U.S. Equity Market Structure: Order Routing Practices, Considerations, and Opportunities

charles SCHWAB

Own your tomorrow.

U.S. Equity Market Structure: Order Routing Practices, Considerations, and Opportunities

Q2 2022

Contents

Executive Summary

The trading volatility of the pandemic era intensified the dialogue around the rules governing U.S. equity market structure, including routing of order flow, and how market participants are compensated for the services they offer and the risks they take. At Schwab, we welcome the opportunity to engage in these important conversations, as we have remained staunch advocates for the retail investor for nearly 50 years – navigating the evolution of equity market structure with a "Through Clients' Eyes" approach.

Today's transparent, competitive U.S. equity markets are the deepest, most liquid, and most efficient in the world, which allows investors to enjoy narrow spreads, low transaction costs, and fast execution speeds. These market characteristics are championed by the SEC and its longstanding goal of enhancing and protecting the retail investor experience. While there remain opportunities to improve this market even further, we are concerned that some calls for reform are obscuring the benefits of the current ecosystem to retail investors, which include vastly expanded product offerings, world-class trading platforms that rival those used by investment professionals, no/low-cost trading, and superior execution quality. To the latter point, we estimate that over the next 10 years, the current market structure will provide over $120B+ of direct benefit exclusively to retail investors – we do not want to put this at risk.

As regulators and legislators consider potential actions to take with respect to U.S. equity market structure, Schwab will continue to advocate for retail investors. The current market structure delivers great outcomes for investors, and indeed has never been better - but there are still areas for improvement, and we are supportive of several specific changes, including increasing transparency and setting guardrails around certain market practices. Any contemplated actions, however, must be data-driven in assessing the benefits of the current equity market ecosystem to retail investors, and consider the potential risks or unintended consequences from changes to this market structure. Schwab remains committed to enhancing and protecting the retail investor experience, and to that end, we have summarized our perspectives on the current market structure and how potential changes may help or hinder our shared objective of protecting these investors and their investing experiences.

Context and Objective

The objective of this white paper is to provide a comprehensive and fact-based summary of equity market structure, order routing practices, client execution quality, and Schwab's perspectives on potential changes to the status quo. This white paper was developed by a cross-functional Schwab team including representation from Operations, Trading, Corporate Strategy, and Legal Services.

I. U.S. equity market structure facilitates competition, to the benefit of retail investors

A brief history of U.S. equity market structure

U.S. equity market structure has evolved significantly over the last 20 years from a concentrated, two-firm oligopoly—prior to the 2000s, the NYSE had ~90% share of trading in its own listed stocks and Nasdaq had 100%—to today's more-competitive marketplace. The implementation of Reg. NMS in 2007 was a watershed moment for the industry as it opened up the exchange-dominated market and encouraged the competition and innovation that characterizes today's structure. In response to these dynamics, exchanges have consolidated and diversified their business models, as key pillars of a resilient ecosystem. This evolution has significantly improved trading outcomes for investors, and particularly retail investors, e.g., via lower trading costs (bid/ask spreads, commissions) and faster execution.

Exhibit 1: Composition of U.S. equity average daily trading volume (millions of shares)

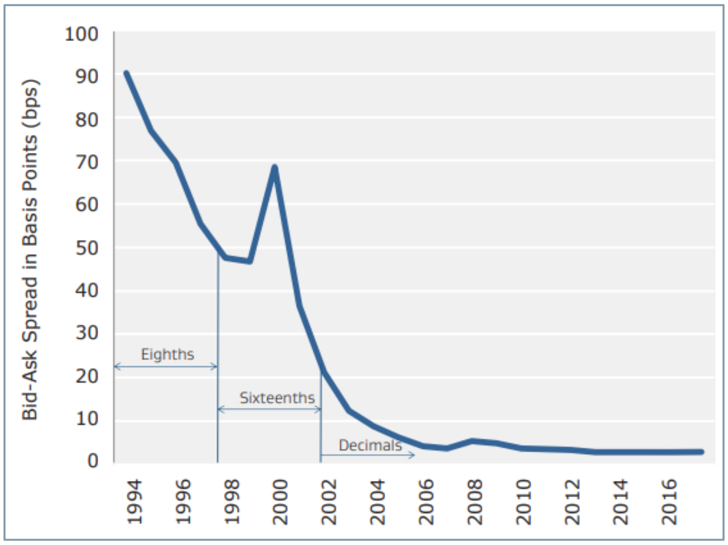
ICE (NYSE)	3,290	37%	2,402	22%	(3%)	(15 ppts.)
Nasdaq	2,652	30%	2,010	18%	(2%)	(12 ppts.)
CBOE	165	2%	1,724	16%	22%	+14 ppts.
Other exchanges	97	1%	256	2%	8%	+1 ppt.
Off exchange	2,647	30%	4,532	41%	5%	+12 ppts.
Total	**8,842**	**100%**	**10,924**	**100%**	**2%**	

Source: SIFMA

Competition and transparency are critical to well-functioning, resilient securities markets, and the US equity market has been a leader in this respect.

