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Market Lens

Why do electronic traders cancel orders? What ever-increasing speeds for issuing and canceling orders tell us about today's market structure.

In the past, market participants manually determined the prices at which they wanted to buy or sell, and executed transactions face-to-face or over the phone. Today, sophisticated computers and algorithms handle these tasks with far greater accuracy, efficiency and speed. While this transformation has brought many benefits to market participants, some have expressed concern about the speed and automation of electronic trading, including rapidly changing price quotations and order cancellations. Upon deeper examination, however, these features have become an integral part of our market structure that reduce volatility, tighten spreads and lower transaction costs.

This paper examines how order cancellation fits into modern markets and how various factors have contributed to the rise of – and benefits from – this activity.

THE ROLE OF AUTOMATED TRADERS

The basic automated trading model has been consistent throughout the evolution of modern markets. Automated traders, including market makers, set the prices at which they are willing to buy and sell any given security based on available pricing information and predictive analysis. The more confidence that automated traders have in the accuracy of this information and analysis, the tighter the spread at which they can quote prices in competition with others. To ensure that securities trade at fair and competitive prices, automated traders continually update their prices in response to market movements and changes in information.

While this process has remained the same, information now changes faster than ever before and competition among automated traders to offer better pricing has become more vigorous. In the face of these developments, order cancellations allow automated traders to dynamically adjust their prices to rapid changes in supply and demand, which results in tighter spreads and better execution for all market participants.

THE ROLE OF TECHNOLOGY

Several features of modern trading and markets cause high levels of order cancellations as a normal and beneficial course of business. A common characteristic across today's markets is the use of computers to calculate desired prices — as well as route, execute and communicate the status of orders — with far greater speed, scale, transparency and efficiency than was possible in manual markets. Investors and traders now employ sophisticated quantitative tools that allow them to consider a variety of inputs simultaneously and in real-time when determining the price at which to buy or sell a security. Once they determine the right prices, they can route orders using computer algorithms and fast communications technology to exchange matching engines that receive, fill and confirm execution of orders in fractions of a second.

This evolution of the market has resulted in far more accurate price discovery, lower bid-ask spreads, and lower transaction costs, which have greatly benefited all market participants. In 2010, for example, Japan Exchange Group (JPX) introduced a new trade matching platform, called Arrowhead, which dramatically reduced messaging and execution latency. A 2014 JPX working paper[1] on the introduction of Arrowhead cited an academic study which asserted that "the launch of Arrowhead boosted liquidity provision in volatile stocks, contributing to reduced transaction costs."

THE ROLE OF RISK MANAGEMENT

To operate successfully in a modern system that delivers these substantial benefits, market participants have to fundamentally alter their approach to risk management. In other words, a faster system requires greater cancellations. The JPX paper also observed, for example, that while Arrowhead increased liquidity and smoothed price volatility on JPX, its greater operating speed also necessitated higher order cancellation rates.

Consider an investor or trader whose execution algorithm decides to submit a limit order to an exchange. Generally, these orders commit the user to buy or sell a set amount of a particular stock at a specified price. As such, limit orders and quotes are like automatically executable options posted for all other players in the market to exercise through the exchange's order book. The "premium" a trader receives for providing this option to the market primarily comes from the bid-ask spread. This "compensation" is required since traders who place limit orders — the foundation of public price discovery — are exposed to the risk that their quotations will be executed at an inopportune time, leading to potential losses. The greater the risk of an inopportune execution, the more compensation is required, which leads to wider bid-ask spreads. Conversely, anything the trader can do to lower the risk of an inopportune execution will lower the compensation required, which leads to narrower bid-ask spreads. That is true whether the firm placing the limit order is an official market maker, a proprietary trader providing two-sided liquidity without an official mandate from an exchange, or an agency broker representing a customer's interest.

Consequently, a wide array of market participants seek to lower their risk of inopportune executions by constantly updating their orders to reflect changing market conditions. In automated markets, this means frequently cancelling and replacing firm orders resting on electronic order books. In fact, some firms may routinely cancel the vast majority of the orders they enter as part of this computerized risk management process. A firm posting two-sided liquidity in an individual security, for instance, might need to raise both its bid and offer after an outstanding sell order is executed in order to adjust for supply and demand changes in that security. In such a case, it would have two firm orders on the book – one of which it would execute and another that it would cancel, resulting in a 50% cancellation rate.[2] With modern-day exchange order books able to process messages and execute transactions in thousandths of a second, and execution priority for resting orders determined according to price-time priority[3], quote updates need to keep pace, leading to high quote cancellation rates.

