

**Q4-2017 FIF Supplemental Retail Execution Quality Statistics
Citadel Securities LLC**

Retail Execution Quality Statistics – Wholesale Market Maker Perspective

The FIF Rule 605/606 Working Group has been working on improving access to execution quality statistics for the retail community. In an effort to provide investors with more useful disclosures about order routing practices, FIF members have voluntarily agreed to provide statistics on retail execution quality as defined below. While many quantitative and qualitative factors go into determining routing decisions, the following statistics are intended to provide some additional perspective on the execution quality provided to retail investors beyond the currently available Rule 605 and Rule 606 statistics.

Please note that when evaluating this data a number of factors such as a firm’s client base, order flow mix, and business model should be taken into consideration.*

S&P 500 Stocks

Order Size Range (Shares)	Average Order Size (Shares)	Shares Executed at Market Quote or Better (%)	Price Improvement (%)	Average Savings per Order (\$)	Average Execution Speed (Seconds)
1-99	24	99.94%	99.66%	\$0.38	0.00
100-499	196	99.79%	94.87%	\$2.99	0.00
500-1,999	852	99.00%	93.16%	\$8.76	0.00
2,000-4,999	2,723	96.12%	87.49%	\$13.06	0.01
5,000-9,999	6,229	92.92%	82.97%	\$16.18	0.01

Other Exchange-Listed Stocks

Order Size Range (Shares)	Average Order Size (Shares)	Shares Executed at Market Quote or Better (%)	Price Improvement (%)	Average Savings per Order (\$)	Average Execution Speed (Seconds)
1-99	25	99.95%	98.79%	\$0.41	0.01
100-499	211	99.64%	93.52%	\$3.63	0.00
500-1,999	899	97.97%	91.21%	\$9.77	0.02
2,000-4,999	2,741	93.56%	83.89%	\$10.94	0.05
5,000-9,999	6,145	89.28%	78.49%	\$5.52	0.09

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Comments

*These statistics are produced on a best efforts basis and provided "as is" without warranty of any type.

Definitions:

- **Order Size Range (Shares)** – Orders have been grouped into different order size ranges as follows 1 – 99 shares, 100 – 499 shares, 500 – 1,999 shares, 2,000 – 4,999 shares and 5,000 – 9,999 shares.
- **Average Order Size (Shares):** Measured as the average order size within each order size range.
- **Shares Executed at Market Quote or Better (%):** Measured as the percentage of shares that receive price improvement (an execution priced better than the National Best Bid/Offer at the time of order receipt), *plus* the percentage of shares executed at the National Best Bid/Offer at the time of order receipt.
- **Price Improvement (%):** Measured as the percentage of shares that receive price improvement. Price improvement is defined as an execution priced better than the National Best Bid/Offer at the time of order receipt.
- **Average Savings per Order (\$):** Measured as the net notional dollar value of price improvement per share multiplied by the number of executed shares given to clients divided by the total number of executed orders. Specifically, this metric is calculated as: (Net price improvement per Share * Executed Shares) / Executed Orders.
- **Average Execution Speed (Seconds):** Measured as the average time elapsed from the order receipt time to the execution time for the full share quantity of the order.¹

FAQs

1. What is a wholesale market maker?

A wholesale market maker is a firm that stands ready to buy and sell a particular stock on a regular and continuous basis at a publicly quoted price.

2. What orders are covered by these statistics?

Only standard market orders that range in size from 1 – 9,999 shares are included in these statistics. Rule 605 order exemptions are applied to these statistics with the exception of Odd-Lot order exclusions. Odd-Lot orders are included in these statistics.

¹ Note: Order receipt time is defined based on existing FINRA regulations (See FINRA Rule 7440). Execution time is based on the time executions are recorded by a firm's order management system.

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3. The definitions of many of the statistics provided refer to the National Best Bid /Offer (NBBO). What is the National Best Bid/Offer (NBBO)?

The National Best Bid/Offer (NBBO) represents the best price across the various national stock exchanges for a security at a point in time during a given trading day. The Bid represents the price at which someone can sell a security while the Offer represents the price at which someone can purchase a security. The National Best Bid/Offer fluctuates throughout the day as buyers and sellers move in and out of a given stock.

4. Why are there different rows based on order size ranges?

Different rows based on order size ranges provide the opportunity for a better comparison when analyzing execution quality. The size of your order may impact the execution you receive. For example, a 200-share order may be handled differently than an 8,000-share order when considering the available quantity at the NBBO.

5. What does average order size tell me?

Average order size allows you to understand how your order compares to others in that size bucket. Average order size is also an indication of the mix of client order flow seen by a particular firm. Differences in average order size between firms should be taken into account when comparing the execution quality statistics across firms. For example, in the 2,000-4,999 order size range, an average order size of 2,500 shares for one firm, versus 4,800 shares for another firm, may account for differences in other execution quality statistics.

6. What does the “Shares Executed at Market Quote or Better” column represent?

This metric is also commonly referred to as “At or Better” and represents the percentage of shares that upon order receipt execute at the NBBO or better. It combines the shares that executed at the quote as well as the shares that were price improved and executed within the quote.

7. What does the “Price Improvement” column tell me?

Price improvement occurs when you receive an execution at a price lower than the best offer for a buy order, and a price higher than a best bid for a sell order (i.e., better than the NBBO). In the price improvement column, this value is represented as the percentage of shares in market orders executed with price improvement. Receiving price improvement is a positive outcome for retail investors.

8. What does the “Average Saving per Order” column tell me?

Average savings per order quantifies real cost savings passed back to retail clients received in the form of price improvement. When normalized on an order basis, this dollar figure represents the savings received on an average order within the order size range.

9. In some cases the average saving per order may be negative. Why does this situation occur?

Average savings per order may be negative as a result of market orders entered in quantities that are larger than the available size at the NBBO at the time of order receipt. Such orders, especially in less active securities, may require executions at multiple price levels to fill the entire order. While the individual trade execution(s) received on these orders may be in line or better than the market at the time of execution, the above statistics compare each execution against the NBBO *prior* to the

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order entering the market. In turn, this method of evaluation can result in valid execution prices appearing to have negative savings.

Let us look at an example: A customer places a market order to buy 1,000 shares of XYZ. The national best offer price for XYZ is \$21.10 and there are 500 shares available at this price. The customer receives an execution on 500 shares at the national best offer price of \$21.10. The new, national best offer price for XYZ is now \$21.15 and there are 2,000 shares available at this price. The customer receives an execution on the remaining 500 shares at a price of \$21.14, better than the national best offer price. Since each execution is compared to the NBBO prior to the order route time regardless of the size available, the 500 shares that were executed at a price of \$21.14 is compared against \$21.10 instead of the next NBBO price of \$21.15. The result is an average saving per order of -\$20.00 per order (i.e., 1,000 shares were executed with an average price of \$21.12, two cents worse than the NBBO price prior to order entry of \$21.10).

10. Why does the average execution speed matter? How do I interpret that number? Average execution speed measures a firm's ability to receive a quick execution. This statistic represents the difference between the order route time and the time of order execution.

11. Where can I go for additional execution quality statistics? Rule 605 execution quality disclosures are public monthly electronic reports that include uniform statistical measures of execution quality. You can find our Rule 605 disclosure here [<http://www.citadelsecurities.com/rule-605-statement/>]