micro E-mini Russell 2000
CME Code	MES	MNQ	MYM	M2K
Multiplier	\$5	\$2	\$0.5	\$5
Contract Size*	\$14,480	\$15,209	\$13,197	\$7,931
Tick Size	0.25 index points(=\$1.25)	0.25 index points (=\$0.5)	1 index points (=\$0.5)	0.1 index points (=\$0.5)
Trading Hours	CME Globex : Sun - Fri 5pm - 4pm CT with trading halt 3.15pm - 3.30pm			
Expiry	Third Friday of March, June, September, December quarterly cycle. Trading in expiring futures terminates at 8.30a.m CT on Last Trading Day			
Daily Settlement	Same as the corresponding E-mini contract. The volume weighted average price (VWAP) of E-mini Futures between 15:14:30-15:15:00 CT			
Final Settlement	Same Special Opening Quotation (SOQ) as the corresponding E-mini contract on the final settlement day. SOQ is calculated based on the opening prices of index component stocks.			
Margin*	\$600	\$760	\$590	\$355
Circuit Breakers	Same rule as E-mini contracts 5% up and down limits during ETH (extended trading hours) -7/13/20% down limits during RTH (regular trading hours)			

(Source : CME Group) *as of April 8, 2019. Margin is for maintenance. Visit www.cmegroup.com for more details

Micro E-mini Futures

Most Successful Product Launch in CME History!

- Over 21M contracts traded across four indices since launch.
- ✓ 10M contracts traded in less than 20 days
- ✓ 1M contracts traded in less than 3 days
- ✓ 310K contracts traded on day one.
- YTD ADV 452K contracts
- 25% of the flow since launch is coming outside of the U.S (approx. 5.3% from APAC)
- 13% of total volume traded during non-U.S hours since launch



(Source: CME Group)

- The metrics suggest the adoption of products and uptake are happening across all segments
Not only retails, but customers across all different segments have started to trade the micro e-mini futures, seeking to benefit from the more precise product.
- Over 38K unique accounts have traded the micro e-mini products since launch from 130+ countries.

Equity Products

1H 2019 update

○ BTIC on Major Indices

19.65M+ contracts traded (\$2.57T notional) since the Nov. 2015 launch. BTIC on the major indices has achieved 39,186 ADV (flat vs. 2018). Liquidity continues to remain on screen with 90% of volume transacting on Globex in 2019. Additionally, BTIC has comprised 31% of the MOC value traded at NYSE and Nasdaq in 2019, compared to 32% in 2018, 14% in 2017, and 6.4% in 2016.

○ Equity Options

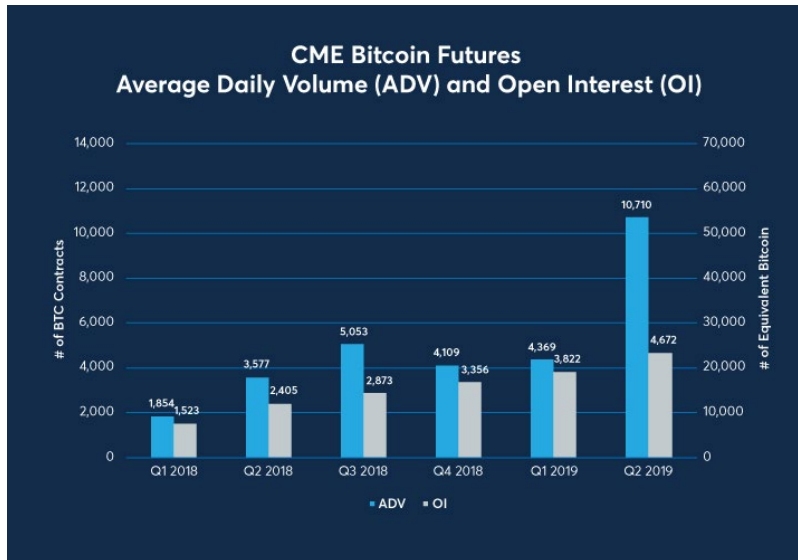
617K ADV through June. On July 29th, pending all regulatory approval, Equity plans to extend the listing cycle in Monday and Wednesday options from 2 to 4 weeks (E-mini and Standard S&P 500). This is in direct response to customer demand, continuing the trend of increased demand for short-term options trading. CME completed its eleventh successful equity options compression run by end of June, alleviating pressure on firms that are most affected by capital constraints imposed by Basel III.

