

# Measuring Real Execution Quality

Benefits to Retail Are Significantly Understated

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# Benefits of Current Market Structure



The current US equities market structure provides meaningful and measurable benefits to retail investors

## Significant Price and Size Improvement

- Wholesalers provided over \$3.6B in price improvement to retail investors in 2020, based on Rule 605's calculation method; however, this method greatly understates the value provided to retail investors
- Wholesalers fill marketable orders at prices typically better than the NBBO, regardless of the quantity of shares displayed at the NBBO. This improvement to both displayed price **and size** - or "Real Price Improvement" - is not captured by Rule 605 figures<sup>1</sup>
- **Virtu alone provided over \$3B in Real Price Improvement to retail investors in 2020<sup>1</sup>**

## Order Handling and Execution

- Wholesalers commit capital to execute marketable retail orders
- The price and size of non-marketable limit orders are reflected on exchanges<sup>2</sup>
- In total, approximately 40% of total retail flow handled by Virtu interacts with public and / or lit markets

## Robust Broker Competition

- The wholesale service model lowers entry barriers for new retail brokers and therefore bolsters competition
- Leveraging wholesaler partnerships allows retail brokers to offer more services at lower costs

## Competitive and Resilient Execution Ecosystem

- Wholesalers compete against other liquidity sources, including over 40 exchanges and ATSs
- Brokers concurrently route to many execution partners and exchanges, mitigating single-point-of-failure risk

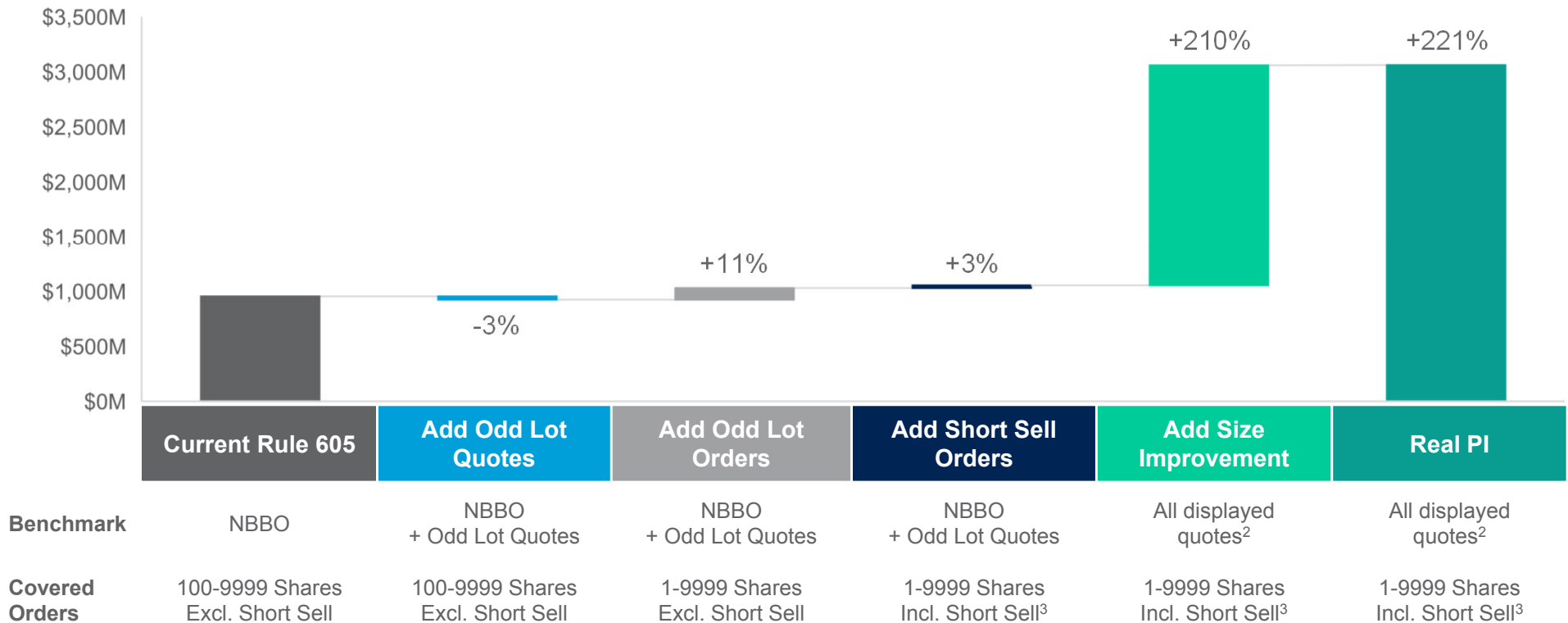
<sup>1</sup> Virtu Americas 2020, see appendix for methodology and example; <sup>2</sup> Beyond the requirements of the Limit Order Display Rule;