Order cancellations, however, have the potential to be abused. Instances of parties entering and canceling orders to manipulate prices are rare, but are damaging to markets and worthy of enforcement.[4] Such one-off behavior should not be conflated with legitimate automated trading activity. Typical automated traders issue bona fide orders with the intention to execute at the time they are placed, while spoofers, for example, place orders with the intention to cancel at the time they are placed in order to manipulate price. The former benefits the market, the latter harms it.

THE ROLE OF INNOVATION

Financial innovation has further accelerated the trend towards speed and automation. In a 2013 study, the US Securities and Exchange Commission (SEC) found that the ratio of shares traded to total shares displayed on the order books of US exchanges was extremely low, with three to four times as many shares quoted as executed. Additionally, the study showed that trade-to-order volume ratios for ETFs and other exchange-traded investment products were more than 10 times smaller than they were in corporate stocks, illustrating how the use of multiple inputs to automatically and continuously calculate accurate prices necessitates even-more-frequent quote

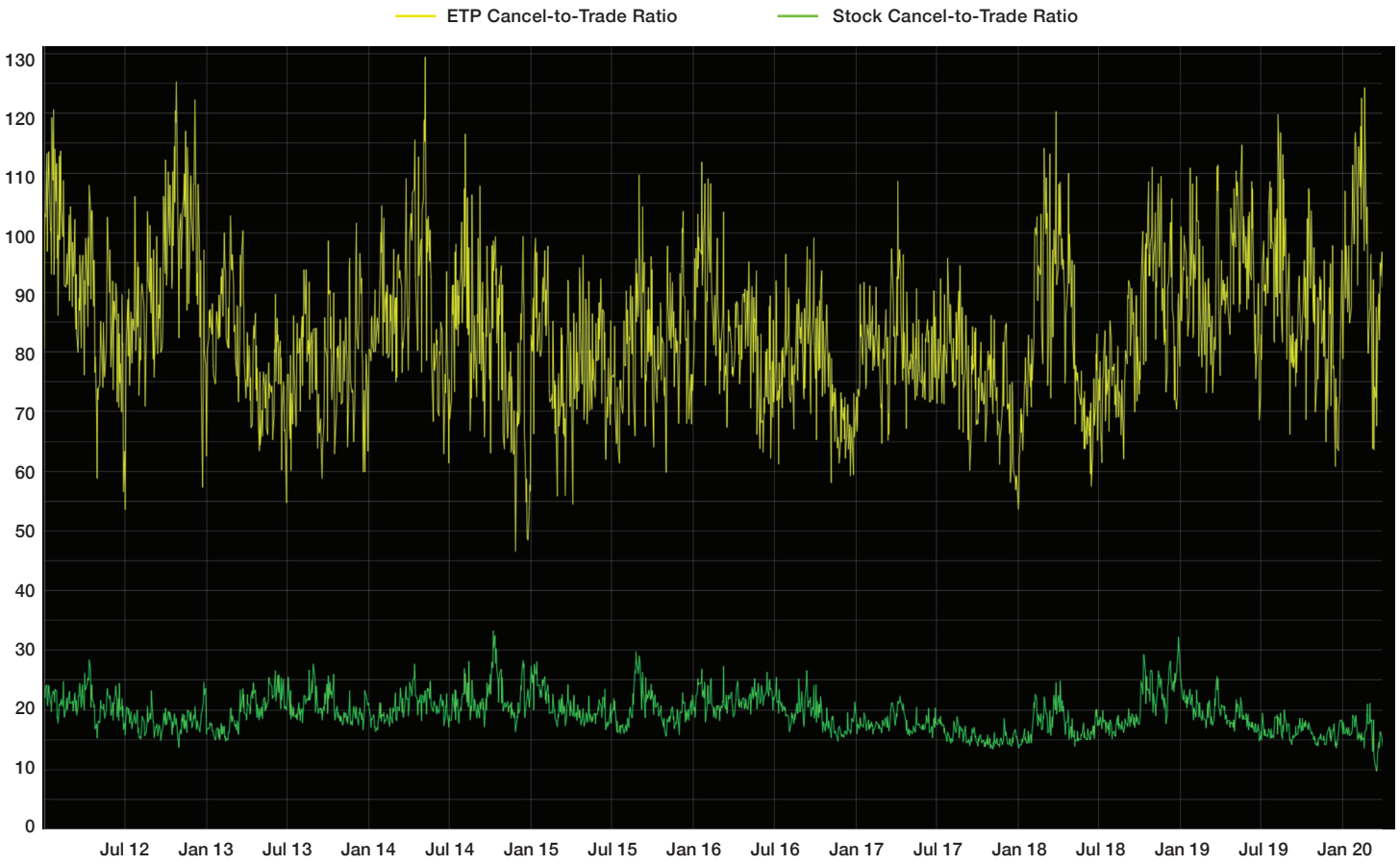
[1] Hosaka, Go: "Analysis of High-Frequency Trading at Tokyo Stock Exchange." JPX Working Paper, March, 2014.