This market supports several types of market participants. It is commonly reported that retail trading volume makes up between 10% and 20% of all equity volume. Retail is a category that includes the millions of self-directed investors with accounts at brokerages like Schwab.[1] On the other hand, between 80% and 90% of US equities trading volume is comprised of institutional investors - large professional money managers such as mutual funds, hedge funds, insurance companies, and proprietary traders.

Exhibit 2: Average U.S. equity bid / ask spreads have fallen over time to low-single-digits



Source: Credit Suisse

At one time, many U.S. retail brokerages including Schwab[2] were engaged in the business of market-making to generate revenue from executing their clients' trades in-house, and in some cases, also trades from other smaller brokers. However, fallout from the dotcom bubble, coupled with further regulatory changes which spurred competition (e.g., Decimalization, Order Handling Rule[3], Reg. NMS[4]) caused many to exit these businesses, and instead outsource order execution to firms with the scale

[1] Larry Tabb's testimony at the June 10, 2021, meeting of the SEC Investor Advisory Committee indicted a figure ~20%. Alternatively, some have calculated retail order flow by only including their side of the trade, resulting in a much smaller number.
[2] Schwab acquired Mayer & Schweitzer in 1991 and SoundView Technology Group in 2003.
[3] Required traders to show investors the size and price of many limit orders received from customers, and to give investors access to prices quoted by dealers on private trading systems that are better than the dealer's publicly quoted prices.
[4] Reg. NMS addressed U.S. market fragmentation by increasing liquidity, transparency, and access across 4 key pillars: order protection (i.e., prevent transactions from occurring at a price inferior to the NBBO), inter-market access, sub-penny quotes, and market data.

and expertise to most effectively serve clients. This includes Schwab, which sold its capital markets unit to UBS in 2004[5].

In the more than 15 years since then, the capital markets have undergone further waves of change, driven both by cyclical trends (e.g., low volatility post-financial crisis) and secular trends (e.g., ever-increasing importance of scale and efficiency, speed, and technology). Today, the U.S. equity markets are among the deepest, most liquid, and most efficient in the world, which allows investors to enjoy narrow spreads, low transaction costs, and fast execution speeds. These market characteristics are championed by the SEC and its longstanding goal of enhancing and protecting the retail investor experience.

Segmentation of retail equity order flow

An important aspect of US equity market structure is the segmentation of retail order flow. Sending all orders to the exchanges, without this segmentation, would result in significantly worse execution for retail investors. Most orders entered by retail customers are small in share size and throughout a trading day these orders are generally asynchronously balanced between buys and sells – making them less risky to trade against when compared to the institutional order flow which comprises the vast majority of the U.S. equity market. In other words, institutional trades are more likely to "move the market" – which is why their execution quality is often measured based on slippage from the NBBO, as opposed to price improvement within it. For a liquidity provider, market movement like this creates a risk, and requires a wider bid-ask spread to compensate.

Institutional equity orders may superficially resemble retail orders, as dealers use sophisticated algorithms to 'slice up' large orders and attempt to reduce market impact. But the underlying risk characteristics are substantially different. By enabling retail orders to transact separate from institutional orders, i.e., where a retail order is known *as such* by a market-maker, with no other information, a competitive market results in a tighter spread (better pricing) for retail investors due to the lower risk profile of the trade. The fact that US equity market structure has enabled such a segmentation of retail order flow is the underlying driver of the value that retail investors have been able to increasingly participate in. Any consideration of changes to the status quo must contend with these tangible gains that have accrued to retail investors under the

[5] https://www.marketwatch.com/story/schwab-strikes-265-mln-deal-to-sell-soundview-to-ubs

current market structure, and which could be put at risk if aspects of this structure were to change.

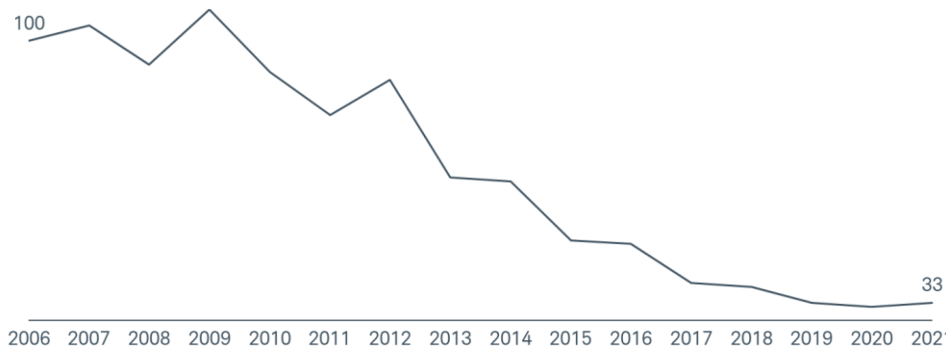
Schwab retail equity order routing

Throughout our 50 years in operation, Schwab has always taken a "Through Clients' Eyes" perspective, as our clients lie at the center of every decision that we make. We believe that a strategy of prioritizing client outcomes also rewards our stockholders over the long term, by attracting new clients and building trusted relationships that allow us to meet our clients' needs in more ways over time. Accordingly, in navigating the evolution of equity market structure and the competitive dynamics that have arisen throughout the years, Schwab has sought to: 1) Improve the overall investing experience for our clients, as exemplified by our decades-long track record of leading the market in reducing commissions and providing education and tools to level the playing field with institutional investors; and 2) Generate excellent execution outcomes for our clients through our order execution strategies, including price improvement (PI) and enhanced liquidity.