# Benefits to Retail Are Significantly Understated



A more fulsome measure of execution quality is necessary to accurately quantify the experience of retail investors

## Real PI Provided by Virtu Is Over 3x Greater Than What Is Measured by Rule 605<sup>1</sup>



**Real PI improves on Rule 605 by including odd lot and short sell orders and updating the benchmark price to be the average price available for the same quantity of shares considering all displayed quotes – NBBO, depth of book and odd lots**

<sup>1</sup> Virtu Americas 2020 activity; see appendix for methodology and example  
<sup>2</sup> All displayed quotes includes odd lots, NBBO, and depth of book from all lit exchanges  
<sup>3</sup> Includes Short Sell marked orders when not 201-restricted

# Rule 605 Recommended Reforms



We advocate for changes that enhance execution quality metrics and disclosures to retail investors and encourage vigorous competition

**In an attempt to measure fill quality on marketable orders, Rule 605 reports compare the execution price of those orders to the NBBO price, regardless of the order size relative to the quantity of shares displayed at the NBBO**

- This measurement dramatically understates actual net PI provided to retail investors when the marketable order size is larger than the number the shares displayed at the NBBO
- The current benchmark (NBBO), by definition, does not include unprotected, displayed odd lot orders

**We believe reform to Rule 605 could result in more accurate measurements that reflect the price improvement and execution quality benefits received by retail investors**

- Current Rule 605 price improvement reports have four major shortcomings:
  1. Unprotected odd lot quotes are not included in the benchmark reference price
  2. Marketable odd lot orders are omitted
  3. Marketable short sell orders are omitted
  4. Rule 605 assumes there is always sufficient quantity of shares to fill marketable orders at the NBBO

**Addressing these shortcomings in Rule 605 reports would help the market to better understand the actual benefits received by retail investors**

# Separating Fact From Fiction



## Myth

## Reality

### Retail flow is not accessible

- **Approximately 40% of total retail flow handled by Virtu interacts with displayed, hidden and midpoint liquidity on public exchanges and ATs or are displayed on lit exchanges**
- Most retail brokers are capable of routing directly to exchanges and many do – but retail brokers also route to wholesalers to obtain price and size improvement over what’s available elsewhere<sup>1</sup>

### Wholesalers have information advantage

- Marketable orders are promptly executed and printed to the tape with full transparency to the marketplace, while non-marketable limit orders are reflected on lit exchanges where they are visible publicly<sup>2</sup>
- Wholesalers receive retail orders without any advanced notice or information about the retail investor that placed the order

### Price improvement is not real

- Wholesalers effectively narrow the NBBO for retail investors – taken as a whole, all wholesalers provided over \$3.6B in price improvement in 2020, as measured by current Rule 605
- NBBO is only the ‘top of the book’ price and size – when Virtu’s performance is compared to all displayed quotes for the quantity of shares to fill the order, Virtu alone provided over \$3B in price improvement<sup>3</sup>