[2] Levine, Matt: "Why Do High-Frequency Traders Cancel So Many Orders?" *Bloomberg View,* October 8, 2015.

[3] Price-time priority means that limit orders at the best prices — the highest bids and the lowest offers — are filled first; In the event of a tie on price, order-entry time determines priority — the first order to arrive gets executed first, and so on for later-arriving orders.

[4] Recent examples of spoofing include the following: "Japan's Financial Watchdog Orders Citigroup Unit to Enhance Surveillance After Manipulation by Trader." *Japan Times*, June 7, 2019; Nikolova, Maria: "Two Futures Traders Get Prison Sentences in Singapore Following Fraud Conviction." *FinanceFeeds*, October 7, 2019; Wei, Shuguang: "A fraudulent pending order was caught! The United States issued the largest ticket in history, and a mysterious 'Chinese King' unexpectedly appears." *STCN*, November 10, 2019.

Fig. 3 — Cancel-to-Trade Ratios for US Equities



Source: US Securities and Exchange Commission

updates.[5] The SEC continuously updates these data. A time series from January 2012 to the present (*Figure 1*), examining cancel-to-trade ratios, shows remarkably consistent levels for both corporate stocks (about 20 cancellations per trade) and ETPs (about 80-100 cancellations per trade).

The increasingly interconnected nature of financial markets can add yet another layer of risk and complexity for today's automated traders. To determine the accurate price to buy or sell a blue-chip stock two decades ago, a bank would have needed to consult the prices of that stock, as well as perhaps one or two related issues and any options or futures on the major indices to which it belonged. More likely, it would have hedged whatever exposure it acquired as part of the stock transaction with those derivative instruments. Today, the markets for those derivatives are also much faster and more automated, with smaller trade sizes, pricing increments and microsecond quote updates. More data, more connectedness, faster delivery – all of these are positive developments, and they lead to markets having more confidence about the prices they are setting, but they also lead to more activity around getting that price right.

Moreover, the market for exchange-traded funds (ETFs) has grown over the past two decades to become a $4 trillion industry.[6] Now, a market participant engaging in that same blue-chip trade would need to update any resting order in an electronic book with every tick of hundreds of other stocks, plus every related derivative instrument, all of which trade at much greater frequencies.

CONCLUSION

Some may look at the isolated high-profile examples of market manipulation and conclude that all rapid order cancellations are problematic. However, as we outline in this paper, high quote cancellation rates have become not only normal, but also integral to the proper functioning of modern markets, resulting in greater efficiency, narrower bid-ask spreads, and more robust price discovery.

We hope that this paper provides additional clarity on how and why order cancellation fits into healthy market structure and how it ultimately benefits investors.

[5] "Trade-to-Order-Volume Ratios." US Securities and Exchange Commission Data Highlight, October 9, 2013.

[6] Gurdus, Lizzy: "ETF Assets Rise to Record $4 Trillion and Top Industry Expert Says It's Still 'Early Days.'" *CNBC*, November 9, 2019.