○ Total Return Futures

Adoption in S&P Total Return (SPTR) futures in 2019 continues to accelerate as dealers' transition from OTC to listed. Activity is up 27% YoY with \$307M notional ADV and outsized activity going into the month end. YTD ADV is 2,361 contracts with open interest averaging 223,729 contracts (\$31.33B notional) in 2019. CME expanded our Total Return futures offering to longer maturities and to include Nasdaq-100, Dow Jones, Russell 2000, and Russell 1000 in Q4-2018.

Bitcoin Futures: Record and Beyond

Historic Q2 with ADV up 145% vs Q1



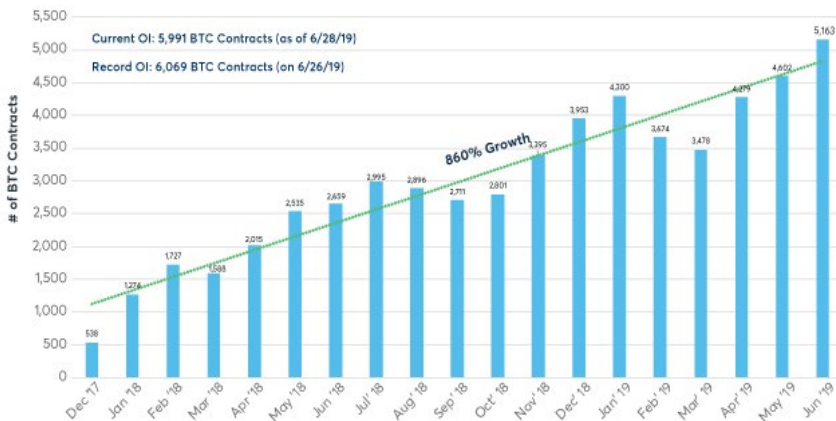
Q2 Highlights

- ADV reached 10,710 contracts (or ~\$403M notional, 53.6K equivalent bitcoins) +200% vs Q2 2018.
- May 13 was the highest volume day, with a record of 33,677 contracts or 170K equivalent bitcoin traded.
- May was the best month ever, 13,604 contracts traded per day in average (68K equivalent bitcoins, \$513M)
- Average daily OI reached 4,672 contracts, +94% vs Q2 2018.
- Average number of Large Open Interest Holders (LOIH) reached 49 June 25.

Bitcoin Futures: Record and Beyond

New Monthly ADV Record of 13.6K in May, +36% versus April 2019

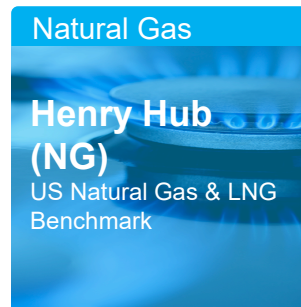
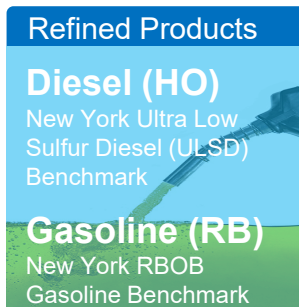
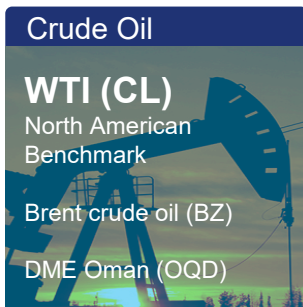
CME Bitcoin Futures-Average Daily Open Interest (OI) by Month



Q2 Highlights

- 2,960+ unique accounts traded since launch across all client types.
- 751 new unique accounts added, most added in any quarter ; 34% growth from Q1 2019
- 1,070+ accounts actively traded in June, the highest number observed in any month ; 40% more than the active accounts in May
- Currently over two dozen FCMs support our bitcoin futures with more looking to offer the product as institutional interest continues to grow

CME: Main Energy Contracts



- CME's Energy business is inherited from **NYMEX** (acquired by CME Group in 2008).
- Futures and options contracts are listed on **Globex** for electronic trading.
- OTC traded energy products are submitted for clearing through **ClearPort**.
- CME owns 50% of Dubai Mercantile Exchange - DME.