### Wholesaling is not competitive

- **Competition among wholesalers drove a 750% increase in net PI per share since 2013<sup>4</sup>**
- Virtu competes with at least 7 other wholesaler firms<sup>5</sup> as well as the entire ecosystem of over 40 exchanges and ATs to provide the best price improvement to retail investors; barriers to entry are minimal and there are new entrants on a regular basis

### Exchanges & ATs would provide better executions

- **Wholesalers provide execution in all market conditions;** exchanges do not have best execution obligations
- When Virtu seeks liquidity on exchanges and ATs it achieves price improving fills on only ~18% of routed shares. To remain competitive, Virtu provides Supplemental Price Improvement at significant expense to itself by improving the execution prices for shares filled on exchanges and ATs. This Supplemental PI is paid out of Virtu’s own pocket. Virtu also incurs meaningful trading fees to execute orders at exchanges and ATs, an expense we expect would fall to retail brokers if they routed orders directly to these market centers

<sup>1</sup> See brokers’ Rule 606 Reports; <sup>2</sup> beyond the requirements of the Limit Order Display Rule; <sup>3</sup> See appendix for methodology and example; <sup>4</sup> See slide 7;

<sup>5</sup> Citadel Securities, G1 Execution, Goldman Sachs, Jane Street, Two Sigma Securities, UBS Securities, Wolverine;

<sup>6</sup> Supplemental Price Improvement reflects enhancements

# Wholesalers Are Part of a Broad Ecosystem



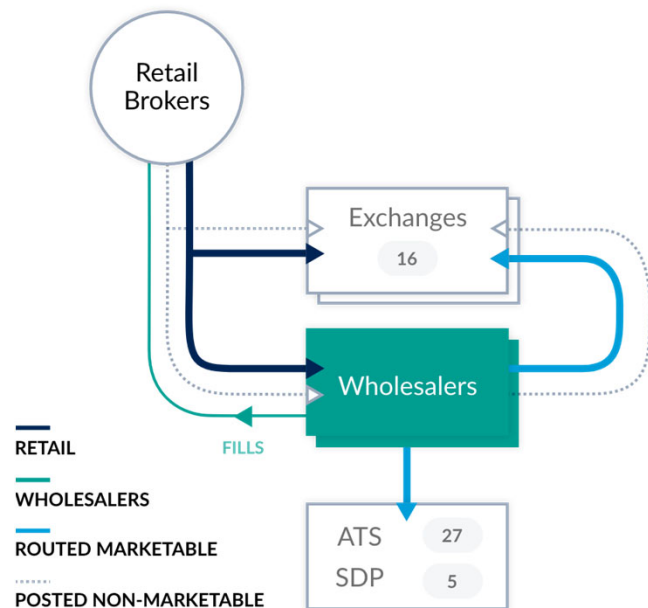
Brokers leverage wholesalers for execution and order handling

**Brokers evaluate wholesalers based on overall execution quality obtained, which incentivizes wholesalers to seek price improving liquidity for the broker, including accessing better prices on exchanges and ATs where available**