In the current market, Schwab typically routes client equity orders to non-exchange market centers[6], which is a form of strategic outsourcing that leverages the concept of comparative advantage. This model allows brokers (e.g., Schwab) to focus on providing low-cost access to the markets, omni-channel services, financial planning, and broader wealth management services - while non-exchange market centers can focus and invest heavily in sophisticated order routing / liquidity seeking capabilities, cutting-edge and resilient technology platforms, and highly specific risk management capabilities. As a result, Schwab clients benefit from these dynamics. We are proud of the success we have had with this approach, with market-leading execution quality, and continued improvement over time.

[6] Often used interchangeably in the modern market structure with other terms, e.g., wholesalers, internalizers, and market makers.

Exhibit 3: Schwab's E/Q ratio has dropped 67% in the last 15 years[7]



Note: The Effective/Quoted (E/Q) Ratio measures the average effective spread of order execution vs. the NBBO's spread at the time of order entry. Lower ratios represent greater cost savings to clients, as they indicate executions at spreads below the NBBO spread.

We leverage our non-exchange market center partners for three primary reasons today:

1. To generate superior execution quality for clients (price improvement, enhanced liquidity).
2. To take advantage of the non-exchange market centers' operational and risk management capabilities.
   a. To access markets and pools of liquidity to which we do not have direct connections (both on- and off-exchange).
   b. To navigate the complex order types and fee schedules of exchanges and ATSs[8].
3. To provide support for retail brokers and investors in ways that exchanges cannot, e.g., market makers provide additional flexibility and are not subject to limited liability as are the exchanges.

Schwab's retail equity order flow generally falls into one of two categories:

- **Non-marketable equity orders** (~25% of Schwab's equity trades)[9] are limit orders that are not immediately executable upon order receipt, i.e., a buy order

---

[7] For all NMS order sizes 100-1,999. Normalization of data required due to the length of study.
[8] Alternative Trading Systems, also referred to as "Dark Pools".
[9] Metrics are combined Schwab and TDA for 2020; only includes NMS equities.

with a limit price less than the national best offer at the time of order receipt, or a sell order with a limit price higher than the national best bid at the time of order receipt

- **Marketable equity orders** (~75% of Schwab's equity trades)[9] are market orders or limit orders that are immediately executable once received by the market

Non-marketable equity orders

Non-marketable order handling is governed by the current Limit Order Display Rule (SEC Rule 604), which applies to all market participants. Under this construct, orders are displayed on an exchange and participate in the protected NBBO[10]. A significant majority of trading volume occurs on exchanges which employ the maker-taker model[11]. Retail brokers increasingly send these orders to wholesalers who, while observing the Limit Order Display Rule by posting them on an exchange, provide enhanced fill rates, significantly increasing the likelihood that a non-marketable order is filled in its entirety compared to routing directly to an exchange. Since retail orders are posted to exchanges whether they are routed directly to an exchange or to a wholesaler, the price discovery process is maintained. Further, after the order is filled, it is promptly reported by the exchange (if filled on the exchange) or through a trade reporting facility (if a wholesaler provides enhanced fill) for public dissemination.

While we believe the market structure for non-marketable equity orders functions well today, we would advocate to include orders for less than 100 shares on some stocks into the NBBO calculation. Therefore, we are supportive of provisions in the SEC's recent Market Data Infrastructure rule (adopted in December 2020), as odd-lot orders[12] have increased over the years, driven by factors including stock prices generally moving higher, the lack of corporate forward stock splits, algorithmic trading, and the elimination of stock commissions.

---

[10] 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.
[11] The maker-taker model is where market participants pay a transaction fee when "taking" liquidity, i.e., sending a market or marketable limit order to the exchange, and receive a rebate when posting non-marketable limit orders, thus providing (or "making") liquidity. This model encourages the use of non-marketable limit orders, which promotes price competition and narrower quoted spreads.
[12] Round lots generally refer to quotes to buy and sell a security in increments divisible by 100, while odd lots refer to orders for fewer than 100 shares, which are not included in the NBBO.

These dynamics highlight the importance of including smaller lot sizes in the overall price discovery ecosystem, and we believe that the SEC's recent initiative to re-define round lots (for certain priced stocks) will enhance transparency in the marketplace for all participants.

Marketable equity orders

This category refers to client orders for an equity transaction that is to be executed immediately at the current market price. Most trades by retail customers, approximately 75% at Schwab, are in the form of market orders or marketable limit orders.

For handling, Schwab typically routes this order flow to wholesalers, who stand ready to buy or sell, by committing capital to immediately execute retail customer orders, or route to one of the many exchanges or ATSs. The characteristics of retail flow allow the wholesalers to provide significant price improvement, enhanced liquidity, and fast execution speed. Non-exchange market centers fiercely compete against each other for retail flow and can win more of it by providing higher levels of execution quality (e.g., price improvement, enhanced liquidity). This competition has resulted in excellent execution quality for our clients, which we monitor closely and work to continuously improve over time.

