Neonet

Measuring best execution - there is more than meets the eye

A market micro structure view on Best Execution

Introduction

It is essential for fund managers and investors to focus on and understand the micro level benchmarks for measuring best execution. As a consequence of Macro Level Transaction Cost Analysis (TCA) already being well established within the buy side community, the true challenges in micro execution may sometimes be overlooked. We argue that hit-rate might be the key missing benchmark.

The role of the Smart Order Router (SOR)

An algorithm (or an investor) decides when to trade and how much. At its simplest, the result is either passively posting or aggressively taking volume. These two tasks are the main focus of a Smart Order Router (SOR). The SOR makes sure passive posting is done where it is most likely to get executed. When trading aggressively, it tries to capture as much as possible of what you see of the consolidated order book.

What you see - the definition

By 'what you see' we refer to what is visible in the consolidated (normalized) order book at the time of order entry, i.e. the sum of all the volume quoted on all lit execution venues, aggregated by price level. Shown in the chart below:

Figure 1
Consolidated
Order Book

Primary Market			
Bid Volume	Bid	Ask	Ask Volume
5000	99.00	100.00	4000
4100	98.50	100.50	3944

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Alternative Market			
Bid Volume	Bid	Ask	Ask Volume
1000	99.50	99.75	522
800	99.00	100.00	3211

=

Consolidated			
Bid Volume	Bid	Ask	Ask Volume
1000	99.50	99.75	522
5800	99.00	100.00	7211
4100	98.50	100.50	3944

Challenges with consolidated order books

Execution venues and investors are located in different geographic locations. The result is that quotes from the market reach the investors at different points in time, depending on where the investor is located. The quote consolidation is preferably done as close as possible to the end investor's terminal. This is done in order not to add additional latency by collecting market data centrally and then distributing it out to an investor.

The Smart Order Router works on the conditions set by location, latency and deviation of latency to execution venues. If, for example, market data, due to geographical distance, is 10ms old when it reaches the SOR and it takes another 10ms to send an order to the execution venue, then the quotes at the execution venue needs to be relative stable for at least 10ms. This in order for the SOR to make well-informed decisions and get a result that is possible to benchmark.

In order to minimize 'information leakage', orders need to be timed correctly and hit all execution venues simultaneously, before other market participants can react on the orders. Managed latency and stable deviation, rather than low latency, are the main underlying - success factors to get a high hit-rate.

The missing buy-side benchmark: strict hit-rate

We define the strict hit-rate benchmark. If we assume 1,000 shares at the price of 100, distributed over different execution venues and we send an order to buy 1,000@100 and we get all of it, we will have a hit-rate of 100%. Anything less is considered a failure from a strict hit-rate perspective.

A low hit-rate indicates a lost opportunity to trade. Even worse, it will be signaling to other market participants that you trade without getting full result, i.e. unnecessary information leakage. This cannot be easily detected by common benchmarks, such as trading within European Best Bid and Offer (EBBO) or Spread Capture (SC). For overall benchmarks such as Arrival and VWAP it is impossible, at least on individual orders, to detect a low hit-rate.

Getting more than 100% - volume based hit-rate

Sophisticated Smart Order Routers access all available liquidity including dark pools, even for aggressive limit orders. With SOR orders using dark pools, algorithms that are sending more volume aggressively than what is visible in the lit consolidated order-book can get a volume based hit-rate higher than 100%. Dark is not only for blocks!

The perfect hit-rate benchmark

To account for the fact that investors are based in different geographic locations, with corresponding latencies, we have to find a way to measure hit-rate in in a neutral and absolute way. To achieve the perfect benchmark, market data should be time-stamped directly at the execution venue with sub microseconds accuracy. This creates a proper benchmark eliminating the latency factor and ignoring the fact that execution venues are located in different geographic locations.

Price improvement

A hidden order (dark or iceberg) adds volume to the market: a dark hit often comes with a price improvement of 50% of the spread since it is traded at mid-price. To quantify this value, we look at all aggressive orders capturing exactly 100% of the volume and compare them with the order book snapshot before order entry. The graph below shows the percentage of orders with price improvement:
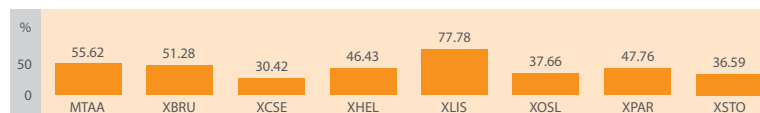

Figure 2
Orders with
Price Improvement
Source: Neonet

As you can see, the percentage of the orders with a price improvement is substantial. However, by how much? Measured in bps of total order value, this data is shown below:
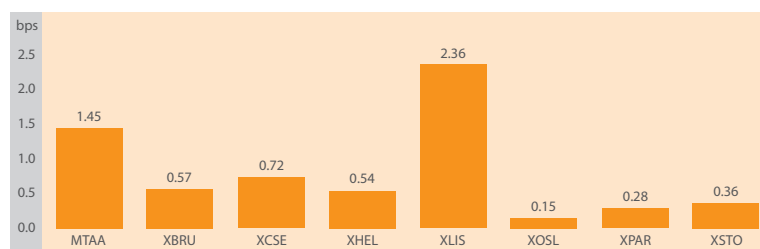

Figure 3
Price Improvement
Value

Source: Neonet

Trading patterns can be widely different. Still what can be concluded is that the value of a high-hit rate and the added value of using dark are substantial and can be measured in basis points of the total order value. This is true even for an aggressive slice of a VWAP order.

Summary

Access to liquidity is essential for an algorithm. It is the SOR that makes sure that an algorithm accesses the different execution venues cleverly to capture as much liquidity as possible, in order to achieve true best execution. You should expect to have a strict hit-rate, somewhere in the area of 90% or more and a volume-based hit-rate that is close to or more than 100%. The result varies from algorithm to algorithm, often explained by the urgency of the algorithm.

Strict hit-rate is an easy benchmark to measure. Just comparing a snapshot of what is visible when the order is sent with the traded result. This is how you should measure best execution!

A high hit-rate indicates a correctly managed market access infrastructure and an SOR that captures volume without leaking information. Utilizing dark pools will bring the additional benefit of volume and price improvement. This adds to the total performance of the algorithm

To get what you see - is simply not good enough!

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