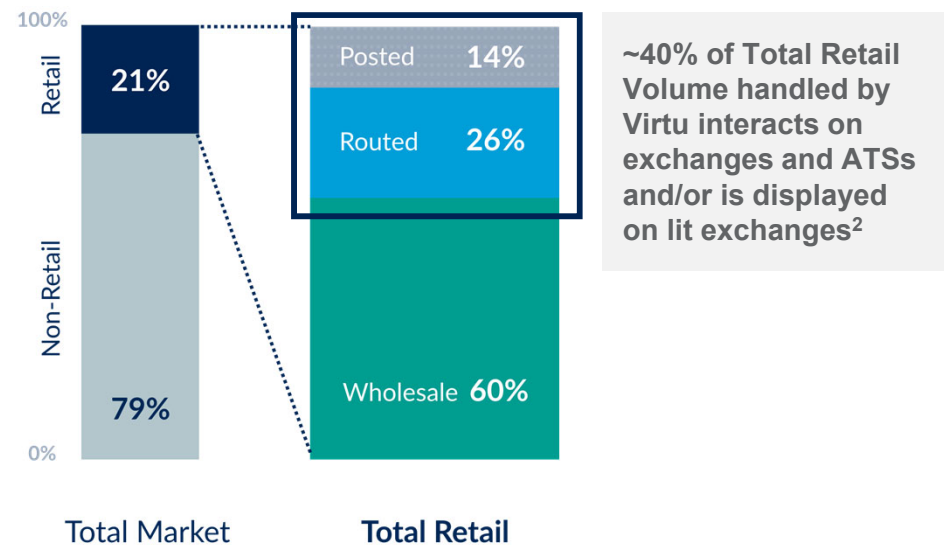
- Wholesalers typically incur and absorb trading fees on this flow when seeking liquidity; absent wholesaling arrangements, these substantial costs would ultimately be paid by retail investors

**Retail is Accessible: About 40% of retail orders handled by Virtu interact with displayed, hidden and midpoint liquidity on exchanges and ATs or are displayed on lit exchanges**

## Retail Brokers Leverage Wholesalers for Routing and Executing Orders



## Total Retail Volume Represents About 21% of Total Market Volume Traded in US Equities<sup>1</sup>



<sup>1</sup> Per Rule 605 Reports from wholesalers for 2020;

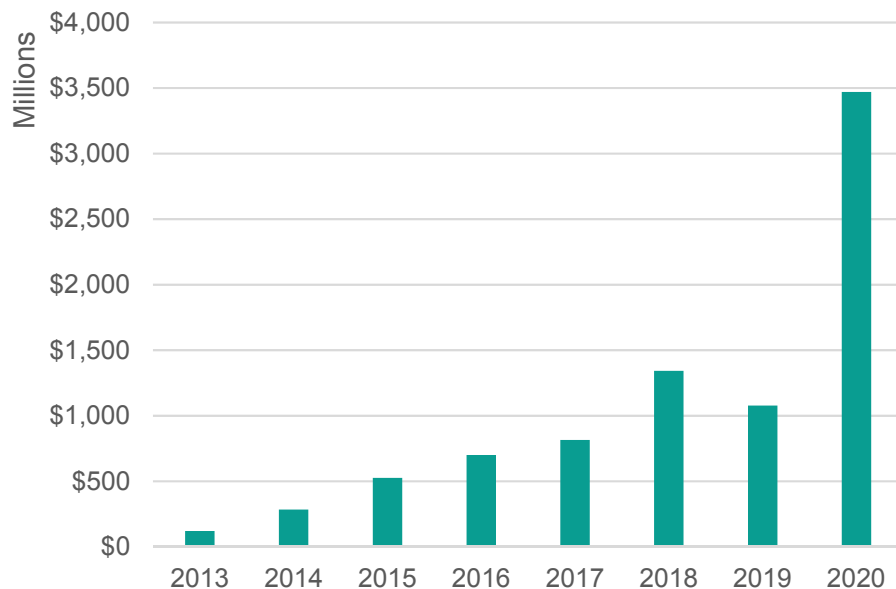
<sup>2</sup> Extrapolating from Virtu's activity, excludes marketable and non-marketable orders routed directly to exchanges by retail brokers