Schwab Q4 2021 Execution Quality Statistics (S&P 500 Stocks, Market Orders)

Order Size Range (Shares)	Average Order Size (Shares)	Shares Executed at Current Market Quote or Better (%)	Price Improvement (%)	Average Savings Per Order ($)	Average Execution Speed (Seconds)
1 – 99	16	99.3%	97.9%	$0.89	0.04
100 - 499	176	99.2%	97.4%	$7.30	0.04
500 - 1,999	862	98.7%	94.8%	$24.74	0.05
2,000 - 4,999	2,806	98.1%	92.3%	$37.04	0.04

II. Schwab perspectives on order routing practices

Variations of order routing practices have evolved over many decades in the equity markets, influenced by factors including regulation, technology, the marketplace, and competitive dynamics between different market participants. For example, prior to Decimalization in 2000[13], market-makers[14] were willing to pay retail brokers $0.01 or $0.02 a share, as equity spreads were quoted in 1/8th or 1/16th increments. The nature of such revenue arrangements is dependent on the broader market construct, including regulatory and technological advancements, and the market dynamics it creates between different types of dealers, brokers, and their clients.

We are supportive of regulatory and industry efforts to continue to explore ways to make our market structure work even better for retail investors. Well-intended policy suggestions in this context (i.e., seeking to act in the interest of retail investors) sometimes include an outright ban on order routing revenue, or relatedly, a requirement for all equity trades to be executed on exchanges. But when considering any policy change in a market like this, we believe it is important to consider the intended goal, the impact it would have for different market participants, and potential unintended consequences to the retail investor under any alternative market structure.

Why does Schwab route marketable order flow to non-exchange market centers?

Schwab's focus is on delivering superior client outcomes. This drives our order routing decisions, including our conclusion that off-exchange wholesalers offer the best option for handling Schwab's marketable order flow. **Schwab does not route order flow to the highest bidder (i.e., the market center that pays us the highest rate). Instead, we route orders to the market centers that provide our clients the best execution.**

[13] Moved the market to decimal pricing from fraction-based pricing, shifting the smallest price increment from 1/16th (or $0.0625) to $0.01. Among other outcomes, this change resulted in tighter spreads and increased competition among market makers.

[14] Market makers hold shares of securities in their inventory to create a market for buyers / sellers. Market-makers realize revenue from the spread between bid and ask but take on risk of loss from price moves.

Utilizing non-exchange market centers, in 2021, Schwab's clients received $2.7B in gross price improvement on equity orders[15]. These are real dollars in the pockets of retail investors – based on conventional price improvement calculations comparing executed prices to the NBBO. When comparing wholesalers to an alternative scenario of routing equity orders to exchanges, however, the results are even more clear. Using publicly available exchange data, we estimate that routing to wholesalers saved Schwab's clients at least $3.4B in 2021[16], vs. what their outcomes would have been from utilizing exchanges. However, even these statistics understate the value provided by non-exchange market centers as they do not capture the value generated from size improvement, which is the ability for market centers to execute orders exceeding displayed size at or better than the NBBO. A Virtu study indicates that they alone provided $2B in size improvement to retail investors in 2020.[17] Using their results as a guide, we estimate that Schwab clients received $4.4B+ in value from size improvement across all orders in 2021.[18]

These firms heavily invest in technologies and risk management to effectively navigate and extract the fragmented liquidity that spans across public and private trading venues (including 16 exchanges that are knitted together under Reg. NMS and 40+ ATSs/dark pools that operate under Reg. ATS), to provide the best execution for retail orders. Non-exchange market centers have invested in specific capabilities including better inventory risk management, increased capital commitment, smart order routing to source more hidden liquidity in the marketplace, and robust order management and risk management systems. All these factors have contributed to a better quantitative and qualitative retail trading experience than our clients could receive through any other means of handling marketable order flow.

This is maintained through the competitive environment fostered by the current market structure, where wholesalers must compete on the basis of execution quality to win

---

[15] Gross price improvement includes shares executed better than the NBBO and does not include shares executed worse than the NBBO. The amount for all retail as retrieved from Bloomberg's aggregation of relevant Rule 605 reports was $4.5B in 2021. Schwab and all retail's net price improvement (which includes shares executed worse than the NBBO) on Rule 605 covered orders was $2.2B and $3.7, respectively.

[16] SEC Rule 605 requires execution venues to publish a monthly report that shows standardized execution quality metrics grouped by order flow attributes like symbol, order type, and order size category. The granularity of this data allows us to perform a robust analysis comparing like order flow. The figure was calculated by finding the aggregate net price improvement difference between Schwab and the exchanges based on Schwab's order flow mix of symbol, order type, and size. This number is conservative as Rule 605 reports do not include all order sizes and types.

[17] https://www.virtu.com/uploads/documents/virtu-real-pi_061021.pdf

[18] Size improvement, according to Virtu, was approximately 2x the amount of net price improvement on Rule 605 covered orders. Schwab's net price improvement was $2.2B in 2021.

more flow. For this competition between wholesalers to stay dynamic, Schwab has invested in its own order routing capabilities to ensure that seamless routing changes from one wholesaler to another can be made based on execution performance. We also invest in both in-house and third-party analytics to rigorously and impartially evaluate these wholesalers so we can route order flow in a way that optimizes our clients' trading experience.

