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# Implied Pricing

The implied pricing algorithm enhances the Montréal Exchange's market quality and liquidity by adding a new price discovery dimension. This algorithm is limited to individual BAX contracts, CGZ, CGF, LGB, the options market (equity, ETF, currency and index options), and all strategies. The price/time algorithm (FIFO) is respected at all times within the context of the implied pricing market model whereby all regular orders (non-implied) will always have price/time priority over implied orders.

Implied pricing is disseminated through HSVF (High Speed Vendor Feed) and OBF Data Feeds for independent software vendors and data vendors that have developed for the functionality. Contact your vendor for more information.

Should you require technical assistance or wish to carry out testing in our development environment, do not hesitate in contacting our Technical Help Desk at 1-877-588-8489 or by e-mail at **samsupport@tmx.com**.

## Definitions

**Regular orders** – Orders routed by approved participants to the Montréal Exchange's trading system.

**Implied orders** – Orders generated by the implied pricing algorithm (using regular orders) and registered in the order book by the trading engine.

**Strategy** – An instrument consisting of two or more legs.

## Establishing implied prices

An implied order is an order generated synthetically from two outright regular orders that are already registered in the order book. These two orders could be constituted from either two individual legs or one individual leg and a strategy involving that leg. Two types of implied orders exist:

**Implied "in":** Implied "in" orders are derived from regular posted orders on individual legs. Implied "in" orders create a synthetic strategy market available for trading to all market participants.

Suppose the following regular markets on individual legs:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| ABC 150417C5.00 | 11 | 8.20 | 8.80 | 26 |
| ABC 150417C5.20 | 16 | 7.65 | 8.05 | 75 |

The implied "in" strategy derived from the outright posted markets would be

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| ABC 5.00/ABC 5.20 implied spread | 11 | 0.15 | 1.15 | 16 |

The implied market for the ABC 5.00/ABC 5.20 strategy is a 0.15 bid for 11 contracts and a 1.15 offer for 16 contracts. It is important to note that the available tradable quantity for an implied strategy generated by the system is the smallest available quantity on each leg of the spread. For example, the offer for 16 contracts on the ABC 5.00/ABC 5.20 implied spread is the smallest available quantity on the offer for ABC 150417C5.00 (26 contracts) and on the bid for ABC 150417C5.20 (16 contracts).

**Implied "out":** Implied "out" orders are derived from a combination of an existing regular spread order and an existing outright order in one of the underlying individual legs. This type of order creates a synthetic market on the other underlying leg.

Suppose the following markets on the ABC 5.00/ABC 5.20 spread and on leg ABC 150417C5.00:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **ABC 5.00/ABC 5.20 spread** | 15 | 0.15 | 1.15 | 100 |
| **ABC 150417C5.00** | 11 | 8.20 | 8.80 | 26 |

The implied "out" individual leg derived from these orders would be:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **Implied ABC 150417C5.20** | 11 | 7.05 | 8.65 | 26 |

As can be seen, there are three components in an implied order: each of the two individual legs (comprising the strategy) and the strategy on the two legs combined. In order to create an implied strategy (spread) order or an implied "leg" order, two of the three components must be available.

## Example of an implied order worked by the trading engine

Posted market:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **ABC 150417C5.00** | 11 | 8.20 | 8.80 | 26 |
| **ABC 150417C5.20** | 16 | 7.65 | 8.05 | 75 |

Implied strategy derived posted markets on individual contracts:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **ABC 5.00/ABC 5.20 implied spread** | 11 | 0.15 | 1.15 | 16 |

A client would like to sell the ABC 5.00/ABC 5.20 implied spread at 0.25 for 15 contracts. The client wants to sell ABC 150417C5.00 and to buy ABC 150417C5.20 at a 0.25 price differential. The client enters the order (a regular order) in the order book, which produces the following market:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **ABC 5.00/ABC 5.20 spread** | 11 | 0.15 | 0.25 | 15 |

Note: The buy order of 0.05 for 11 contracts is an implied order (derived from regular orders on individual legs) whereas the sell order of 0.25 for 15 contracts is a regular order. The two posted orders are executable and tradable.

The trading engine takes the client spread order (0.25 offer for 15 contracts) and automatically "works" the order using individual regular orders displayed in the book. Thus, the trading engine through the implied pricing algorithm will produce for the client a tradable offer of 15 ABC 150417C5.00 contracts at 8.30 in order to buy simultaneously (once the 15 ABC 150417C5.00 contracts are sold at 8.30) 15 of the 75 ABC 150417C5.20 contracts displayed (regular order) at 8.05 (for ABC 5.00/ABC 5.20 spread at 0.25). The trading engine will also simultaneously produce a 7.95 bid for 11 contracts ABC 150417C5.20 to simultaneously sell (if the 7.95 bid is filled) 11 contracts of ABC 150417C5.00 at 8.20.The order book will show the following orders:

| SERIES | Qty | Bid | Ask | Qty |
|---|---|---|---|---|
| **ABC 150417C5.00** | 11 | 8.20 | 8.30 | 15 |
| **ABC 150417C5.20** | 11 | 7.95 | 8.05 | 75 |

Note: The sell order of 15 contracts at 8.30 is an implied order (derived from regular orders in the ABC 5.00/ABC 5.20 spread of 0.25 for 15 contracts and the offer on the individual leg of ABC 150417C5.20). The buy order of 11 contracts at 7.95 in ABC 150417C5.20 is an implied order (derived from regular orders in the ABC 5.00/ ABC 5.20 spread of 0.25 for 15 contracts and the bid on the individual leg of ABC 150417C5.00.

As long as the offer for 75 ABC 150417C5.20 contracts at 8.05 is displayed in the order book, the implied sell order for 15 ABC 150417C5.00 contracts at 8.30 will be maintained by the trading engine for the sell execution of the ABC 5.00/ABC 5.20 spread at 0.25. Once a quantity is executed by the trading engine, the total volume of the regular order (ABC 5.00/ABC 5.20 spread market in this case) is adjusted accordingly (i.e. if the trading engine sells 10 ABC 150417C5.00 contracts at 8.30 and simultaneously buys 10 ABC 150417C5.20 contracts at 8.05, the engine adjusts the spread quantity to a remainder of 5 contracts pending at 0.25 while confirming the partial execution of 10 contracts to the client). The same principle applies to the 7.95 bid for 11 ABC 150417C5.20 contracts which is implied off of the 8.20 bid for 11 contracts of ABC 150417C5.00.

## Operational process

1. Implied pricing was developed for protocols supported by the Exchange: SAIL (SOLA Access Information Language) and FIX (Financial Information eXchange).
2. Implied orders are disseminated through the HSVF and OBF Data Feeds for independent software vendors and data vendors that have developed for the functionality.
3. Post-trade dissemination through the HSVF and OBF Data Feeds is supported by the Exchange and available to approved participants and data vendors whereby trade data of individual legs resulting from implied orders is distinctly marked.
4. Only regular orders count for the end-of-day settlement process. However, trades resulting from both regular and implied orders will be considered for required volume computation.
5. For trading purposes, each instrument maintains its current price fluctuation (as determined in the contract specifications).
6. Erroneous trades involving transactions resulting from implied orders will be addressed according to the Procedures for the Cancellation of Trades.

# For more information:

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