



AGRICULTURE

How CME Group Agricultural Markets Operate

Nothing is more important to CME Group than the integrity of our markets. We use a variety of controls throughout the life of each trade, and those protections help to ensure customers have confidence in the market so they can manage their risk. We want to provide you with more information on how CME Group maintains the integrity of each market throughout the lifecycle of every trade.

BEFORE A TRADE OCCURS

CME Group has a system of risk controls that must be satisfied before a trader can enter a trade. These protections guard against a market participant entering unlimited quantities of orders or placing orders beyond their ability to execute and clear those orders.

CME Clearing and Credit Controls

CME Group and our clearing members use performance bonds, appropriate margin methodologies and additional risk management tools to protect our markets. These ensure that customers have the ability to execute the orders they place.

An order cannot be entered without passing pre-existing credit checks set by clearing firms. These ensure that, even for short-term traders who may exit their positions by the end of the trading session, financial requirements of the clearing member and the exchange are met. In addition, CME Group collects margin twice daily to ensure financial security. Both CME Group and the clearing member's objective is to ensure that the customer is fully able to meet their financial obligations no matter what the conditions in the market.

5 THINGS YOU NEED TO KNOW ABOUT CME GROUP MARKET INTEGRITY

- Integrity is the hallmark of all CME Group markets. To ensure that markets work – and work efficiently – CME Group uses a variety of controls throughout the life of each trade.
- Before a trade even occurs, a number of risk and credit controls must be satisfied.
- Orders are processed in the order they are received and are matched based on defined algorithms.
- While the order book changes as orders are entered, filled, modified and cancelled, customers are prohibited by exchange rules from putting bids or offers in the book that they do not intend to or are unable to execute.
- CME Group sends out market data to all customers at one time. All customers get the same information, though the speed at which they consume the market data is up to them.



PLACING A TRADE IN THE MARKET

Futures and options trading has transitioned from a mostly trading-pit-based system to a predominantly electronic market. Today, traders can enter their electronic orders manually – sometimes called “point and click” traders – or through automated systems such as auto-spreaders and defined algorithms. A subset of electronic trading is high-frequency trading. While there are a variety of different approaches to entering orders, it is important to remember that customers are prohibited by exchange rules from putting bids or offers in the book that they do not intend to execute or are unable to execute.

Regardless of how a trade is entered, there are controls on the actions that every trader can take. Credit controls and maximum order quantities are hard wired into the system to make the market function as efficiently as possible at all times. For example, credit controls ensure that a mandatory credit check is run before someone enters a trade on any CME Group exchange. Risk controls, another tool used by clearing firms, can block exposure at the executing firm or account level.

MARKET REGULATION

CME Group has a vested interest in preserving the integrity of its markets and accordingly employs substantial technological and human resources in its Market Regulation department to protect the market from anomalous, aberrant, abusive, and disruptive activity.

From the moment an order is placed, Market Regulation has a number of procedures and automated systems in place to monitor CME Group markets. These include staff oversight and engagement with market participants, automated systems that look for specific trading patterns, and established programs to perform complex data analysis. The Market Regulation team is also responsive to customer feedback and questions, and constantly monitors social media.

Over the years, Market Regulation has developed a highly granular and precise audit trail for electronic orders, trade, and market data information, which the company further enriches with outside reference data. Every order, modification, and cancellation, as well as every market data message is captured and maintained in this audit trail and is available for staff to monitor and analyze in real-time. At minimum, this audit trail information is time stamped at the millisecond level, with some systems capturing sub-millisecond increments.

Market Regulation analyzes the audit trail in conjunction with other pertinent data sources, such as records of position holders, using highly sophisticated tools, programs, and research methodologies. When anomalous activity or aberrations in market conditions are identified, comprehensive reviews are performed and documented. If a review concludes that disciplinary action is warranted, Market Regulation pursues those actions through an established enforcement program.

To ensure Market Regulation's tools, techniques, programs other resources evolve with the market, CME Group continually invests in and develops these important facets of the company.