The inherently lower risk profile of retail order flow, compared to institutional flow, is the underlying source of value that drives this competition. While retail trades present less risk for liquidity providers, wholesalers must still assess this risk along with the cost of doing business in order to offer competitive prices. This competition has demonstrably resulted in impressive trading outcomes for our clients as summarized in Exhibit 4.

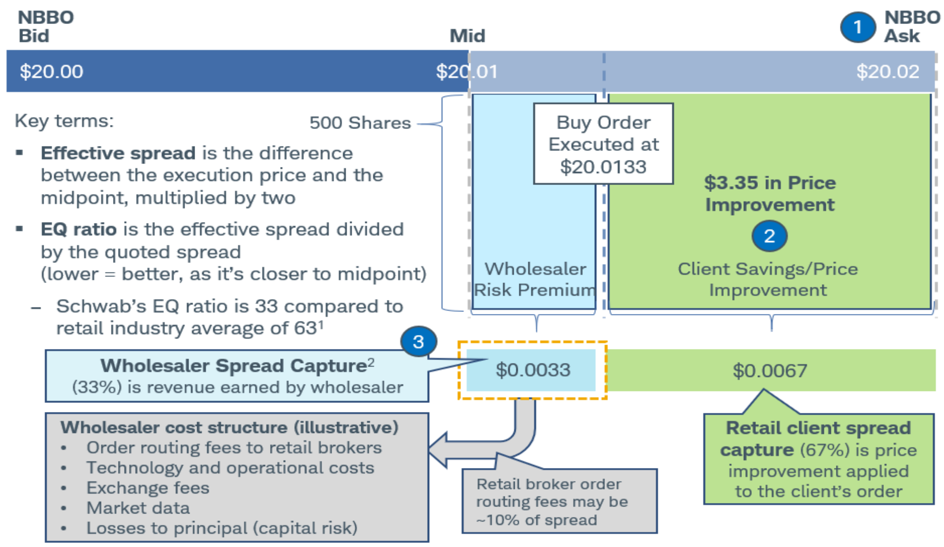
Exhibit 4: Key annual Schwab order execution quality metrics

Total Price Improvement[19]	Savings vs. Exchange[20]	Enhanced Liquidity[21]	% of Trades Price Improved[22]	% of Trades Receiving Midpoint[23]
$2.7B	$3.4B	5x quoted size	90%+	50%+

The below diagram helps to illustrate how this dynamic plays out on an individual trade.

[19] Conventional price improvement calculation using the NBBO, using all marketable NMS equity orders.
[20] Price improvement received over what exchanges would have provided. Analysis further detailed later.
[21] Enhanced liquidity is calculated by the order-weighted average of the ratio of shares executed at or better than the NBBO to size of the NBBO. Market orders included are those larger than the size of the NBBO. These criteria ensure we are including orders where the non-exchange market center had the potential to provide enhanced liquidity, then measuring the extent to which they did or did not do so, on average.
[22] The percent of market orders receiving shares at or better than the NBBO.
[23] The percent of market orders receiving shares at the midpoint of the NBBO.

Illustrative client buy order for 500 shares on a stock with a 2-cent spread[1]



1. Industry average figure per Larry Tabb's SEC testimony. 2. This illustration is oriented around the client and hence the midpoint price. In reality, liquidity providers typically realize revenue from both selling above the mid-point and buying below it. This revenue is offset by bearing risk and incurring losses from market movements, in addition to operational costs.

Retail segmentation enables wholesalers to compete on the basis of best execution (improved prices and liquidity) to win volume. Schwab does not route order flow to the highest bidder (i.e., the market center that pays us the highest rate). Instead, we route orders to the market centers that provide our clients the best price, after setting a fixed rate that all participating market centers have agreed to pay. Order routing revenue and price improvement are not 'zero-sum'. Conversely, we have seen progressive improvements to execution quality while payment rates remained relatively stable. The decline observed in E/Q ratio over time is empirical evidence that demonstrates how this competitive system has created substantial benefits for retail investors. In summary, marketable retail orders routed to wholesalers continue to provide the best experience for the retail orders compared to competing alternatives like routing directly to an exchange.

Looking forward, Schwab estimates the industry-wide benefits provided to retail order flow from off-exchange wholesalers to be in excess of $50B over the next 10 years[24] — and if we include size improvement, retail investors will save at least $120B

[24] $4.5B was the 2021 gross price improvement received by retail as retrieved from Bloomberg's aggregation of relevant Rule 605 reports. The Virtu study, and corroborating analysis by Schwab, suggests that Rule 605 reports omit at least 14% of price improvement by their exclusions of odd lots, oversize, and short sale orders. Therefore, the price improvement figure is adjusted up to $5B.

compared to exchange-only fills.[25]

***

Addressing conflicts of interest

As in any economic transaction with buyers and sellers, the dynamics of order routing revenue creates the potential for conflicts of interest. However, this can be thoughtfully addressed, for example, by ensuring that a broker's routing destinations are paying the same rate for the same order flow and by creating effective policies and procedures to manage this risk. Below we highlight some of the tactics that we employ that effectively manage this risk at Schwab:

- **Leveling of order routing revenue rates across execution partners**: Schwab does not route order flow to the highest bidder (i.e., the market center that pays us the highest rate). Instead, we route orders to the market centers that provide our clients the best execution – measured by price improvement amount, price improvement frequency, execution speed, fill rates, and enhanced liquidity. As we detail below, we would advocate for the industry to require brokers to receive the same level of payment for the same order flow across all market centers that they route to.
- **Order routing committee reviews**: Schwab's internal Best Execution Review (BER) committee, meets monthly and is tasked with comprehensively reviewing our execution quality through multiple dimensions of metrics (both industry standard, as well as proprietary). Reviews are also performed daily by the Trading Operations team.
- Transparent and extensive **disclosures** on Schwab's website and 606 reports.
- **Schwab does not share any personal client data** with other market participants.
- We do not engage in **"gamification"** or encourage our clients to trade unnecessarily for our own benefit; and we have led the industry, over decades, in reducing the conflict of interests created by trading commissions.

.

[25] Virtu estimated size improvement value to be ~2x the net price improvement value. Applying this increase to the $3.7B in 2021 retail net price improvement gives us $7.4B in size improvement, or $74B over ten years. This value added to the $50B in gross price improvement gives us $124B extrapolated over 10 years.

Potential alternatives to order routing revenue

While we believe that the current equity market structure, including order routing revenue, is well-suited to optimizing retail client outcomes, we are always open to disruptive ideas that may benefit our clients. Here we consider several of these alternatives along with key considerations.

Routing marketable flow directly to public exchanges

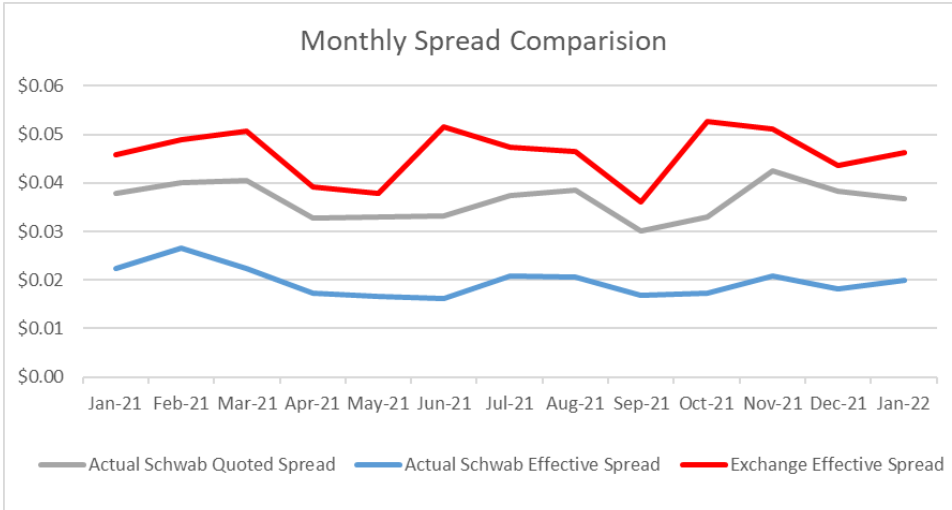
If marketable flow were routed directly to exchanges instead of our current routing strategy, retail investors would be disadvantaged as they would receive worse execution quality and would pay higher transaction costs. If regulation or legislation were to restrict the ability of off-exchange venues to compete for executions, the trading costs for our retail investor clients would rise, effectively creating a transfer of wealth from the retail investors that we serve to other market participants.

We present the following data points for consideration:

- In 2021, non-exchange market centers saved Schwab clients **over $3.4B compared to what they would have received on an exchange**
    - Using publicly available exchange execution quality numbers, we can see that the amount of price improvement and liquidity on exchanges is far less than what can be achieved with off-exchange wholesalers. In fact, if we overlay publicly available exchange execution quality numbers on Schwab's marketable flow, the results would be far worse as exchanges provide minimal price and size improvement over what is displayed in the NBBO. We estimate that by routing to non-exchange market centers as opposed to exchanges, Schwab clients received $3.4B more in price improvement.[26]
    - In times of extreme volatility and wider quoted spreads, our data show that off-exchange wholesalers perform even better than exchanges. The below exhibit shows that when volatility increased or trading shifted to wider-spread securities, the non-exchange market centers were able to smooth out the cost of crossing the spread by keeping effective spreads low, while the Schwab order flow-adjusted exchange effective spread increased more than the quoted spread.

---

[26] Exchange data is available via Rule 605 reports.