Product Changes

Listing Cycle Expansion

WTI Crude Oil Futures (CL) & Options (LO):

monthly contracts listed for the **current year and the next 10 calendar years** (previously: next 8 calendar years)

Extension of Trading at Settlement

Trading at settlement ("TAS") is an order type that allows to **execute at a spread to the settlement price** at any time during the trading session.

TAS pricing **trade off of a "Base Price"** of 0 to create a differential (plus or minus 10 ticks) versus settlement in the underlying product .

WTI Crude Oil Futures (CL):

TAS eligibility extended to **12 consecutive months plus 2 months** (previously: 7 months)

Henry Hub Natural Gas Futures (NG):

TAS eligibility extended to **12 consecutive months** (previously: 7 months)

Product Launches

WTI Houston Crude Oil futures (HCL)

Crude Oil futures contract physically delivered in at the most robust crude infrastructure system in Houston.

Trade as a Globex exchange listed spread to WTI Futures (CL) and Brent Futures (BZ) with no leg risk.

Launched on November 5th, 2018. May 2019 ADV was 1,163 with average open interest at 5,343.

IMO 2020 - Marine Fuel 0.5% sulfur

The International Maritime Organization (IMO) is the United Nations (UN) agency responsible for ensuring a clean, safe secure and efficient global shipping industry.

IMO 2020 regulation caps sulfur emissions to 0.5% and will be enforced worldwide on January 1st, 2020 (current cap: 3.5%).

IMO 2020 is one of the most important fuel regulation changes ever implemented, with significant implications on the refining and shipping industries as well as marine transportation.

NYMEX listed new contracts against Platts Fuel Oil 0.5% reflecting the IMO 2020 regulation on December 9th, 2018 with first listed contract = April 2019.

CME registered the first-ever derivative trade for IMO 2020 compliant fuels end of January 2019.

Futures trend

Continued Extended Trading Hours (ETH) volume increases

22% of total CL volumes executed during ETH in May 2019.

CL ADV during ETH was 284 k in May 2019.

RBOB futures (RB) ETH ADV was 21k in May, up 28% YoY.

ULSD futures (HO) ETH ADV was 16k in May, up 15% YoY.

Brent futures (BZ) ADV reached 150k in May, up 47% YoY.

30% of BZ volume traded during Singapore time (8am-8pm)
CL-BZ spread

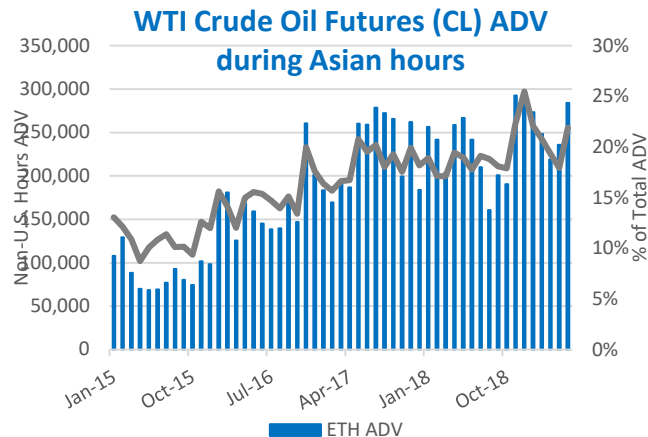
Listed on GLOBEX and available on most ISVs, WTI Futures (CL) vs Brent Futures (BZ) implied spreads is actively trading on NYMEX.

Eliminates price slippage, providing easier, more efficient execution for the spread.

“Buying the spread” refers to buying the WTI Futures and selling the Brent Futures

No spread ratio as both WTI Futures and Brent Futures have the same contract unit = 1,000 barrels

+ 1 lot CLBZ = +1 lot CL and -1 lot BZ



Options trend

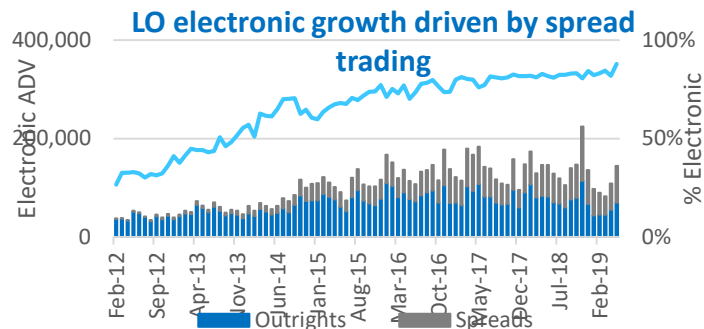
Electronic volumes growth

WTI Crude Oil Options (LO):

88% traded electronically in May 2019, a new record.