MARKET PROTECTION

In addition to our Market Regulation team monitoring the markets and using automated trade data, a wide range of automated market protections are in place in the market to make it as efficient as possible. Credit controls, discussed earlier in this piece, are an example of pre-trade market protections. During the trading session, a number of other important tools are also at work in agricultural markets:

- Daily Price Limits are measured off of the prior day's settlement price and restrict a market from moving above or below a predetermined price limit level during a given trading session. Once a futures price has moved higher by its daily limit, there can be no trading at any higher price until the next day of trading. Conversely, once a futures price has declined by its daily limit, there can be no trading at any lower price until the next day of trading. Daily price limits expand the next trading session, and are typically only used in markets where circuit breakers are not currently in place.
- Stop Logic is designed to prevent an extreme price deviation from fair value due to cascading stop orders in the order book. If elected stop orders would result in prices beyond pre-defined thresholds, the market automatically enters a brief reserved state for a predetermined time period, ranging from 5-20 seconds. During this period, no orders are matched but new orders other than market orders may be entered and orders may be modified and cancelled. This allows for the market to pause and liquidity to replenish, particularly in times of market stress.
- Velocity Logic builds on Stop Logic but is designed to guard against an extreme price deviation from fair value due to any order type, not only stop orders. It uses a combination of price and time – the market can move only so far so fast before a Velocity Logic event is triggered. Once an event is triggered the market enters a reserve state similar to Stop Logic.



THE CENTRAL LIMIT ORDER BOOK

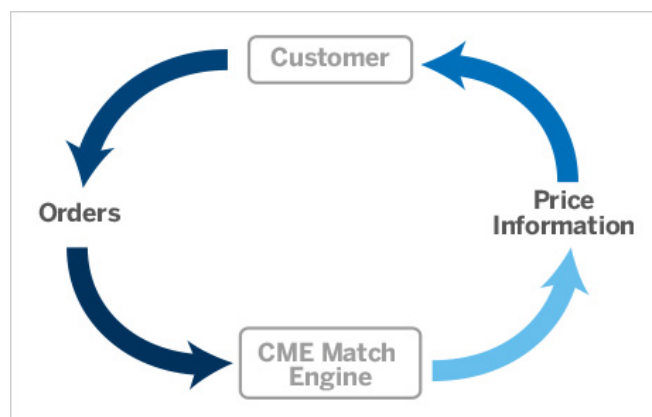
As orders are entered, bids and offers are disseminated through market data and in a central-limit order book for each market. For example, in agricultural products, this data is disseminated for 10 levels of the order book for grains and oilseeds and five levels of the order book for livestock and dairy products. In addition, in 2017, CME Group will begin publishing Market by Order data, which will provide greater detail on all orders at all levels of the book.

Executing Orders

Customers can enter orders into Globex using a range of front ends and order-entry methodologies. Where speed of execution is a high priority, customers may use low-latency systems and possibly co-location. Others may find that calling their broker who then places the order meets their needs.

Customers have a range of options on the speed at which they place orders and how quickly they receive market data from the exchange. These alternatives impact both order entry and market data dissemination.

- Only once an order reaches the CME gateway does CME control the speed of order processing within its systems. Within the CME systems, no customer has a latency advantage versus any other customer. See the following section on “Matching Trades for Execution.”
- CME Group distributes all market data to the public at the same time, and it is equally accessible by all customers.



It is important to note that the order book locks when an order reaches the engine. Until that order is executed, no other order can change the composition of the book. Any unfilled bids or offers will be matched to the incoming order and the incoming order will be filled as fully as possible based on the composition of the order book.

In looking to execute large orders, it's important to remember that while the book is locked during the execution of a given order, it unlocks between match events. This has implications for how customers place large orders. Let's consider a customer who wants to execute a 500-contract buy order. If he places a single order for 500 contracts at a price which will sweep the 500 contracts that are offered in the book, the book will lock and he will get filled on his order. Alternatively, if the customer places five different 100-contract orders, it is a possibility that other orders may get between those orders and alter the book.

Suppose a 200-contract cancellation gets between the first and second of those five, 100-contract buy orders.

- The first buy would be filled in full as the offer in the book is 500 deep, reducing the book to 400 offered.
- The cancellation would then reduce the book to 200 offered.
- The second buy order would be filled reducing the book to 100 offered.
- The third buy would be filled reducing the book to zero.
- The fourth and fifth buy orders would not be filled.

MATCHING TRADES FOR EXECUTION

Orders flow sequentially through the match engine with no ability for one order to move ahead of another order. They are processed in the order received by the engine – whether they are new orders, modifications or cancellations. This means that once in the queue, one customer's cancellation cannot get in front of another's earlier buy or sell order to prevent that buyer or seller from lifting an existing order in the book.

