Publication date : 22 November 2019 - Effective date: 25 November 2019

Euronext Derivatives Markets: Trading Procedures

Annexe Three – Trading Algorithms

In Continuous trading on Euronext Trading Platform uses two **matching policies** that define the matching algorithm used i.e.:

- Price Time Priority
- Price Pro Rata

Each Contract is assigned a single policy. A policy provides priority and volume allocation rules, for the existing orders, in case of a trade.

Price Time Priority:
Matching policy in which in order to choose the orders to be allocated, system uses first the best price then within this price level, the time ordered by priority (oldest first, newest last). This policy is also named First In First Out (FIFO).

Price Pro Rata (PPR):
Matching policy in which if there are several orders at the last price level reached by the incoming order, equal priority is given to every order at this price and incoming volume is divided among these orders in proportion to their resting volume. Otherwise priority is given to orders at the best price (highest for a bid, lowest for an offer).

For resting orders with the same price, a ratio is calculated by dividing the order quantity of each resting order at the best price by the total order quantity at that price. The volume of an incoming order is divided over the resting orders by multiplying the ratio of the resting order by the volume of the incoming order; this is called the "pro-rated volume" of a resting order.

In a first step the incoming order is executed against the calculated pro-rated volume of the resting orders. Resting orders with the highest pro-rated volume are executed first. When there are resting orders with equal pro-rated volume, resting orders are executed based on time of order entry (oldest first).

If the calculated pro-rated volume is greater than the minimal pro-rata threshold, which in this case is set to 1[1], the quantity is rounded down to the nearest integer. If the calculated pro-rated volume is less than the minimal pro-rata threshold, which in this example is equal to 1, the quantity is rounded up to 1 lot.
For example: if the unrounded allocation of a resting order is 2.8 lots, the rounded allocation will be set at 2 lots. If the unrounded allocation of a resting order is 0.3 lots, the rounded allocation will be set at 1 lot.

In case the incoming order has not been fully executed due to rounding effects of the pro-rated volume, the residual incoming order quantity is distributed over the remaining resting orders by recalculating the pro-rated

[1] The minimal pro-rata threshold parameter that is variable and configured per contract

volume per resting order. In this second step the original ratio of the first step is applied and the same priority rules are applied (resting orders with the highest pro-rated volume are executed first; when there are resting orders with equal pro-rated volume, resting orders are executed based on time of order entry).

The pro-rata algorithm is only applied to resting orders. For aggressive orders, priority is still given on the basis of time.

Example (in this example the minimal pro-rate threshold is equal to 1):
An order book is comprised of four resting orders at an Offer price of 100 for a total of 280 lots:s

	Bid Quantity	Bid Price	Offer Price	Offer Quantity	Timestamp
			100	50	10:00:00
			100	150	10:00:01
			100	40	10:00:02
			100	40	10:00:03
Total				280	

An order is entered at a Bid price of 100 for a total of 250 lots:

Order #	Bid Quantity	Bid Price	Offer Price	Offer Quantity	Timestamp
INCOMING	250	100	100	50	10:00:00
			100	150	10:00:01
			100	40	10:00:02
			100	40	10:00:03
Total	250			280	

For the incoming Bid order pro-rata will result in the following fills:

Offer Price	Offer Quantity	Time stamp	Ratio	Pro-rated volume	Rounded pro-rated volume	Residual pro-rated volume	Allocated residual pro-rated volume	Fill
100	50	10:00:00	18% (50/280)	44.6 (18% x 250)	44	0.5 ((250-247) x 18%)	1	44+1=45
100	150	10:00:01	54% (150/280)	133.9 (54% x 250)	133	1.6 ((250-247) x 54%)	1	133+1=134
100	40	10:00:02	14% (40/280)	35.7 (14% x 250)	35	0.4 ((250-247) x 14%)	1	35+1=36
100	40	10:00:03	14% (40/280)	35.7 (14% x 250)	35	0.4 ((250-247) x 14%)	0	35
Total	280				247		3	250

Following the execution, the order book is as follows, with allocation ratios amended:

Order #	Bid Qty	Bid Price	Offer Price	Offer Qty	Timestamp	Ratio
			100	5	10:00:00	16.7%
			100	16	10:00:01	53.3%
			100	4	10:00:02	13.3%
			100	5	10:00:03	16.7%