52% of on-screen volume executed via RFQ in May 2019.

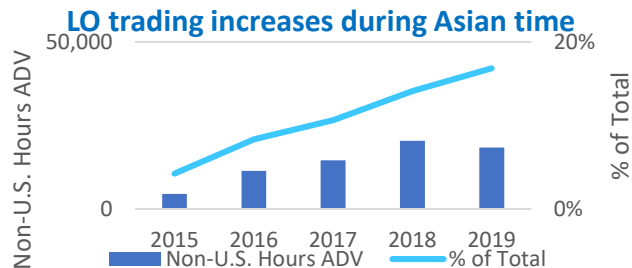
Over 80% of volume has traded on-screen for almost two years straight.



Increased trading during non-U.S. hours

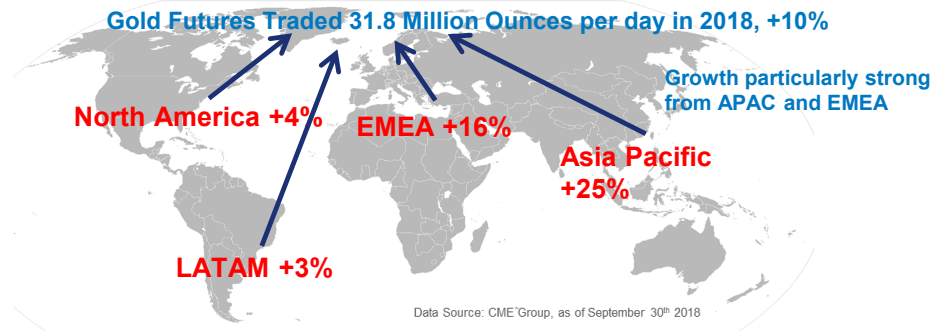
WTI Crude Oil Options (LO):

17% of total electronic LO volume executed during non-U.S. hours YTD in 2019.



Global Participation in COMEX Gold Futures

- Volumes from non-US regions accounted for 43% in 2017 and 44% in 2018.
- Asia-Pacific region in 2018, we have seen 25% growth vs 2017. Asia-Pacific based clients are trading ~5.4 million ounces of Gold per day
- Non-US hour liquidity is improving. During 2018, over 40% of COMEX Gold futures can trade between 8am-8pm Singapore time
- Deep liquidity even during Asia hours. During Q4'18, on average during 8am-8pm SIN time there was deeper liquidity to the 3rd level of the book than during regular US trading hours



Data Source: CME Group, as of December 31st 2018

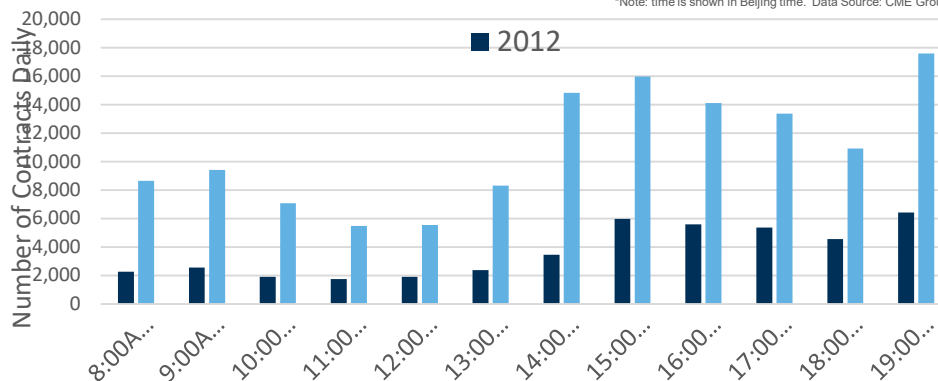
Global Shifts in Customer Dynamics & Liquidity:

Increasing Liquidity during Asian Time Zone

- Given COMEX's standing as the global benchmark as the deepest most transparent pool of liquidity, regional consumption growth is mirrored by regional growth in futures trading
- As a result, Asian customer participation in gold futures liquidity has dramatically grown over the years. More liquidity benefits all participants in the market.