- Currently, Schwab receives substantially better fills through wholesalers than what can be achieved on exchanges. Some argue that displayed quotes would tighten if retail order flow were required to be traded on exchanges. Today, market makers face less adverse selection on marketable retail order flow than on professional order flow, which is why they are willing to provide retail orders with better prices, or a better "effective spread". Forcing all market participants to anonymously send their marketable order flow to exchanges would result in both retail and professional investors receiving the same experience, which means that compared to the current structure, professionals may receive better prices – but this would come directly at the expense of retail investors. The result would be a transfer of wealth from retail investors to institutional participants and professional traders. Historically, the SEC has advocated for an enhanced experience for retail investors in order to protect them, to improve access to financial markets, and to improve confidence in the economy. We are aligned with this historical stance in favor of the retail investor.
- In the past few years, exchanges have been proactive in attempting to attract more marketable retail order flow, and as a result various retail programs have emerged. The goal of these programs is to allow exchange market makers to interact with retail marketable flow by providing price improvement. Schwab interacts with these programs indirectly through off-exchange wholesalers who have built the infrastructure, capability, and scale to consume the exchange data and provide retail order flow a consistent trading experience. The current retail liquidity programs have provided some benefit to retail investors, and we encourage exchanges to continue to work on ways to improve the retail investor experience.
- In evaluating the results of the SEC's Tick Size Pilot (conducted in April 2016 – April 2019), spreads for all test group securities increased substantially compared with the control group, but **there was an outsized adverse effect on the test group**

which included a provision requiring on-exchange trading (i.e., Test Group 3)[27]. Test Groups 1 and 2's average quoted spread increased ~14% during the Pilot period vs. **the Pre-Pilot period whereas Test Group 3's quoted spread increased 24%.**

- In rescinding Former NYSE Rule 390, the SEC seemed to express a desire to promote the free forces of competition and allow investor interests to control the success or failure of individual market centers[28]. Any proposed changes need to be data-driven and crafted to protect or enhance the retail investor experience.

***

Lessons from other geographies

Another approach to considering the potential impact of banning order routing revenue in the U.S. equity market is to look to countries which have enacted similar policies – specifically, the U.K., Canada, and Australia.

We highlight at the outset that in contrast to these jurisdictions, the U.S. equity market structure has been far more successful at encouraging retail investing. The SEC has made it a priority to create a framework that democratizes investment services for non-professionals, and the greater retail market participation in the U.S. compared to these other countries is evidence of that. Order routing revenue has been a significant contributing factor for retail brokers to provide access, education, research, and trading tools that were previously only be available to professionals.

In contrast, the U.K. has a fundamentally different retail market structure, which is characterized by lower retail investor participation and higher equity trading fees. In these other geographies, there are no disclosures like the Rule 606 reports available for retail investors, there is no Order Protection Rule[29], and there is no consolidated SIP[30]. At Schwab, we continue to advocate for the strengthening of rules to reduce conflicts of interest.

---

[27] https://www.sec.gov/files/TICK%20PILOT%20ASSESSMENT%20FINAL%20Aug%202.pdf
[28] https://www.sec.gov/comments/4-657/4657-79.pdf
[29] Prevents a trading center from executing an order at an inferior price (i.e., a trade-through) to the market protected quotation (i.e., a displayed limit order at another trading center).
[30] A central, consolidated live stream of every exchange's best bids/offers and trade executions.

Most importantly, banning order routing revenue in these countries simply did not improve market quality nor the retail investor experience. We present the following points for consideration:

- After the U.K. effectively banned order routing revenue in May 2012, a CFA Institute study[31] showed that that the ability for retail-sized orders to receive midpoint execution – the most optimal outcome – declined from 8.6% of trades to 1.8% of trades (in comparison, 50% of Schwab's market orders receive midpoint execution). Furthermore, there were increases in both the percent of trades executed worse than the best bid/offer, and quoted spreads on small-cap stocks. This deterioration of market quality occurred even though market volatility had reduced from the pre-ban to post-ban period.
- Relatedly, a CFA Institute study[32] analyzing the effects of Canada's and Australia's trade-at rules (introduced in 2012 and 2013, respectively) found that:
    1. Spreads widened in both markets after implementation of the rule
    2. Minimum price improvement regulation is associated with an increase in spreads
    3. The rules do not appear to have succeeded in encouraging the posting of lit liquidity or increasing overall liquidity

While some market participants believe that the U.K.'s lack of price improvement is evidence of an efficient market because everyone is treated equally, we see it as a market that prevents the efficient allocation of resources. As discussed previously, retail order flow is inherently less risky and therefore retail investors should be allowed to participate in the natural economic benefit of better prices, as compared to what non-retail order flow receives. The current U.S. market structure allows for this, which enables Schwab to produce excellent order execution outcomes for our clients. Forcing a one-size-fits-all model where retail order flow must be sent to exchanges with professional order flow would necessarily result in worse prices for retail investors since they can no longer be differentiated according to their fair economic value.

***

[31] https://www.cfainstitute.org/-/media/documents/article/position-paper/payment-for-order-flow-united-kingdom.ashx
[32] https://www.cfainstitute.org/-/media/documents/issue-brief/policy-brief-trade-at-rules.ashx

Additional alternatives

In sum, if order routing revenue were banned, we expect retail investors would be worse off. If such a ban on order routing revenue were to be introduced, retail brokers would be challenged immediately to consider several alternatives, each of which could result in significant risks or challenges. These alternatives include the following:

- Route orders to exchanges: This would result in dramatically worse outcomes for retail clients, as described previously.
- Create an affiliated ATS: Retail brokers could look to generate revenue by charging third parties to access their retail order flow via their ATS.
- Internalize order flow: Retail brokers may look to start their own trading desks to internalize order flow. Under the current wholesaler model, retail brokers can seamlessly move order flow from one wholesaler to another based on order execution quality, making best execution quality more competitive and reducing risk. Internalization is also a capital-intensive business, handing significant advantages to large incumbents.
- Reintroduce explicit commissions / fees: The increase in retail investor participation ever since Schwab led the industry toward commission-free online trading has allowed millions more individuals to take control of their financial futures and instilled greater confidence in the financial markets. It would be a mistake to move to a market structure that could require brokers to reintroduce explicit trading fees that could reduce retail investor participation in the markets.