# Strong Competition Benefits Retail

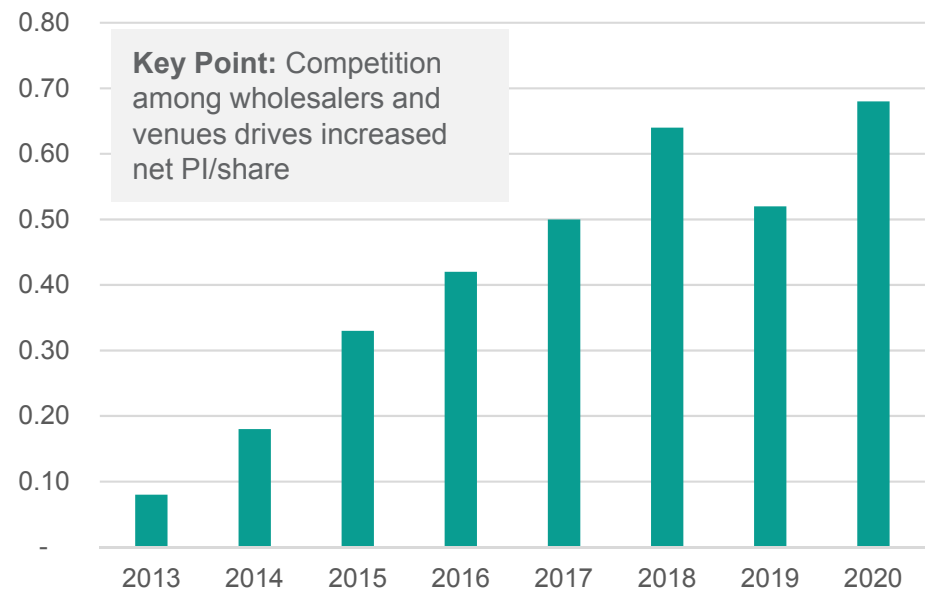


- Wholesalers compete against each other and over 40 other liquidity sources (exchanges, ATs) for the opportunity to provide execution and routing of orders for retail brokers
- Retail brokers measure liquidity sources based on the amount of price improvement provided
- This structure puts wholesalers in competition to provide the best execution for the retail broker on all orders handled, including incentivizing wholesalers to access better prices on exchanges and ATs (where available) at the wholesalers' own expense to remain competitive

**Total Net Price Improvement<sup>1</sup> Provided to Retail Investors by All Wholesalers**



**Average Net Price Improvement<sup>1</sup> Provided by All Wholesalers (*¢ per share*)**



**Though significant, these figures substantially understate benefits to retail investors<sup>2</sup>**

<sup>1</sup> Net price improvement based on Rule 605 reports; <sup>2</sup> See appendix for methodology and example

# Appendix



# Benefits to Retail Are Significantly Understated (con't)



Current Rule 605 method ignores odd lot quotes, odd lot orders, short sell orders and the size of covered orders relative to the amount of shares available at the NBBO

#	Method	Net Price Imp. (2020) <sup>1</sup>	Covered Order Sizes	Benchmark	Limitations / Notes
1	<b>Current Rule 605</b>	<b>\$953M</b>	100 – 9999  Excl. Short Sell orders	The price at the NBBO, assuming infinite size at the NBBO.	<ul style="list-style-type: none"> <li>Doesn't consider unprotected odd lots in the market data</li> <li>Omits marketable orders for 1-99 shares</li> <li>Doesn't consider the size of the incoming order</li> <li>Omits marketable orders marked as Short Sell</li> </ul>
2	<b>Add Odd Lot quotes to benchmark</b>	<b>\$926M</b>  -3% vs. <i>Current Rule 605</i>	100 – 9999  Excl. Short Sell orders	The volume weight average price (VWAP) for the number of shares required to fill the marketable order based on all displayed odd lots in the market data plus infinite size at the NBBO for the size not satisfied by odd lots.	<ul style="list-style-type: none"> <li>Omits marketable orders for 1-99 shares</li> <li>Doesn't consider the size of the incoming order</li> <li>Omits marketable orders marked as Short Sell</li> </ul>
3	<b>Add Odd Lot orders to universe of covered orders</b>	<b>\$1,031M</b>  +8% vs. <i>Current Rule 605</i>	1-9999  Excl. Short Sell orders	The volume weight average price (VWAP) for the number of shares required to fill the marketable order based on: <ul style="list-style-type: none"> <li>all displayed odd lots in the market data, plus</li> <li>infinite size at the NBBO for the size not satisfied by odd lots.</li> </ul>	<ul style="list-style-type: none"> <li>Doesn't consider the size of the incoming order</li> <li>Omits marketable orders marked as Short Sell</li> </ul>
4	<b>Add Short Sell marked orders to universe of covered orders</b>	<b>\$1,055M</b>  +11% vs. <i>Current Rule 605</i>	1-9999 <sup>3</sup>	The volume weight average price (VWAP) for the number of shares required to fill the marketable order based on: <ul style="list-style-type: none"> <li>all displayed odd lots in the market data, plus</li> <li>infinite size at the NBBO for the size not satisfied by odd lots.</li> </ul>	<ul style="list-style-type: none"> <li>Doesn't consider the size of the incoming order</li> </ul>
5	<b>“Real PI”</b>  <b>Considers the size of the covered order vs. all displayed quotes<sup>2</sup></b>	<b>\$3,062M</b>  +221% vs. <i>Current Rule 605</i>	1-9999 <sup>3</sup>	The volume weight average price (VWAP) for the size of the covered order based on all displayed quotes (NBBO, depth, and unprotected odd lots in the market data).  <b>Note:</b> The VWAP price is capped at 5% from the inside price to limit for instances where the incoming marketable order (a) would have exhausted all displayed liquidity in the market and/or (b) would have traded through enough price levels to trigger an Limit-Up/Limit-Down halt.	