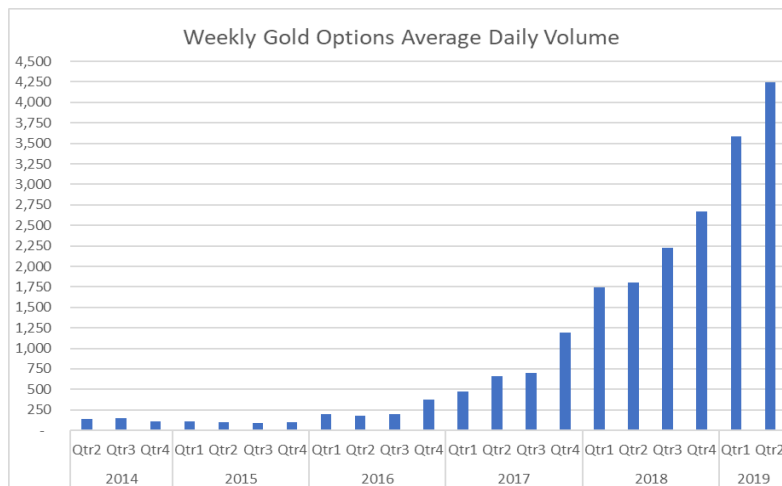
Gold Futures Liquidity during Asian Hours 2012 vs 2018 YTD (as of end June 2018)

*Note: time is shown in Beijing time. Data Source: CME Group



Weekly Expiry Gold Options

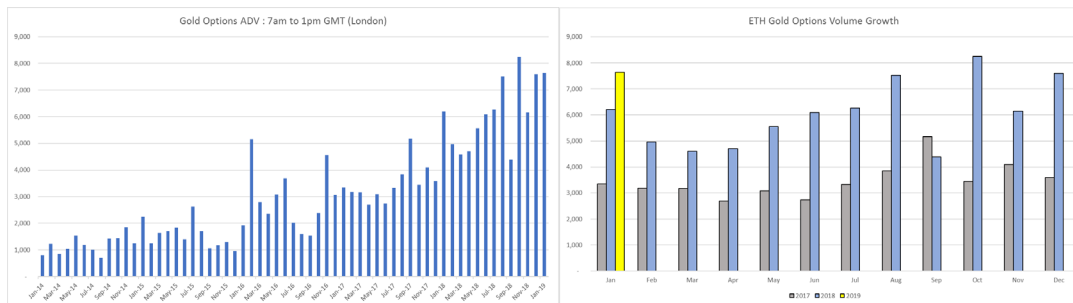
- Tremendous growth in our Friday Expiry Gold options (+92% in 2018)
- Investors and hedgers can use Friday expiries to express views around certain event risks which can move the gold price (e.g. non-farm payrolls)



Data Source: CME Group, as of December 31st 2018

Improved Gold Option Liquidity in Asia afternoon

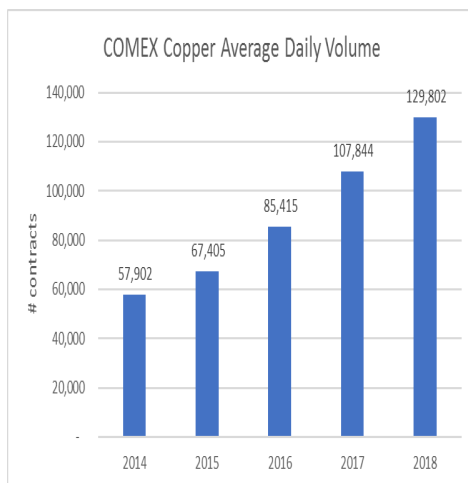
- Record Volumes in Gold options traded during the Asia afternoon time during Q1' 2019.
- During Asia hours in March 2019, average bid/offer for nearby ATM call (April'19) was 4.13 ticks (~0.35vol). This is an improvement from 8 ticks wide just one year ago
- During Asia hours, in March 2019, average top of book size for near ATM Call was 51 lots. This is an improvement from just 25 lots one year ago