III. We advocate for an enhanced experience for Main Street investors

While we believe that the existing market structure serves our clients well, we continue to be supportive of regulatory and industry efforts to explore ways to make equity market structure work even better for retail investors. In that spirit, we would advocate for the following changes within the current market structure.

Enhanced disclosures

After several studies and investigations on the practice of order routing revenue dating back to the 1990s, the SEC has continually supported a disclosures-based regime to protect investors and regulate the practice[33]. In the spirit of disclosure and transparency to clients, we would be supportive of building upon the disclosure concepts that were put forth by the Financial Information Forum (FIF) in 2018. However, we caveat that any new disclosure requirements must be mindful of the different order flow characteristics between the various brokers and their client bases. Specifically, some of the new disclosures that we would advocate for include:

- **Client trade-by-trade disclosures** on price improvement and order routing revenue
  - Today, Schwab's retail clients can already see the PI they receive on each individual trade
  - Schwab will proactively build on this to give clients modern disclosures with greater transparency: for each executed trade, we intend to show clients the PI and estimated order routing revenue, side by side, on our digital platforms (i.e., web and mobile)
  - We would advocate for all brokers to provide similar levels of disclosure to enable comparisons for clients to make their own decisions based on the "all-in" trading costs at their broker (i.e., including commissions and other fees)
- **Rule 605 enhancements**: we are supportive of the proposals put forth by the FIF in 2018. Specifically, the following:
  - Include customer orders of less than 100 shares: Odd-lots represent close to 50% of self-directed orders and are currently out of scope from public data
  - For marketable orders, add a new Marketable Benchmark metric that informs on the size of the order relative to the protected NBBO
  - For non-marketable limit orders, add a new metric that informs on the number of shares executed (regular way) in the market while the order was in force and at prices that could have filled the order.

***

[33] The NASD investigated the practice in 1990, decided it was not illegal and recommended disclosures. In 2000, the SEC began to investigate payment for order flow, and considered banning it, but ultimately also decided that disclosure was sufficient to protect investors. Rules 605 and 606 in Reg. NMS (implemented in 2007) required brokers to disclose both execution quality and payment for order flow information, and subsequentially amended Rule 606 in 2018 to require additional disclosures.

Caps on order routing revenue rates and mandated leveling

As a retail broker operating under the fundamental principle of putting clients first, Schwab would be supportive of regulations that aim to set a **cap on order routing revenue rates**. This would fulfill the SEC's objective of protecting retail investors by ensuring PFOF rates do not become excessive, potentially to the detriment of execution quality. We note that there is already a precedent for this type of a cap, as Rule 610 of Reg. NMS limits the fees that any trading center can charge for accessing its protected quotations to no more than $0.003 per share. Importantly, however, as opposed to a flat dollar cap on order routing revenue rates, we would advocate for a mandated permissible ratio of order routing as a 'percent of spread' to account for differences in client types and order flow composition between different brokers.

In December 2020, the SEC charged a retail broker over its disclosure, procedural, and order routing practices and found that the firm had negotiated agreements with its liquidity providers to accept what amounted to a ~80/20 split between order routing revenue and price improvement, a departure from the more typical ~20/80 split for other retail brokers[34]. Recently disclosed execution quality and payment-for-order-flow information suggest that this firm has since improved their order routing and execution quality practices to levels that are more in line with industry norms, and for this we applaud them. However, as Schwab's goal is to protect all retail investors, we want to ensure that the conditions that allowed for this excess are mitigated.

We would also advocate for brokers to have **mandated leveling of order routing revenue rates** across liquidity provider partners they are connected to in order to manage potential conflicts of interest. This practice is already core to Schwab's current order routing strategy as it forces us to route client orders to the market centers that provide us the best execution quality (as opposed to the highest order routing revenue rates). We believe that mandating this requirement for all brokers would further mitigate potential conflicts of interest involved with the practice of order routing.

The U.S. investor base is becoming more diverse as markets attract new investment, innovation, global institutional participation, and retail investors. Schwab's "Through Clients' Eyes" approach compels us to advocate on behalf of not only our 30M+ clients but for the millions of retail investors everywhere who have decided to take control of planning their financial futures. These investors have come to appreciate the benefits and protections afforded by the intentional design of risk-based order flow segmentation.

---

[34] https://www.sec.gov/litigation/admin/2020/33-10906.pdf

We applaud the many industry participants, regulators, and exchanges that are also committed to ensuring fair and transparent markets through a modern, thoughtful, and data-driven approach. We look forward to engaging in thoughtful dialogue that can enhance the retail experience by increasing quote transparency, improving disclosures, and mitigating the risk of payment-for-order flow conflicts, while protecting from any potential unintended consequences that could erode confidence in our markets.