Matching Algorithms

In pit trading, the trader determined who would get filled on an order. In an electronic market, an allocation algorithm is used to determine who gets filled and in what amounts. CME Group constantly reviews how its algorithms are performing, and uses two different allocation algorithms in our agricultural products.

FIFO (First In, First Out)

The FIFO algorithm uses price and time as the only criteria for filling an order. In this algorithm, all orders at the same price level are filled according to time priority; the first order at a price level is the first order matched. This gives an advantage to limit orders that have been in the order book at that price level the longest time. FIFO is currently used for livestock outright futures and EU Wheat futures.

Split FIFO and Pro-Rata (K algorithm)

The Split FIFO/Pro-Rata algorithm is a hybrid which integrates a percent-based allocation on both a FIFO and Pro-Rata formula to the resting order book. This algorithm has been developed with the flexibility to calibrate the level of tradable quantity that is allocated on a FIFO and Pro-Rata basis (A set percentage FIFO, and a set percentage Pro-Rata).

This algorithm ensures broader participation in the market. Currently set at 40% FIFO, this algorithm is used for grain futures (excluding EU Wheat) and spreads and livestock spreads.

The Role of Speed and Latency

Given that futures and options markets are now almost entirely electronic, speed and latency have become important issues for market participants of all kinds. For market makers, who are constantly adjusting bids and offers as the market moves, low latency can be a top priority so that stale bids and offers are removed from the order book as the market moves to different price levels. For others, who have longer term trading or risk management profiles, speed might be less of a priority than getting a set price.

Decisions such as what type of network connections, routing hardware, front-end order-entry and quote systems are being used all impact latency. Additionally, the physical proximity to the CME match engine impacts latency. A customer geographically further away, all else equal, will have greater latency than one close to the trading engine.

Co-Location

As part of its efforts to deliver access to low-cost connectivity services and support, CME Group allows every customer to rent equidistant connectivity to CME Globex through the exchange, major FCMs or third-party vendors. Costs are commensurate with the capacity needed (number of servers) and range from high-capacity multiple-rack installations to affordable virtual servers for cost-conscious customers.

The reasons for providing this service date back to when electronic markets started gaining significance, as CME Group observed customers buying and renting space as close to its match engine as possible to minimize latency. This gave an advantage to those who were first to obtain the closest real estate. In response, CME Group established a co-location facility so that each customer has a level playing field of access.

Messaging

In recent years, CME Group adopted the CME Globex Messaging Efficiency Program to encourage responsible messaging practices – making sure there are not too many messages taking up bandwidth compared to the volume of trade in the market.

Each product has a benchmark message-to-fill ratio against which the total messages, weighted with the below factors for each message type, are compared. For example, in the case of Corn, the message-to-fill ratio is 50:1, while in the case of Live Cattle it is 20:1. In the case of Live Cattle, this means that for every 20 messages, CME Group expects one fill. If an executing firm's daily message-to-fill ratio exceeds the benchmark, CME Group levies a surcharge of \$1,000 per product group, per day.

Order Type	Factor
New Order	0
Order Modification	1
Order Cancellation	3
FAK/FOK Order	3

It is important that messaging programs provide guidelines without excessively constraining participants and therefore impacting liquidity – just as if pit traders had been told they could only bid or offer a set number of times before they had to buy or sell. For example, hedgers put in an order and expect it to be filled. They may need to move or modify their order if the market conditions change, but not that frequently. Their message-to-fill ratio is likely quite low. On the other hand, the messaging also has to work for the perspective of a market maker who typically will layer the book – that is have bids and offers at multiple levels above and below the market. As the market moves, market makers are constantly moving orders to frame the current market price and to manage the positions they are carrying. To do this effectively, their message-to-fill ratio can be much higher than that of the average hedger, and it is especially high in volatile markets.

CONTINUAL EVOLUTION

Over the past decade, CME Group markets have evolved significantly as customers have shifted their business from the pits to the screen. This has created new market dynamics and challenges for both traders and exchanges. CME Group continues to evolve its platform and rules with the goal of ensuring its markets retain the highest integrity and are the most effective for meeting customers' risk management needs.

**Should you have additional questions,
please contact us at agriculture@cmegroup.com.**



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Futures trading is not suitable for all investors, and involves the risk of loss. Futures are a leveraged investment, and because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for a futures position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles. And only a portion of those funds should be devoted to any one trade because they cannot expect to profit on every trade.

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