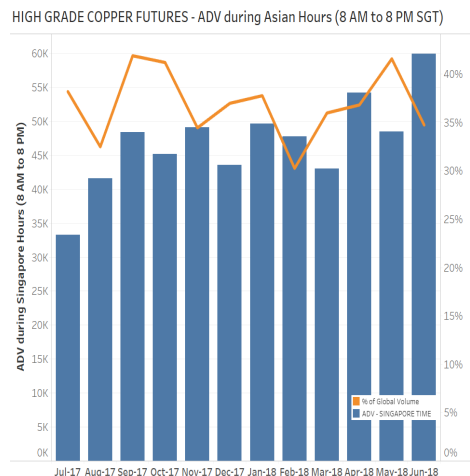
Data Source: CME Group, as January 24th 2019

Copper Futures: Volume Growth & Liquidity (Asian Hours)

Average Daily Volume in Copper Futures exceeded 1.45 mil mt in 2018 **35-40% of the average daily volume (ADV) is traded during Asia hours**

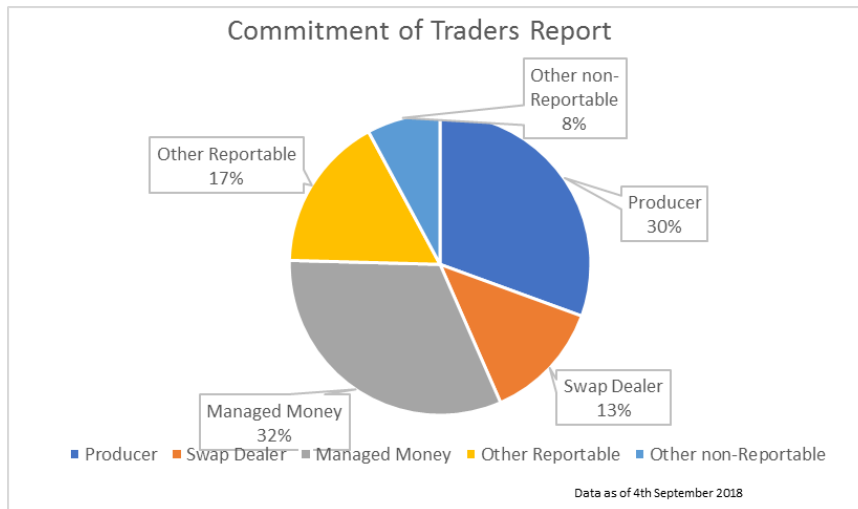


Data as of 30th April 2019 Data Source: CME Group



Diversity Of The Market Place

Who trades Copper Futures?



CFTC Commitment of Traders Report is also available on CME Group website:

<http://www.cmegroup.com/tools-information/quickstrike/commitment-of-traders-metals.html>

Copper Options: CME Group's Growing Presence

Liquidity is now very tight.

Liquidity Summary	Currently (US Hours)	Currently (APAC Hours)	Jan-June 2017
Average bid/ask in volatility	0.50%	1.00%	3.00%
Average bid/ask in premium (U.S. \$/lb)	0.002	0.004	0.018
Average top of book quantity (Lots)	75 – 100	40-50	5 – 10
Average Daily Volume	3,000+/day	3,000+/day	180/day
Average Open Interest	50,000+	50,000+	4,000