<sup>1</sup> See slide 10 for example calculation

<sup>2</sup> All displayed quotes includes odd lots, NBBO, and depth of book from all lit exchanges

<sup>3</sup> Includes Short Sell marked orders when not 201-restricted

# Example: Why PI Calculation Matters



Ignoring size of orders understates the benefits retail receives

## Consider the following scenario

Wholesaler receives a market order to sell long 600 shares.  
 The aggregate size on the bid looks like the illustration below.  
 Wholesaler fills the sell order for 600 shares at \$99.9700.

Price (\$)	Aggregate Size of Quotes on the Bid (across all exchanges)	Benchmark Calculation		
		Rule 605	605 + OL Quotes	"Real PI"
\$99.99	6		6	6
\$99.97	9		9	9
\$99.95	125 <-- NBB	600	585	125
\$99.94	27			27
\$99.92	175			175
\$99.90	100			100
\$99.85	275			158
\$99.80	325			

Avg Benchmark Price:	\$ 99.9500	\$ 99.9507	\$ 99.9068
Fill Price	\$ 99.9700	\$ 99.9700	\$ 99.9700
PI per Share	\$ 0.0200	\$ 0.0193	\$ 0.0632
Total PI Received	\$ 12.00	\$ 11.58	\$ 37.90

## Price improvement calculations should reflect actual benefits received by investors

- #1 Current Rule 605**  
 Under the current Rule 605 methodology, this fill is price improved by \$0.0200 per share, or a total of \$12.00 on the trade.  
 i.e., fill price of \$99.97 vs. the benchmark \$99.9500 (NBB)  
**This ignores odd lots and the fact the incoming order is over 4 times greater than the size of the NBB**
- #2 Rule 605 + Odd Lot Quotes**  
 If displayed odd lot quotes are considered, this fill is price improved by \$0.0193 per share, or a total of \$11.58 on the trade.  
 i.e., fill price of \$99.97 vs. the benchmark of \$99.9507 (volume weighted average price of odd lots + unlimited size at NBB)  
**This ignores the fact the incoming order is over 4 times greater than the size of the NBB**
- #5 "Real PI"** (All displayed quotes including odd lots, NBBO, and depth of book from all lit exchanges)  
 If all displayed quotes are considered, this fill is price improved by \$0.0632 per share, or a total of \$37.90 on the trade.  
 i.e., fill price of \$99.97 vs. the benchmark of \$99.9068 (volume weighted average price of all displayed quotes)