Huge Improvement in APAC hour liquidity

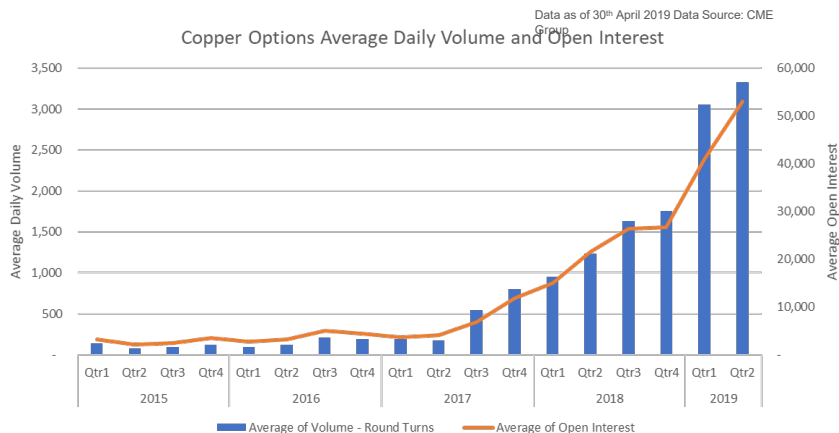
- APAC hour liquidity growth:- from 14 ticks to 7 ticks bid/ask
- APAC hour liquidity growth:- from 10 lots to 50 lots top of book spread
- APAC hour liquidity growth:- we have market makers quoting overnight and responding to RFQs

Data as of 30th April 2019 Data Source: CME Group

Copper Option Volume, OI + Liquidity Growth

Average Daily Volumes and OI broke several records in Q1'19

- Average daily volume has grown from 100 contracts in 2016 to 3,092 contracts in Q1, 2019.
- Set a daily volume record of 14,231 contracts on April 23rd.
- Open interest continues to build, hitting an all-time record of 67,510 lots on March 25.
- Multiple trade sizes available at CME:- block trade record of 10,500 lots



May a Record Breaking Month for Agricultural Products

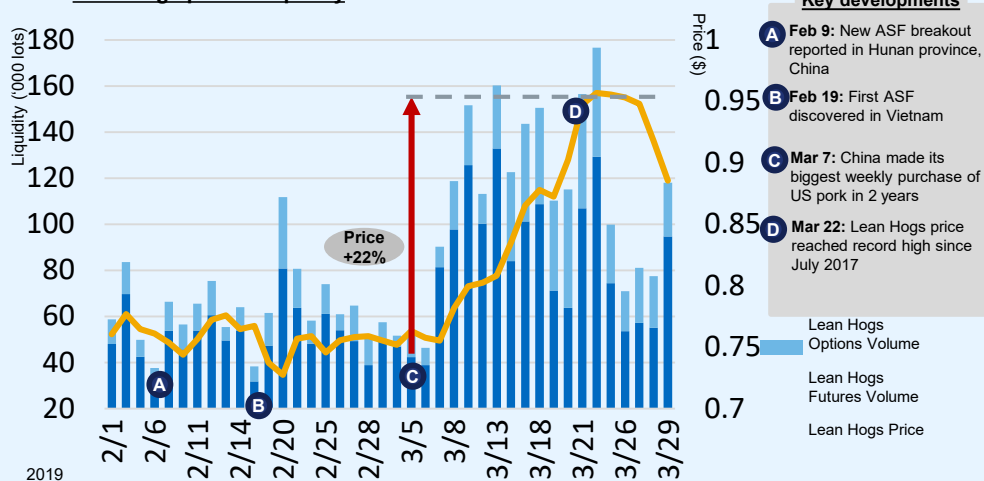
Grain & Oilseed, Lean Hogs Volatile due to Wet Weather and African Swine Fever woes

- Agricultural volume averaged 1.9 million contracts per day in May 2019, up 31% from May 2018
 - All-time daily volume record for agricultural futures and options of 3,228,143 contracts traded on May 29, surpassing the previous record of 3,197,646 set on June 19, 2018
 - Agricultural options also reached a record 901,106 contracts and corn options reached a record 582,364 contracts
 - Record Corn futures and options ADV, up 78% to 861,000 contracts
 - Soybean futures and options ADV rose 9% to 321,000 contracts
 - Hard Red Winter Wheat futures and options ADV increased 19% to 69,000 contracts
 - Livestock futures and options ADV grew 15% to 191,000 contracts
- Since the end of 2018, the open interest (OI) in CME Group agricultural futures and options has grown 30% to 9,353,259 contracts

The global venue to manage regional risks – A case study on the African Swine Fever (ASF) outbreaks in Asia

African Swine Fever (ASF) in Asia pushed up the Lean Hogs price in Mar 2019, and there has been an increased needs of price risk management

Lean Hogs price & liquidity

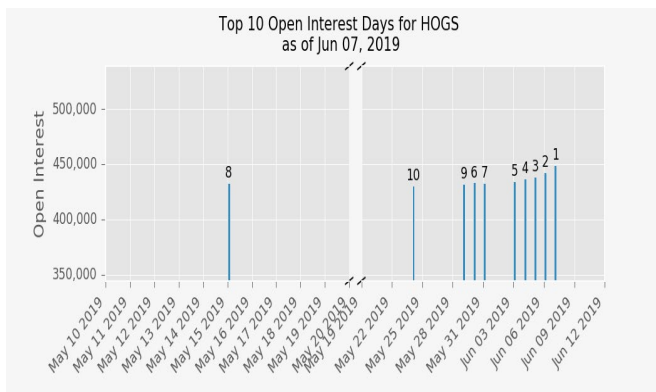


Source: Bloomberg, CME Group

Expanding Open Interest Records in Lean Hog Options

African Swine Fever Outbreaks in China, Hong Kong, Vietnam and North Korea fueling demand for options protection

Rank	Date	Product	F/O Indicator	Open Interest
1	2019-06-07	HOGS	OPTION	448,912
2	2019-06-06	HOGS	OPTION	442,882
3	2019-06-05	HOGS	OPTION	439,060
4	2019-06-04	HOGS	OPTION	436,852
5	2019-06-03	HOGS	OPTION	435,010
6	2019-05-30	HOGS	OPTION	433,436
7	2019-05-31	HOGS	OPTION	433,265
8	2019-05-15	HOGS	OPTION	432,689
9	2019-05-29	HOGS	OPTION	431,953
10	2019-05-24	HOGS	OPTION	430,472



Ag Option Product Suite

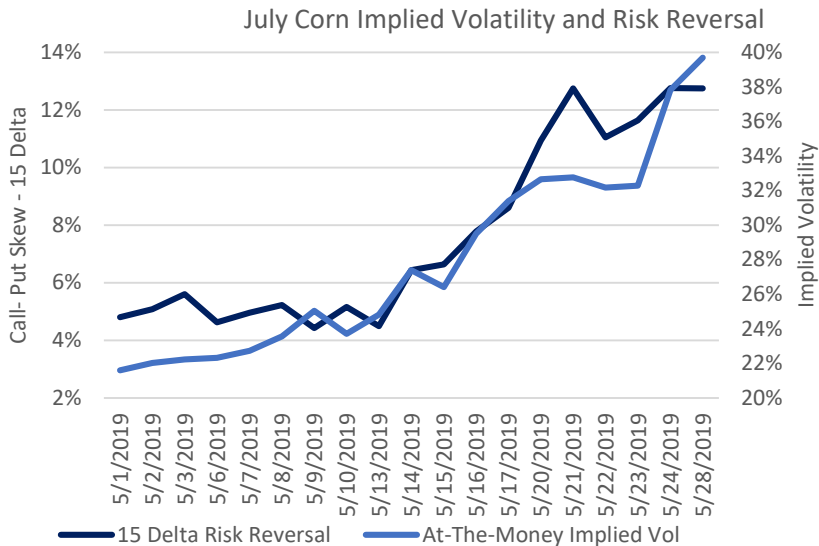
Monthly Highlights

- Given weather and trade concerns, corn implied volatility has seen a dramatic increase throughout the month leading to a record single day volume record on May 29th of 582,364 contracts
- Record Lean Hog short option open interest was established in May for producers based on CFTC Commitment of Traders report
- August Feeder Cattle Call Skew historically high

Option Product	May ADV	Year/Year % Change
CORN OPTION	217,249	90%
SOYBEAN OPTION	90,992	1%
CHI WHEAT OPTION	35,502	-18%
HOGS OPTION	15,348	125%
CATTLE OPTION	12,010	-14%
SOYBEAN MEAL OPTION	9,145	-44%
SOYBEAN OIL OPTION	6,518	26%
KC WHEAT OPTION	4,763	19%
MILK OPTION	1,875	5%
FEEDER CATTLE OPTION	2,120	86%

Corn Implied Volatility and Skew Dramatically Increase

- In May, the July Implied volatility went from a low of 22% to a high of 40%
- The 15 delta skew (call- put) went from calls trading 5% above puts to 13%



Tremendous Growth in ETH Liquidity for Grain & Oilseed Options, Record % in May

